Final
Environmental Impact Statement

for the

Proposed Abengoa Biorefinery Project
near Hugoton, Stevens County, Kansas

Volume 2 - Appendices

U.S. Department of Energy
Golden Field Office
Office of Energy Efficiency and Renewable Energy

DOE/EIS-0407

August 2010

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COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

COOPERATING AGENCY: The U.S. Department of Agriculture-Rural Development is a cooperating agency in the preparation of the Abengoa Biorefinery Project EIS.

TITLE: *Final Environmental Impact Statement for the Abengoa Biorefinery Project near Hugoton, Stevens County, Kansas* (DOE/EIS-0407) (Abengoa Biorefinery Project EIS).

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The Final EIS and information about the document are available on the Internet at the Abengoa Biorefinery Project Web site at http://www.biorefineryprojecteis-abengoa.com and on the DOE NEPA Web site at http://www.nepa.energy.gov.

ABSTRACT: DOE's Proposed Action is to provide federal funding to Abengoa Bioenergy Biomass of Kansas, LLC (Abengoa Bioenergy) to support the design, construction, and startup of a commercial-scale integrated biorefinery to be located near the city of Hugoton, Stevens County, Kansas. If DOE decides to provide federal funding, it would negotiate an agreement with Abengoa Bioenergy to provide up to $71 million, subject to annual appropriations, of the total anticipated cost of approximately $685 million (2009 dollars). The biorefinery would use lignocellulosic biomass (corn stover, wheat straw) as feedstock to produce ethanol and biopower (electricity) sufficient to meet the needs of the biorefinery and produce excess electricity for sale to the regional power grid. DOE also evaluates an Action Alternative, under which the biorefinery would not produce excess electricity for sale to the regional grid, and a No-Action Alternative, under which the biorefinery would not be constructed. The Final Abengoa Biorefinery Project EIS evaluates the potential direct, indirect, and cumulative environmental impacts from the construction, operation, and decommissioning of the biorefinery. DOE encourages public participation in the NEPA process. In preparing this Final EIS, DOE considered comments on the Draft EIS received by letter, and oral and written comments given at a public hearing in Hugoton, Kansas, and revised the EIS as appropriate.

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ACRONYMS AND ABBREVIATIONS

To ensure a more reader-friendly document, the U.S. Department of Energy (DOE or Department) limited the use of acronyms and abbreviations in this Proposed Biorefinery Project EIS. In addition, acronyms and abbreviations are defined the first time they are used in each chapter. The acronyms and abbreviations used in the text of this document are listed below. Acronyms and abbreviations used in tables and figures are listed in footnotes to the tables and figures.

ABBK	Abengoa Bioenergy Biomass of Kansas (also called Abengoa Bioenergy)
AERMOD	American Meteorological Society/EPA Regulatory Model
°C	degrees Celsius
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
dBA	A-weighted decibels
DOE	U.S. Department of Energy (also called the Department)
EIS	environmental impact statement
EPAct 2005	Energy Policy Act of 2005
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FR	Federal Register
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
K.A.R.	Kansas Administrative Regulation
NRCS	Natural Resources Conservation Service
NEPA	National Environmental Policy Act, as amended
PM10	particulate matter with an aerodynamic diameter of 10 micrometers or less
PM2.5	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
USDA	United States Department of Agriculture
USGS	United States Geological Survey
U.S.C.	United States Code

TERMS AND DEFINITIONS

In this Abengoa Biorefinery Project EIS, DOE has italicized terms that appear in the Glossary (Chapter 11) the first time they appear in a chapter.

UNDERSTANDING SCIENTIFIC NOTATION

DOE has used scientific notation in this Proposed Biorefinery Project EIS to express numbers that are so large or so small that they can be difficult to read or write. Scientific notation is based on the use of positive and negative powers of 10. The number written in scientific notation is expressed as the product of a number between 1 and 10 and a positive or negative power of 10. Examples include the following:

Positive Powers of 10	Negative Powers of 10
$10^1 = 10 \times 1 = 10$	$10^{-1} = 1/10 = 0.1$
$10^2 = 10 \times 10 = 100$	$10^{-2} = 1/100 = 0.01$
and so on, therefore, $10^6 = 1{,}000{,}000$ (or 1 million)	and so on, therefore, $10^{-6} = 0.000001$ (or 1 in 1 million)

Probability is expressed as a number between 0 and 1 (0 to 100 percent likelihood of the occurrence of an event). The notation 3×10^{-6} can be read 0.000003, which means that there are 3 chances in 1 million that the associated result (for example, a fatal cancer) will occur in the period covered by the analysis.

Appendix A

Facilities and Processes

Abengoa Bioenergy Biomass of Kansas, LLC	Rev. 3
Biorefinery Facility	
Hugoton, Kansas	

Facility Design Assumptions and Engineering Specifications

Production Schedule	Qty	Units	Notes
Nominal Production Schedule	350	days/yr	
Hours per Day of Operation	24	hr/day	
Hours per Year of Operation	8,400	hr/yr	
Maximum Production Schedule - Permit	365	days/yr	
Hours per Day of Operation	24	hr/day	
Hours per Year of Operation	8,760	hr/yr	

Production Rate	Qty	Units	Notes
Nominal Biomass Anhydrous ETOH Production	16	MMgpy	Nominal production is based on 16 MMgpy anhydrous ethanol produced from cellulosic feedstocks on a 350 day annual production schedule. The targeted cellulosic feedstocks include: wheat straw, milo (sorghum) stubble, corn stover, switchgrass, and opportunity feedstocks that are locally available.
Enzymatic Hydrolysis Plant	45,714	gal/day	
	1,905	gal/hr	
TOTAL Nominal Biomass Denatured Ethanol Production	16.8	MMgpy	
Enzymatic Hydrolysis Plant	47,954	gal/day	
	1,999	gal/hr	
Maximum Biomass Anhydrous ETOH Production - Permit	18	MMgpy	For permitting purposes, the biomass ethanol production is based on a 10% increase in plant efficiency and a production schedule of 365 days per year results in a maximum annual anhydrous ethanol production of 18 MMgpy (rounded).
Enzymatic Hydrolysis Plant	49,320	gal/day	
	2,055	gal/hr	
TOTAL Maximum Denatured Ethanol Production - Permit	18.9	MMgpy	
Enzymatic Hydrolysis Plant	51,737	gal/day	
	2,156	gal/hr	
Anhydrous Ethanol Density	6.58	lb/gal	
Anhydrous Ethanol Weight	59,220	ton/yr	
Ethanol (Denatured) Density	6.56	lb/gal	
Ethanol (Denatured) Weight	62,033	ton/yr	
Ethanol Yield - Permit	2.65	gal/bu	
Ethanol HAPs			HAP emission rate based on engineering estimate.
Acetaldehyde	200	ppmw	
Methanol	200	ppmw	
Acrolein	20	ppmw	
Formaldehyde	100	ppmw	

Denaturant Usage	Qty	Units	Notes
Denaturant (Gasoline) % of Total	4.9%	by volume	
	4.8%	by weight	
Nominal Denaturant (Gasoline) Usage	0.8	MMgpy	
	2,240	gal/day	
	94	gal/hr	
Maximum Denaturant (Gasoline) Usage - Permit	0.9	MMgpy	
	2,417	gal/day	
	101	gal/hr	
Denaturant (Gasoline) Density	6.26	lb/gal	Typical density = 0.75 g/cm^3
Denaturant (Gasoline) Weight	2,817	ton/yr	

Off-Spec Product	Qty	Units	Notes
% Off-Spec Produced per Year	5%		
Max. Off-Spec Produced	0.9	MMgpy	

Facility Design Assumptions and Engineering Specifications

Biomass Receiving - Wood Resides	**Qty**	**Units**	**Notes**
Wood Residues Weight	0.256	wet T/m^3	Typical density for chipped hard wood.
	16	wet lb/ft^3	
Conversion Factor	2,204.6	lb/T	
Nominal to Maximum Usage Ratio Factor	3.20		
Wood Residue % Moisture	25%		
Nominal Wood Residues Onsite Delivery Rate	1,452	wet T/day	Wood receiving and short term intermediate wood yard storage based on maximum equipment design rate. One 20-car shuttle delivered in one day at 80 ton/car and 5.33 hr/day rail delivery, rounded up.
	1,600	wet ton/day	
	3,200,000	wet lb/day	
	300	wet ton/hr	
Maximum Wood Residues Onsite Delivery Rate - Permit	2,903	wet T/day	Wood receiving and short term intermediate wood yard storage based on maximum equipment design rate. Two 20-car shuttles delivered in one day at 80 ton/car and 10.667 hr/day rail delivery, round up.
	3,200	wet ton/day	
	6,400,000	wet lb/day	
	300	wet ton/hr	
	600,000	wet lb/hr	

Biomass Receiving - Crop Resides or Energy Crops	**Qty**	**Units**	**Notes**
Crop Residues or Energy Crops Weight	0.096	wet T/m^3	Typical density for Corn Stover from PS Design Basis.
	6	wet lb/ft^3	
Conversion Factor	2,204.6	lb/T	
Crop Residues or Energy Crops % Moisture	15%		
Nominal Crop Residues or Energy Crops Onsite Delivery Ra	1,601	wet T/day	Crop Residues or Energy Crops receiving and short term intermediate bale storage based on nominal daily feed rate usage (100% Crop Residues or Energy Crops), and a truck delivery rate of 15 hr/day, rounded up.
	1,765	wet ton/day	
	3,530,000	wet lb/day	
	120	wet ton/hr	
	235,333	wet lb/hr	
Maximum Crop Residues or Energy Crops Onsite Delivery F	3,465	wet T/day	Based on Based on Biomass Handling Design Basis Rev A 10/22/09. Total biomass handling design demand 3,818 wet ton/day, rounded up.
	3,820	wet ton/day	
	7,640,000	wet lb/day	
	160	wet ton/hr	
	318,333	wet lb/hr	

Facility Design Assumptions and Engineering Specifications

Nominal Biomass Feed Rates	Qty	Units	Notes
Nominal to Maximum Feed Rate Ratio Factor	1.10		
Nominal Raw Biomass to Enzymatic Hydrolysis Process	544	dry T/day	Based on Rev 0A PFD Strm 11025.
Raw Crop Residues or Energy Crops	190,511	dry T/yr	
	600	dry ton/day	
	210,000	dry ton/yr	
	420,000,000	dry lb/yr	
	1,200,000	dry lb/day	
	50,000	dry lb/hr	
Nominal Enzymatic Hydrolysis Process Residuals Generated	272	dry T/day	Based on FBD-7268-M-00J Rev H, rounded up; (Switchgrass, EH Residuals, Wood) Corn Stover substituted for Switchgrass. EH Process Residuals consist of a wet lignin-rich stillage cake. Wet lignin-rich stillage may be sent offsite for lignin recovery and returned to the facility as a lignin-lean solid fuel. No syrup is included in the stillage cake.
	95,255	dry T/yr	
	300	dry ton/day	
	105,000	dry ton/yr	
	210,000,000	dry lb/yr	
	600,000	dry lb/day	
	25,000	dry lb/hr	
Nominal Gasification Process	0	dry T/day	The gasification process has been removed from the proposed facility activities.
	0	dry T/yr	
	0	dry ton/day	
	0	dry ton/yr	
	0	dry lb/yr	
	0	dry lb/day	
	0	dry lb/hr	
Nominal Raw Wood Residues to Mixed Fuel-Fired Boilers	907	dry T/day	Wood Residues feed rate based on a nominal process usage rate of 1330 wet ton/day @ 25wt% moisture, rounded up. Based on Biomass Handling Design Basis Rev A 10/22/09 and FBD-7268-M-00J Rev H; (Switchgrass, EH Residuals, Wood) Corn Stover substituted for Switchgrass
Raw Wood Residues	317,518	dry T/yr	
	1,000	dry ton/day	
	350,000	dry ton/yr	
	700,000,000	dry lb/yr	
	2,000,000	dry lb/day	
	83,333	dry lb/hr	
Nominal Raw Crop Residues or Energy Crops to Mixed Fuel-Fired Boilers	1,089	dry T/day	Crop Residues or Energy Crops feed rate is based on the balance needed after EH Process Residuals and Raw Wood Residues are added to the mixed-fuel boilers to produce the required steam.
	381,022	dry T/yr	
Raw Crop Residues or Energy Crops	900	dry ton/day	
	420,000	dry ton/yr	
	840,000,000	dry lb/yr	
	2,400,000	dry lb/day	
	100,000	dry lb/hr	
TOTAL Nominal Fuel Feed Rate to Mixed Fuel-Fired Boiler	1,996	dry T/day	Based on Based on Biomass Handling Design Basis Rev A 10/22/09 and FBD-7268-M-00J Rev H; (Switchgrass, EH Residuals, Wood) Corn Stover substituted for Switchgrass. When wood is not available, Crop Residues or Energy Crops will be fed to offset the difference so that there is always a consistent feed rate into the boilers.
Raw Crop Residues or Energy Crops plus Raw Wood Residues plus EH Process Residuals	698,539	dry T/yr	
	2,200	dry ton/day	
	770,000	dry ton/yr	
	1,540,000,000	dry lb/yr	
	4,400,000	dry lb/day	
	183,333	dry lb/hr	

Facility Design Assumptions and Engineering Specifications

Maximum Biomass Feed Rates	Qty	Units	Notes
Maximum Raw Biomass to Enzymatic Hydrolysis Process - Permit	599	dry T/day	Nominal EH Process feed rate + 10% safety margin.
	218,543	dry T/yr	
Raw Crop Residues or Energy Crops	660	dry ton/day	
	240,900	dry ton/yr	
	481,800,000	dry lb/yr	
	1,320,000	dry lb/day	
	55,000	dry lb/hr	
Maximum Enzymatic Hydrolysis Residuals Generated - Perr	299	dry T/day	EH Process Residuals feed rate + 10% safety margin.
	109,272	dry T/yr	
	330	dry ton/day	
	120,450	dry ton/yr	
	240,900,000	dry lb/yr	
	660,000	dry lb/day	
	27,500	dry lb/hr	
Maximum Gasification Process Usage - Permit	0	dry T/day	The gasification process has been removed from the project design.
	0	dry T/yr	
	0	dry ton/day	
	0	dry ton/yr	
	0	dry lb/yr	
	0	dry lb/day	
	0	dry lb/hr	
Maximum Raw Wood Residues to Mixed Fuel-Fired Boilers - Permit	1,134	dry T/day	Wood Residues feed rate based on a nominal process usage rate of 1662 wet ton/day @ 25wt% moisture, rounded up. Based on Biomass Handling Design Basis Rev A 10/22/09 and FBD-7268-M-00J Rev H; (Switchgrass, EH Residuals, Wood) Corn Stover substituted for Switchgrass
	396,897	dry T/yr	
Raw Wood Residues	1,250	dry ton/day	
	437,500	dry ton/yr	
	875,000,000	dry lb/yr	
	2,500,000	dry lb/day	
	104,167	dry lb/hr	
Maximum Raw Crop Residues or Energy Crops to Mixed Fuel-Fired Boiler - Permit	2,236	dry T/day	Assumes no Wood Residues are fed into the boiler.
	816,225	dry T/yr	
Raw Crop Residues or Energy Crops	2,465	dry ton/day	
	899,725	dry ton/yr	
	1,799,450,000	dry lb/yr	
	4,930,000	dry lb/day	
	205,417	dry lb/hr	
Maximum Fuel Feed Rate to Mixed Fuel-Fired Boiler - Perm	2,536	dry T/day	Based on Based on Biomass Handling Design Basis Rev A 10/22/09 and FBD-7268-M-00K Rev G; (100% Corn Stover) (Switchgrass, EH Residuals, Wood) Corn Stover substituted for Switchgrass. When wood is not available, Crop Residues or Energy Crops will be fed to offset the difference so that there is always a consistent feed rate into the boilers.
Raw Crop Residues or Energy Crops plus Raw Wood Residues plus EH Process Residuals	925,497	dry T/yr	
	2,795	dry ton/day	
	1,020,175	dry ton/yr	
	2,040,350,000	dry lb/yr	
	5,590,000	dry lb/day	
	232,917	dry lb/hr	

Facility Design Assumptions and Engineering Specifications

Lignin-Rich/Lean Stillage and Syrup Production	Qty	Units	Notes
Maximum Lignin-Rich Stillage Production	299	dry T/day	Lignin makes up approximately 14.6%wt of the "wet" lignin-rich stillage cake and 43.4%wt of dry lignin-rich stillage cake. Lignin-lean stillage would return to the biorefinery wet, at approximately 65%wt moisture. Moisture of the lignin-rich and lignin-lean stillage was assumed equivalent; therefore the difference in weight is due to the removal of lignin. Assumes 100% of lignin is removed and no residuals from lignin processing.
	109,272	dry T/yr	
	330	dry ton/day	
	120,450	dry ton/yr	
	240,900,000	dry lb/yr	
	660,000	dry lb/day	
	27,500	dry lb/hr	
Maximum Lignin-Lean Stillage Production	130	dry T/day	
	47,424	dry T/yr	
	143	dry ton/day	
	52,275	dry ton/yr	
	104,550,600	dry lb/yr	
	286,440	dry lb/day	
	11,935	dry lb/hr	
Distiller's Biomass Thin Stillage Syrup Production	0	dry T/day	Distiller's biomass thin stillage is sent directly to wastewater treatment. The evaporators have been removed from the project design.
	0	dry T/yr	
	0	dry ton/day	
	0	dry ton/yr	
	0	dry lb/yr	
	0	dry lb/day	
	0	dry lb/hr	

Lignin-Rich Storage Data	Qty	Units	Notes
Lignin-Rich Stillage Density	74	lb/ft^3	Rev 0 PFD - 66%wt Water + 34%wt solids (@101 lb/ft^3)
Storage Capacity Desired	3.0	days	
	3,000,000	wet lb	
	40,541	ft^3	
Storage Width	40	ft	
Height of Wall	10	ft	
Distance from Back Wall to Spout Discharge	55	ft	
Angle of Repose	15	deg	
Angle (Radians)	0.2618		
Pile Height Above Wall	5.36	ft	= tangent of angle of repose x (0.5 x pile width)
Peak Pile Height	15.36	ft	
Total Length	80	ft	
Calculated Storage	39,435	ft^3	
	2,918,210	lb	

Biomass Yard Data - Wood Residues	Qty	Units	Notes
Wood Residues Storage Capacity	15	days	Maximum Raw Wood Residues storage based on nominal/average receiving over the 15 day period.
Total Processed Wood Residues Storage	21,773	wet T	
Number of Fuel Yards/Piles	1		Raw Wood Residues are received and immediately processed through the wood chip hog (grinder) before storage in the fuel yard pile.
Total Size Required	21,773	wet T/pile	
	24,000	wet ton/pile	
	3,000,000	ft^3/pile	
Wood Yard Pile Diameter	375	ft	Cone shaped pile assumed.
Wood Yard Pile Height (Maximum)	60	ft	

Biomass Yard Data - Crop Residues or Energy Crops	Qty	Units	Notes
Crop Residues or Energy Crops Laydown Capacity	7	days	Crop Residues or Energy Crop laydown capacity based on nominal/average delivery rate over 7 day period.
Total Laydown Capacity	11,208	wet T	
Wood Yard Pile Length and Width	750	ft	

Biomass Storage Data - Crop Residues or Energy Crops	Qty	Units	Notes
Processed Crop Residues or Energy Crops Storage Capacit	0.25	days	Crop Residues or Energy Crop storage capacity based on nominal/average process needs over 6 hour period.
Total Storage Capacity	375	wet T	
Number of Bins	3	Bins	
Total Size Required	125	wet T/Bin	
	138	wet ton/Bin	
	45,929	ft^3/Bin	
Bin Diameter	40	ft	
Bin Height	40	ft	

Facility Design Assumptions and Engineering Specifications

Ash Production - Pellets	Qty	Units	Notes
Percent Ash Dried	100%		
Ash Dried	23,292	lb/hr	
	559,000	lb/day	
	204,035,000	lb/yr	
	102,018	ton/yr	
Maximum Dryer Capacity	9.6	MMBtu/hr	
Ash Loadout Rate	11	ton/truck	Ash Loadout assumes truck delivery occurs in a 10-minute period; therefore, a maximum of six trucks can be loaded in one hour.
	66	ton/hr	
	132,000	lb/hr	

Boiler Ash Storage Data - Typical	Qty	Units	Notes
Boiler Ash Storage Capacity	5	days	
Total Boiler Ash Bin Storage	1,200	wet ton	
Boiler Ash Density	60	lb/ft^3	
Number of Bins	1	Bin	
Boiler Ash Storage Volume	46,583	ft	
Total Size Required	1,200	ton/Bin	
	40,000	ft^3/Bin	
Bin Diameter	40	ft	
Bin Height	55	ft	Elevated Storage Silo.

Boiler Ash Storage Data - Optional	Qty	Units	Notes
Boiler Ash Storage Capacity	15	days	Overflow storage of Boiler Ash Pellets required to ensure continued operations of the facility.
Total Boiler Ash Pit Storage	3,600	wet ton	
Number of Pits	1		
Total Size Required	3,600	ton/pit	
	120,000	ft^3/pit	
Boiler Ash Pit Length and Width	150	ft	Ash pit is a below grade storage facility.
Boiler Ash Pit Height (Below Grade)	10	ft	

Misc Chemical / Supply Usage	Qty	Units	Notes
Sulfuric Acid (94%) Usage	887	lb/hr	Rev 0A PFD Strm 1991 + overdesign for EH Plant. Based on 365 days per year.
	21,278	lb/day	
	7,766,616	lb/yr	
Delivery Capacity (By Rail Car)	190,000	lb	
Sodium Hydroxide (50%) Usage	286	lb/hr	Rev 0A PFD Strm 1916 + overdesign for EH Plant. Based on 365 days per year.
	6,864	lb/day	
	2,505,360	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Phosphoric Acid Usage	50	lb/hr	50 lb/hr used for wastewater treatment. Based on 365 days per year.
	1,200	lb/day	
	438,000	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Aqueous Ammonia (<20%) Usage at EH	3,300	lb/hr	Rev 0A PFD Strm 1940 (adjusted for 19wt%) + overdesign for EH Plant. EPI Boiler Proposal Case J + overdesign for Boilers. Based on 365 days per year.
Aqueous Ammonia (<20%) Usage at Boilers	1,391	lb/hr	
	112,581	lb/day	
	41,092,187	lb/yr	
Delivery Capacity (By Rail Car)	190,000	lb	
Magnesium Hydroxide (50%) Usage	152	lb/hr	WWT Rev 1 + 12% overdesign. Based on 365 days per year.
	3,650	lb/day	
	1,332,250	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Diamonium Phosphate Usage	7	lb/hr	WWT Rev 1 + 12% overdesign. Based on 365 days per year.
	156	lb/day	
	57,096	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Trona (Sodium Sesquicarbonate) Usage	2,024	lb/hr	FSC Boiler Vendor Estimate. Based on 365 days per year.
	48,576	lb/day	
	17,730,240	lb/yr	
Delivery Capacity (By Rail Car)	190,000	lb	

Facility Design Assumptions and Engineering Specifications

Misc Chemical / Supply Usage (Con't)	Qty	Units	Notes
Diesel Usage	1,508	lb/hr	Based on 365 days per year.
	36,198	lb/day	
	13,212,409	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Media Liquid Usage	1,222	lb/hr	Rev 0A PFD Strm 1910 + overdesign for EH Plant. Based on 365 days per year.
	29,330	lb/day	
	10,705,596	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Antifoam Usage	247	lb/hr	Rev 0A PFD Strm 1931 + overdesign for EH Plant. Based on 365 days per year.
	5,928	lb/day	
	2,163,720	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Cellulase Usage	1,997	lb/hr	Rev 0A PFD Strm 1980 + overdesign for EH Plant. Based on 365 days per year.
	47,916	lb/day	
	17,489,340	lb/yr	
Delivery Capacity (By Truck)	49,500	lb	
Fluidized Based Sand Usage	880	lb/hr	FSE Boiler Estimate + overdesign for Boiler. Based on 365 days per year.
	21,120	lb/day	
	321,200	lb/yr	
Delivery Capacity (By Truck)	22,000	lb	
Boiler Ash Waste	23,292	lb/hr	Assumes 10% Ash content from Agricultural and Wood Residues from Boilers. Based on 365 days per year.
Used Fluidized Bed Sand Accounted For In Ash	559,000	lb/day	
	204,035,000	lb/yr	
Delivery Capacity (By Truck)	22,000	lb	
Dirt/Fines Waste From Dust Collectors	12,733	lb/hr	Includes approximately 4% losses in grinders. Based on 365 days per year.
	305,600	lb/day	
	107,352,941	lb/yr	
Delivery Capacity (By Truck)	22,000	lb	
Hazardous & Municipal Wastes	22	lb/hr	
	526	lb/day	
	192,146	lb/yr	
Delivery Capacity (By Truck)	22,000	lb	
Total Annual Chemical / Supply Usage	426,394,101	lb/yr	
	213,197	ton/yr	

Facility Design Assumptions and Engineering Specifications

EH Ethanol Product Storage Tank	Qty	Units	Notes
Tank ID	T-02102		
Conversion Factor	7.48	gal/ft^3	
Storage Capacity	460,000	gal	
	61,497	ft^3	
Throughput	18.88	MMgpy	
	51,736.68	gal/day	
	2,155.70	gal/hr	
Storage Capacity	8.89	days	
	213.39	hours	
Turnovers	41.05	times/yr	
Tank Diameter	43	ft	
Area of Deck	1,452	ft^2	
Tank Height	43	ft	

EH Denaturant (Gasoline) Storage Tank	Qty	Units	Notes
Tank ID	T-02105		
Conversion Factor	7.48	gal/ft^3	
Storage Capacity	22,500	gal	
	3,008	ft^3	
Throughput	0.88	MMgpy	
	2,416.68	gal/day	
	100.70	gal/hr	
Storage Capacity	9.31	days	
	223.45	hours	
Turnovers	39.20	times/yr	
Tank Diameter	14	ft	
Area of Deck	154	ft^2	
Tank Height	20	ft	

EH Product Shift Storage Tank #1	Qty	Units	Notes
Tank ID	T-02107		
Conversion Factor	7.48	gal/ft^3	
Storage Capacity	45,200	gal	
	6,043	ft^3	
Throughput	9.00	MMgpy	
Storage Capacity	0.92	days	
	22	hours	
Turnovers	199	times/yr	
Tank Diameter	20	ft	
Area of Deck	314	ft^2	
Tank Height	20	ft	

EH Product Shift Storage Tank #2	Qty	Units	Notes
Tank ID	T-02108		
Conversion Factor	7.48	gal/ft^3	
Storage Capacity	45,200	gal	
	6,043	ft^3	
Throughput	9.00	MMgpy	
Storage Capacity	0.92	days	
	22	hours	
Turnovers	199	times/yr	
Tank Diameter	20	ft	
Area of Deck	314	ft^2	
Tank Height	20	ft	

Facility Design Assumptions and Engineering Specifications

EH Product Off-Spec Storage Tank	Qty	Units	Notes
Tank ID	T-02101		
Conversion Factor	7.48	gal/ft^3	
Storage Capacity	45,200	gal	In the event of off-spec product being stored in the tank, the off-spec product will be metered back into the distillation process.
	6,043	ft^3	
Throughput	0.90	MMgpy	
Storage Capacity	0.92	days	
	22	hours	
Turnovers	20	times/yr	
Tank Diameter	20	ft	
Area of Deck	314	ft^2	
Tank Height	20	ft	

Sulfuric Acid Storage Tank	Qty	Units	Notes
Tank ID	T-01911		
Conversion Factor	15.49	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	45,000	gal	
	6,016	ft^3	
Throughput	0.50	MMgpy	
Storage Capacity	32.76	days	
	786.21	hours	
Turnovers	11	times/yr	
Tank Diameter	20	ft	
Area of Deck	314	ft^2	
Tank Height	20	ft	

Sodium Hydroxide (Caustic) Tank	Qty	Units	Notes
Tank ID	T-01900		
Conversion Factor	12.51	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	15,000	gal	
	2,005	ft^3	
Throughput	0.20	MMgpy	
Storage Capacity	27.34	days	
	656.12	hours	
Turnovers	13	times/yr	
Tank Diameter	13	ft	
Area of Deck	133	ft^2	
Tank Height	16	ft	

Phosphoric Acid Tank	Qty	Units	Notes
Tank ID	T-01913		
Conversion Factor	12.56	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	7,050	gal	
	943	ft^3	
Throughput	0.03	MMgpy	
Storage Capacity	73.79	days	
	1,770.96	hours	
Turnovers	4	times/yr	
Tank Diameter	10	ft	
Area of Deck	79	ft^2	
Tank Height	13	ft	

Facility Design Assumptions and Engineering Specifications

EH Plant Aqua Ammonia Tank	Qty	Units	Notes
Tank ID	T-01910A		
Conversion Factor	7.60	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	120,000	gal	
	16,043	ft^3	
Throughput	3.80	MMgpy	
Storage Capacity	11.52	days	
	276.36	hours	
Turnovers	32	times/yr	
Tank Diameter	25	ft	
Area of Deck	491	ft^2	
Tank Height	33	ft	

Boilers Aqua Ammonia Tank	Qty	Units	Notes
Tank ID	T-1910B		
Conversion Factor	7.60	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	45,000	gal	
	6,016	ft^3	
Throughput	1.60	MMgpy	
Storage Capacity	10.25	days	
	655.70	hours	
Turnovers	36	times/yr	
Tank Diameter	20	ft	
Area of Deck	314	ft^2	
Tank Height	20	ft	

Media Liquid Tank	Qty	Units	Notes
Tank ID	T-01912		
Conversion Factor	8.20	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	90,000	gal	
	12,032	ft^3	
Throughput	1.31	MMgpy	
Storage Capacity	25.16	days	
	603.88	hours	
Turnovers	15	times/yr	
Tank Diameter	25	ft	
Area of Deck	491	ft^2	
Tank Height	25	ft	

Cellulase Tank #1	Qty	Units	Notes
Tank ID	T-01940		
Conversion Factor	8.62	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	22,500	gal	
	3,008	ft^3	
Throughput	1.01	MMgpy	
Storage Capacity	8.10	days	
	194.29	hours	
Turnovers	45	times/yr	
Tank Diameter	15	ft	
Area of Deck	177	ft^2	
Tank Height	18	ft	

Facility Design Assumptions and Engineering Specifications

Cellulase Tank #2	Qty	Units	Notes
Tank ID	T-01941		
Conversion Factor	8.62	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	22,500	gal	
	3,008	ft^3	
Throughput	1.01	MMgpy	
Storage Capacity	8.10	days	
	194.29	hours	
Turnovers	45	times/yr	
Tank Diameter	15	ft	
Area of Deck	177	ft^2	
Tank Height	18	ft	

Antifoam Tank	Qty	Units	Notes
Tank ID	T-01930		
Conversion Factor	8.34	lb/gal	
	7.48	gal/ft^3	
Storage Capacity	10,000	gal	
	1,337	ft^3	
Throughput	0.26	MMgpy	
Storage Capacity	14.07	days	
	337.65	hours	
Turnovers	26	times/yr	
Tank Diameter	12	ft	
Area of Deck	113	ft^2	
Tank Height	12	ft	

Receiving and Product Loadout by Truck	Qty	Units	Notes
Received by Truck			
Biomass - Wood Residues	0%		
Biomass - Crop Residues or Energy Crops	100%		
Denaturant (Gasoline)	100%		
Chemicals/Supplies	Various		
Shipped by Truck			
Lignin-Rich Stillage / Lignin-Lean Stillage	100%		
Ash Pellets	100%		
Dirt/Fines	100%		
Ethanol (Denatured)	100%		
Received by Rail			
Biomass - Wood Residues	100%		
Biomass - Crop Residues or Energy Crops	0%		
Denaturant (Gasoline)	0%		
Shipped by Rail			
Ethanol (Denatured)	0%		
Ash Pellets	0%		
Truck Fluid Capacity (Ethanol/Denaturant/Chemicals)	7,500	gal/truck	
	49,500	lb/truck	
Truck Dry Capacity (Corn/WDGS/DDGS)	49,500	lbs/truck	
Truck Dry Capacity (Biomass)	36,000	lb/truck	
Truck Dry Capacity (Wastes/Materials)	22,000	lb/truck	
Rail Car Capacity (Corn/Ethanol/Denaturant/Chemicals)	190,000	lb/car	
Empty Truck (Corn/WDGS/DDGS)	30,000	lbs/truck	

Shipping and Receiving Schedule	Qty	Units	Notes
Daily	12	hr/day	"Worst Case Scenario" for hourly and daily haul road emissions assumes shipping and receiving will occur 6:00 AM to 6:00 PM only.
Annual	330	days	
Total Shipping and Receiving Hours	3,960	hr/yr	
All Receiving and Shipping Roads	PAVED		

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Rev. 3

Operations Data

Plant Capacity:	***Denatured Ethanol:***	*18.90*	*MMgpy*	***Biomass:***	*1,140,625*	*ton/yr*
	Anhydrous Ethanol:	*18.00*	*MMgpy*			

Plant Operation	*365*	*day/yr*
	8,760	*hr/yr*

UNCONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct CO_2 + CO_2e
HAUL ROADS											
EP-01000FUG	Paved Plant Roads	251.55	64.11	6.41							
EP-01050FUG	Biomass Laydown Roads	17.45	4.45	0.44							
ENZYMATIC HYDROLYSIS PLANT											
EP-11134	Biomass Grinding DC #1										
EP-11135	Biomass Grinding DC #2										
EP-11235	Floor Sweep System DC										
EP-11601	Biomass Surge Bin #1 DC										
EP-11602	Biomass Surge Bin #2 DC										
EP-11603	Biomass Surge Bin #3 DC										
EP-12101	EH Metering Bin #1										
EP-11711	Boiler 1 Metering Bin DC #1										
EP-11721	Boiler 1 Metering Bin DC #2										
EP-11731	Boiler 1 Metering Bin DC #3										
EP-11712	Boiler 2 Metering Bin DC #1										
EP-11722	Boiler 2 Metering Bin DC #2										
EP-11732	Boiler 2 Metering Bin DC #3										
EP-11713	Boiler 3 Metering Bin DC #1										
EP-11723	Boiler 3 Metering Bin DC #2										
EP-11733	Boiler 3 Metering Bin DC #3										
EP-11714	Boiler 4 Metering Bin DC #1										
EP-11724	Boiler 4 Metering Bin DC #2										
EP-11734	Boiler 4 Metering Bin DC #3										
EP-11081	Dirt Load-Out Silo										
EP-11082	Dirt Load-Out Silo Spout										
EP-11001FUG	Raw Wood Residues Grinding and Handling	0.06	0.03	0.00							
EP-11002FUG	Crop Residues and Energy Crops Grinding and H	382.36	116.71	19.55							
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.06	0.03	0.00							
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	6.58	3.29	0.49							
EP-11052FUG	Wood Residues (Hog Fuel) Storage Pile Loading	0.065	0.031	0.0046							
EP-18185	EH Fermentation CO2 Scrubber							7,586.51	8.94	32.06	57,801
EP-18180	EH Distillation Vent Scrubber							175.31	1.99	6.53	1,393
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout							0.76	0.0203	0.036	

UNCONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct $CO_2 + CO_2e$
ETHANOL STORAGE AND PIPING											
EP-02000	Fugitive Leaks							8.30	1.66E-03	0.004	
T-02107	EH Product Shift Tank #1							0.12	2.40E-05	0.00006	
T-02108	EH Product Shift Tank #2							0.12	2.40E-05	0.00006	
T-02101	EH Product Off-Spec Tank							0.07	1.50E-05	0.00004	
T-02102	EH Ethanol Product Storage Tank							0.21	5.04E-05	0.00019	
T-02105	EH Denaturant Storage Tank							1.14	5.68E-03	0.0093	
EP-02100	Vapor Recovery System										
EP-02100FUG	Loading Losses							7.77	0.01	0.03	
UTILITIES											
EP-02701	Ash Pelletizer Dryer DC	150.17	150.17	150.17	3.85	0.05	7.01	0.47	0.15	0.16	10,205
EP-02702	Ash Pelletizer Cooler DC	75.09	75.09	75.09							
EP-02710	Ash Pellets Load-Out Silo	8.85	8.85	8.85							
EP-02711	Ash Pellets Load-Out Silo Spout	9.50	9.50	9.50							
EP-02710FUG	Ash Pellets Load-Out from Silo	0.11	0.05	0.01							
EP-04001	EH Cooling Water Tower	0.14	0.14	0.14							
EP-21001	CoGen Cooling Water Tower	0.70	0.70	0.70							
EP-20001	Biomass-Fired Boiler #1	3,123.81	2,793.10	2,407.28	486.57	641.98	300.12	37.23	621.82	664.95	883,944
EP-20002	Biomass-Fired Boiler #2	3,123.81	2,793.10	2,407.28	486.57	641.98	300.12	37.23	621.82	664.95	883,944
EP-20003	Biomass-Fired Boiler #3	3,123.81	2,793.10	2,407.28	486.57	641.98	300.12	37.23	621.82	664.95	883,944
EP-20004	Biomass-Fired Boiler #4	3,123.81	2,793.10	2,407.28	486.57	641.98	300.12	37.23	621.82	664.95	883,944
EP-20514	Boiler Bottoms Ash Handling DC #1										
EP-20524	Boiler Bottoms Ash Handling DC #2										
EP-20534	Boiler Bottoms Ash Handling DC #3										
EP-20544	Boiler Bottoms Ash Handling DC #4										
EP-20510	Boiler Fly Ash Handling DC #1										
EP-20520	Boiler Fly Ash Handling DC #2										
EP-20530	Boiler Fly Ash Handling DC #3										
EP-20540	Boiler Fly Ash Handling DC #4										
EP-20511	Bed Media Handling DC #1										
EP-20521	Bed Media Handling DC #2										
EP-20531	Bed Media Handling DC #3										
EP-20541	Bed Media Handling DC #4										
EP-20512	Trona Handling DC #1										
EP-20522	Trona Handling DC #2										
EP-20532	Trona Handling DC #3										
EP-20542	Trona Handling DC #4										
EP-20551FUG	Ash Pellets Storage Pit	0.574	0.287	0.043							
EP-20552FUG	Ash Pellets Storage Pit Loading & Load-Out	0.216	0.102	0.015							
EP-09001 (SSM	Biogas Flare	0.003	0.003	0.003	1.83	0.67	9.75	0.002	0.0008	0.0008	4,675.55
EP-06001 (EMG	Firewater Pump Engine	0.008	0.008	0.008	0.15	0.05	0.13	0.15	0.0004	0.0010	26.06

UNCONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct CO_2 + CO_2e
Total Plantwide		**13,398.71**	**11,605.95**	**9,900.56**	**1,952.10**	**2,568.68**	**1,217.37**	**7,929.86**	**2,487.28**	**2,698.66**	**3,609,877**

Basis:

1. The following major source threshold levels apply to the facility:

	Major Source Threshold	Synthetic Minor Source Threshold	Construction Permit Threshold	Proposed Major Source Thresholds
VOC:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
NO_x:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
SO_2:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
CO:	100 ton/yr	50 ton/yr	50 ton/yr	250 ton/yr
PM/PM_{10}:	100 ton/yr	50 ton/yr	15 ton/yr	250 ton/yr
HAPs:	10/25 ton/yr	5/12.5 ton/yr	2.5/10 ton/yr	10/25 ton/yr

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 3**
Biorefinery Facility
Hugoton, Kansas

Operations Data

Plant Capacity:	***Denatured Ethanol:***	*18.90*	*MMgpy*	***Biomass:***	*1,140,625*	*ton/yr*
	Anhydrous Ethanol:	*18.00*	*MMgpy*			

Plant Operation	*365*	*day/yr*
	8,760	*hr/yr*

CONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct CO_2 + CO_2e
HAUL ROADS											
EP-01000FUG	Paved Plant Roads	12.58	3.21	0.32							
EP-01050FUG	Biomass Laydown Roads	5.24	1.33	0.13							
ENZYMATIC HYDROLYSIS PLANT											
EP-11134	Biomass Grinding DC #1	23.07	23.07	23.07							
EP-11135	Biomass Grinding DC #2	23.07	23.07	23.07							
EP-11235	Floor Sweep System DC	1.02	1.02	1.02							
EP-11601	Biomass Surge Bin #1 DC	1.50	1.50	1.50							
EP-11602	Biomass Surge Bin #2 DC	1.50	1.50	1.50							
EP-11603	Biomass Surge Bin #3 DC	1.50	1.50	1.50							
EP-12101	EH Metering Bin #1	2.40	2.40	2.40							
EP-11711	Boiler 1 Metering Bin DC #1	0.66	0.66	0.66							
EP-11721	Boiler 1 Metering Bin DC #2	0.66	0.66	0.66							
EP-11731	Boiler 1 Metering Bin DC #3	0.66	0.66	0.66							
EP-11712	Boiler 2 Metering Bin DC #1	0.66	0.66	0.66							
EP-11722	Boiler 2 Metering Bin DC #2	0.66	0.66	0.66							
EP-11732	Boiler 2 Metering Bin DC #3	0.66	0.66	0.66							
EP-11713	Boiler 3 Metering Bin DC #1	0.66	0.66	0.66							
EP-11723	Boiler 3 Metering Bin DC #2	0.66	0.66	0.66							
EP-11733	Boiler 3 Metering Bin DC #3	0.66	0.66	0.66							
EP-11714	Boiler 4 Metering Bin DC #1	0.66	0.66	0.66							
EP-11724	Boiler 4 Metering Bin DC #2	0.66	0.66	0.66							
EP-11734	Boiler 4 Metering Bin DC #3	0.66	0.66	0.66							
EP-11081	Dirt Load-Out Silo	0.09	0.09	0.09							
EP-11082	Dirt Load-Out Silo Spout	0.10	0.10	0.10							
EP-11001FUG	Raw Wood Residues Grinding and Handling	0.06	0.03	0.005							
EP-11002FUG	Crop Residues and Energy Crops Grinding and Ha	0.24	0.11	0.02							
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.06	0.03	0.00							
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	2.63	1.32	0.20							
EP-11052FUG	Wood Residues (Hog Fuel) Storage Pile Loading	0.06	0.03	0.005							
EP-18185	EH Fermentation CO2 Scrubber							75.87	2.26	2.46	57,801
EP-18180	EH Distillation Vent Scrubber							1.75	0.31	0.36	1,393
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout							0.76	0.0203	0.036	

CONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct $CO_2 + CO_2e$
ETHANOL STORAGE AND PIPING											
EP-02000	Fugitive Leaks							1.84	3.67E-04	0.0010	
T-02107	EH Product Shift Tank #1							0.12	2.40E-05	0.0001	
T-02108	EH Product Shift Tank #2							0.12	2.40E-05	0.00006	
T-02101	EH Product Off-Spec Tank							0.07	1.50E-05	0.00004	
T-02102	EH Ethanol Product Storage Tank							0.21	5.04E-05	0.00019	
T-02105	EH Denaturant Storage Tank							1.14	5.68E-03	0.0093	
EP-02100	Vapor Recovery System							0.92	0.0017	0.0031	
EP-02100FUG	Loading Losses							0.78	0.0015	0.003	
UTILITIES											
EP-02701	Ash Pelletizer Dryer DC	1.50	1.50	1.50	3.85	0.05	7.01	0.47	0.15	0.16	10,205
EP-02702	Ash Pelletizer Cooler DC	0.75	0.75	0.75							
EP-02710	Ash Pellets Load-Out Silo	0.09	0.09	0.09							
EP-02711	Ash Pellets Load-Out Silo Spout	0.10	0.10	0.10							
EP-02710FUG	Ash Pellets Load-Out from Silo	0.11	0.05	0.01							
EP-04001	EH Cooling Water Tower	0.14	0.14	0.14							
EP-21001	CoGen Cooling Water Tower	0.70	0.70	0.70							
EP-20001	Biomass-Fired Boiler #1	68.10	64.79	60.93	316.27	64.20	300.12	37.23	31.09	38.75	883,944
EP-20002	Biomass-Fired Boiler #2	68.10	64.79	60.93	316.27	64.20	300.12	37.23	31.09	38.75	883,944
EP-20003	Biomass-Fired Boiler #3	68.10	64.79	60.93	316.27	64.20	300.12	37.23	31.09	38.75	883,944
EP-20004	Biomass-Fired Boiler #4	68.10	64.79	60.93	316.27	64.20	300.12	37.23	31.09	38.75	883,944
EP-20514	Boiler Bottoms Ash Handling DC #1	0.75	0.75	0.75							
EP-20524	Boiler Bottoms Ash Handling DC #2	0.75	0.75	0.75							
EP-20534	Boiler Bottoms Ash Handling DC #3	0.75	0.75	0.75							
EP-20544	Boiler Bottoms Ash Handling DC #4	0.75	0.75	0.75							
EP-20510	Boiler Fly Ash Handling DC #1	3.00	3.00	3.00							
EP-20520	Boiler Fly Ash Handling DC #2	3.00	3.00	3.00							
EP-20530	Boiler Fly Ash Handling DC #3	3.00	3.00	3.00							
EP-20540	Boiler Fly Ash Handling DC #4	3.00	3.00	3.00							
EP-20511	Bed Media Handling DC #1	0.75	0.75	0.75							
EP-20521	Bed Media Handling DC #2	0.75	0.75	0.75							
EP-20531	Bed Media Handling DC #3	0.75	0.75	0.75							
EP-20541	Bed Media Handling DC #4	0.75	0.75	0.75							
EP-20512	Trona Handling DC #1	0.75	0.75	0.75							
EP-20522	Trona Handling DC #2	0.75	0.75	0.75							
EP-20532	Trona Handling DC #3	0.75	0.75	0.75							
EP-20542	Trona Handling DC #4	0.75	0.75	0.75							
EP-20551FUG	Ash Pellets Storage Pit	0.23	0.11	0.02							
EP-20552FUG	Ash Pellets Storage Pit Loading & Load-Out	0.22	0.10	0.015							
EP-09001 (SSM	Biogas Flare	0.003	0.003	0.003	1.83	0.67	9.75	0.002	0.0008	0.0008	4,675.55
EP-06001 (EMG	Firewater Pump Engine	0.008	0.008	0.008	0.15	0.05	0.13	0.15	0.0004	0.0010	26.06

CONTROLLED Potential to Emit Summary (TPY)

Emission Point No.	Emission Unit(s)	PM	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Single HAP	Total HAPs	Direct $CO_2 + CO_2e$
Total Plantwide		380.29	351.96	330.93	1,270.91	257.56	1,217.37	233.11	124.36	158.05	3,609,877

Basis:

1. The following major source threshold levels apply to the facility:

	Major Source Threshold	Synthetic Minor Source Threshold	Construction Permit Threshold	Proposed Major Source Thresholds
VOC:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
NO_x:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
SO_2:	100 ton/yr	50 ton/yr	40 ton/yr	250 ton/yr
CO:	100 ton/yr	50 ton/yr	50 ton/yr	250 ton/yr
PM/PM_{10}:	100 ton/yr	50 ton/yr	15 ton/yr	250 ton/yr
HAPs:	10/25 ton/yr	5/12.5 ton/yr	2.5/10 ton/yr	10/25 ton/yr

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UNCONTROLLED HAPs Summary (TPY)

		EP-18185	EP-18180	EP-02000	T-02107	T-02108	T-02101	T-02102	T-02105	EP-02100
CAS No.	**HAP Chemicals**	**EH Fermentation CO2 Scrubber**	**EH Distillation Vent Scrubber**	**Fugitive Leaks**	**EH Product Shift Tank #1**	**EH Product Shift Tank #2**	**EH Product Off-Spec Tank**	**EH Ethanol Product Storage Tank**	**EH Denaturant Storage Tank**	**Vapor Recovery System**
75-07-0	Acetaldehyde	8.94E+00	1.43E+00	1.66E-03	2.40E-05	2.40E-05	1.50E-05	4.24E-05		--
107-02-8	Acrolein	8.94E+00	1.99E+00	1.66E-04	2.40E-06	2.40E-06	1.50E-06	4.24E-06		--
71-43-2	Benzene							2.52E-05	2.84E-03	--
7782-50-5	Chlorine									
75-15-0	Carbon disulfide							2.02E-07	2.27E-05	--
9882-8	Cumene							1.01E-06	1.14E-04	--
95-50-1	Dichlorobenzene									
75-09-2	Dichloromethane									
100-41-4	Ethylbenzene							5.04E-07	5.68E-05	--
206-44-0	Fluoranthene									
86-73-7	Fluorene									
50-00-0	Formaldehyde	8.94E+00	1.99E+00	8.30E-04	1.20E-05	1.20E-05	7.48E-06	2.12E-05		--
110-54-3	Hexane									
7647-01-0	Hydrogen chloride									
67-56-1	Methanol	5.26E+00	1.12E+00	1.66E-03	2.40E-05	2.40E-05	1.50E-05	4.24E-05		--
91-20-3	Naphthalene									
85-01-8	Phenanathrene									
115-07-1	Propylene									
129-00-0	Pyrene									
100-42-5	Styrene									
108-88-3	Toluene							5.04E-05	5.68E-03	--
1330-20-7	Xylene							5.04E-06	5.68E-04	--
7440-36-0	Antimony									
7440-38-2	Arsenic									
7440-41-7	Beryllium									
7440-43-9	Cadmium									
7440-47-3	Chromium									
7440-48-4	Cobalt									
7439-92-1	Lead									
7439-96-5	Manganese									
7439-97-6	Mercury									
7440-02-0	Nickel									
7782-49-2	Selenium									
	Other HAPs									
Total HAPs Per Unit		**32.06**	**6.53**	**0.00**	**0.00006**	**0.00006**	**0.00004**	**0.00019**	**0.0093**	**0**

UNCONTROLLED HAPs Summary (TPY)

		EP-02100FUG	EP-02701	EP-20001	EP-20002	EP-20003	EP-20004	EP-09001 (SSM)	EP-19001FUG	EP-06001 (EMG)
CAS No.	HAP Chemicals	Loading Losses	Ash Pelletizer Dryer DC	Biomass-Fired Boiler #1	Biomass-Fired Boiler #2	Biomass-Fired Boiler #3	Biomass-Fired Boiler #4	Biogas Flare	Lignin-Rich Stillage Storage and Loadout	Firewater Pump Engine
75-07-0	Acetaldehyde	1.02E-03		1.82	1.82	1.82	1.82		1.01E-02	1.23E-04
107-02-8	Acrolein	1.02E-04		8.76	8.76	8.76	8.76		1.52E-03	
71-43-2	Benzene	7.31E-03	1.80E-04	9.20	9.20	9.20	9.20	9.20E-07		1.50E-04
7782-50-5	Chlorine			1.73	1.73	1.73	1.73			
75-15-0	Carbon disulfide	5.85E-05								
9882-8	Cumene	2.92E-04								
95-50-1	Dichlorobenzene		1.03E-04					5.26E-07		
75-09-2	Dichloromethane			0.64	0.64	0.64	0.64			
100-41-4	Ethylbenzene	1.46E-04		0.07	0.07	0.07	0.07			
206-44-0	Fluoranthene		2.58E-07	3.50E-03	3.50E-03	3.50E-03	3.50E-03	1.31E-09		
86-73-7	Fluorene		2.40E-07	7.45E-03	7.45E-03	7.45E-03	7.45E-03	1.23E-09		
50-00-0	Formaldehyde	5.10E-04	6.44E-03	9.64	9.64	9.64	9.64	3.29E-05	2.03E-02	1.90E-04
110-54-3	Hexane		1.55E-01					7.88E-04		
7647-01-0	Hydrogen chloride			621.82	621.82	621.82	621.82			
67-56-1	Methanol	1.02E-03							4.05E-03	
91-20-3	Naphthalene		5.24E-05	0.21	0.21	0.21	0.21	2.67E-07		1.37E-05
85-01-8	Phenanathrene		1.46E-06	1.53E-02	1.53E-02	1.53E-02	1.53E-02	7.45E-09		
115-07-1	Propylene									4.15E-04
129-00-0	Pyrene		4.29E-07	8.10E-03	8.10E-03	8.10E-03	8.10E-03	2.19E-09		
100-42-5	Styrene			4.16	4.16	4.16	4.16	1.49E-06		6.58E-05
108-88-3	Toluene	1.46E-02	2.92E-04	2.01	2.01	2.01	2.01			
1330-20-7	Xylene	1.46E-03		0.055	0.055	0.055	0.055			4.59E-05
7440-36-0	Antimony			1.73E-02	1.73E-02	1.73E-02	1.73E-02			
7440-38-2	Arsenic		1.72E-05	4.82E-02	4.82E-02	4.82E-02	4.82E-02	8.76E-08		
7440-41-7	Beryllium			2.41E-03	2.41E-03	2.41E-03	2.41E-03			
7440-43-9	Cadmium		9.45E-05	8.98E-03	8.98E-03	8.98E-03	8.98E-03	4.82E-07		
7440-47-3	Chromium		1.20E-04	4.60E-02	0.05	0.05	0.05	6.13E-07		
7440-48-4	Cobalt		7.21E-06	1.42E-02	1.42E-02	1.42E-02	1.42E-02	3.68E-08		
7439-92-1	Lead		4.29E-05	1.05E-01	1.05E-01	1.05E-01	1.05E-01	2.19E-07		
7439-96-5	Manganese		3.26E-05	3.50	3.50	3.50	3.50	1.66E-07		
7439-97-6	Mercury		2.23E-05	0.008	7.67E-03	7.67E-03	7.67E-03	1.14E-07		
7440-02-0	Nickel		1.80E-04	0.072	7.23E-02	7.23E-02	7.23E-02	9.20E-07		
7782-49-2	Selenium			0.006	6.13E-03	6.13E-03	6.13E-03			
	Other HAPs		2.06E-06	0.98	0.98	0.98	0.98	1.05E-08		
Total HAPs Per Unit		**0.03**	**0.16**	**664.95**	**664.95**	**664.95**	**664.95**	**0.00083**	**0.036**	**0.0010**

UNCONTROLLED HAPs Summary (TPY)

CAS No.	HAP Chemicals	Maximum Single HAP
75-07-0	Acetaldehyde	17.65
107-02-8	Acrolein	45.97
71-43-2	Benzene	36.80
7782-50-5	Chlorine	6.92
75-15-0	Carbon disulfide	0.00
9882-8	Cumene	0.00
95-50-1	Dichlorobenzene	0.00
75-09-2	Dichloromethane	2.54
100-41-4	Ethylbenzene	0.27
206-44-0	Fluoranthene	0.01
86-73-7	Fluorene	0.03
50-00-0	Formaldehyde	49.50
110-54-3	Hexane	0.16
7647-01-0	Hydrogen chloride	2,487.28
67-56-1	Methanol	6.38
91-20-3	Naphthalene	0.85
85-01-8	Phenanathrene	0.06
115-07-1	Propylene	0.00
129-00-0	Pyrene	0.03
100-42-5	Styrene	16.64
108-88-3	Toluene	8.08
1330-20-7	Xylene	0.22
7440-36-0	Antimony	0.07
7440-38-2	Arsenic	0.19
7440-41-7	Beryllium	0.01
7440-43-9	Cadmium	0.04
7440-47-3	Chromium	0.18
7440-48-4	Cobalt	0.06
7439-92-1	Lead	0.42
7439-96-5	Manganese	14.02
7439-97-6	Mercury	0.03
7440-02-0	Nickel	0.29
7782-49-2	Selenium	0.02
	Other HAPs	3.92
Total HAPs Per Unit		**2,487.28**
Total Plantwide HAPs		**2,698.66**

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CONTROLLED HAPs Summary (TPY)

		EP-18185	EP-18180	EP-02000	T-02107	T-02108	T-02101	T-02102	T-02105	EP-02100
CAS No.	HAP Chemicals	EH Fermentation CO2 Scrubber	EH Distillation Vent Scrubber	Fugitive Leaks	EH Product Shift Tank #1	EH Product Shift Tank #2	EH Product Off-Spec Tank	EH Ethanol Product Storage Tank	EH Denaturant Storage Tank	Vapor Recovery System
75-07-0	Acetaldehyde	2.26E+00	3.10E-01	3.67E-04	2.40E-05	2.40E-05	1.50E-05	4.24E-05		1.20E-04
107-02-8	Acrolein	9.00E-02	2.00E-02	3.67E-05	2.40E-06	2.40E-06	1.50E-06	4.24E-06		1.20E-05
71-43-2	Benzene							2.52E-05	2.84E-03	8.62E-04
7782-50-5	Chlorine									
75-15-0	Carbon disulfide							2.02E-07	2.27E-05	6.90E-06
9882-8	Cumene							1.01E-06	1.14E-04	3.45E-05
95-50-1	Dichlorobenzene									
75-09-2	Dichloromethane									
100-41-4	Ethylbenzene							5.04E-07	5.68E-05	1.72E-05
206-44-0	Fluoranthene									
86-73-7	Fluorene									
50-00-0	Formaldehyde	9.00E-02	2.00E-02	1.84E-04	1.20E-05	1.20E-05	7.48E-06	2.12E-05		6.02E-05
110-54-3	Hexane									
7647-01-0	Hydrogen chloride									
67-56-1	Methanol	2.00E-02	1.00E-02	3.67E-04	2.40E-05	2.40E-05	1.50E-05	4.24E-05		1.20E-04
91-20-3	Naphthalene									
85-01-8	Phenanathrene									
115-07-1	Propylene									
129-00-0	Pyrene									
100-42-5	Styrene									
108-88-3	Toluene							5.04E-05	5.68E-03	1.72E-03
1330-20-7	Xylene							5.04E-06	5.68E-04	1.72E-04
7440-36-0	Antimony									
7440-38-2	Arsenic									
7440-41-7	Beryllium									
7440-43-9	Cadmium									
7440-47-3	Chromium									
7440-48-4	Cobalt									
7439-92-1	Lead									
7439-96-5	Manganese									
7439-97-6	Mercury									
7440-02-0	Nickel									
7782-49-2	Selenium									
	Other HAPs									
Total HAPs Per Unit		**2.46**	**0.36**	**0.0010**	**0.00006**	**0.00006**	**0.00004**	**0.00019**	**0.00928**	**0.0031**

CONTROLLED HAPs Summary (TPY)

CAS No.	HAP Chemicals	EP-02100FUG Loading Losses	EP-02701 Ash Pelletizer Dryer DC	EP-20001 Biomass-Fired Boiler #1	EP-20002 Biomass-Fired Boiler #2	EP-20003 Biomass-Fired Boiler #3	EP-20004 Biomass-Fired Boiler #4	EP-09001 (SSM) Biogas Flare	EP-19001FUG Lignin-Rich Stillage Storage and Loadout	EP-06001 (EMG) Firewater Pump Engine
75-07-0	Acetaldehyde	1.02E-04		0.18	0.18	0.18	0.18		1.01E-02	1.23E-04
107-02-8	Acrolein	1.02E-05		0.88	0.88	0.88	0.88		1.52E-03	
71-43-2	Benzene	7.31E-04	1.80E-04	0.92	0.92	0.92	0.92	9.20E-07		1.50E-04
7782-50-5	Chlorine			0.02	0.02	0.02	0.02			
75-15-0	Carbon disulfide	5.85E-06								
9882-8	Cumene	2.92E-05								
95-50-1	Dichlorobenzene		1.03E-04					5.26E-07		
75-09-2	Dichloromethane			0.06	0.06	0.06	0.06			
100-41-4	Ethylbenzene	1.46E-05		6.79E-03	6.79E-03	6.79E-03	6.79E-03			
206-44-0	Fluoranthene		2.58E-07	3.50E-03	3.50E-03	3.50E-03	3.50E-03	1.31E-09		
86-73-7	Fluorene		2.40E-07	7.45E-03	7.45E-03	7.45E-03	7.45E-03	1.23E-09		
50-00-0	Formaldehyde	5.10E-05	6.44E-03	0.96	0.96	0.96	0.96	3.29E-05	2.03E-02	1.90E-04
110-54-3	Hexane		1.55E-01					7.88E-04		
7647-01-0	Hydrogen chloride			31.09	31.09	31.09	31.09			
67-56-1	Methanol	1.02E-04							4.05E-03	
91-20-3	Naphthalene		5.24E-05	0.02	0.02	0.02	0.02	2.67E-07		1.37E-05
85-01-8	Phenanathrene		1.46E-06	1.53E-02	1.53E-02	1.53E-02	1.53E-02	7.45E-09		
115-07-1	Propylene									4.15E-04
129-00-0	Pyrene		4.29E-07	8.10E-03	8.10E-03	8.10E-03	8.10E-03	2.19E-09		
100-42-5	Styrene			0.42	0.42	0.42	0.42			
108-88-3	Toluene	1.46E-03	2.92E-04	0.20	0.20	0.20	0.20	1.49E-06		6.58E-05
1330-20-7	Xylene	1.46E-04		5.48E-03	5.48E-03	5.48E-03	5.48E-03			4.59E-05
7440-36-0	Antimony			1.73E-02	1.73E-02	1.73E-02	1.73E-02			
7440-38-2	Arsenic		1.72E-05	4.82E-02	4.82E-02	4.82E-02	4.82E-02	8.76E-08		
7440-41-7	Beryllium			2.41E-03	2.41E-03	2.41E-03	2.41E-03			
7440-43-9	Cadmium		9.45E-05	8.98E-03	8.98E-03	8.98E-03	8.98E-03	4.82E-07		
7440-47-3	Chromium		1.20E-04	4.60E-02	4.60E-02	4.60E-02	4.60E-02	6.13E-07		
7440-48-4	Cobalt		7.21E-06	1.42E-02	1.42E-02	1.42E-02	1.42E-02	3.68E-08		
7439-92-1	Lead		4.29E-05	1.05E-01	1.05E-01	1.05E-01	1.05E-01	2.19E-07		
7439-96-5	Manganese		3.26E-05	3.50E+00	3.50E+00	3.50E+00	3.50E+00	1.66E-07		
7439-97-6	Mercury		2.23E-05	7.67E-03	7.67E-03	7.67E-03	7.67E-03	1.14E-07		
7440-02-0	Nickel		1.80E-04	7.23E-02	7.23E-02	7.23E-02	7.23E-02	9.20E-07		
7782-49-2	Selenium			6.13E-03	6.13E-03	6.13E-03	6.13E-03			
	Other HAPs		2.06E-06	0.12	0.12	0.12	0.12			
Total HAPs Per Unit		**0.003**	**0.16**	**38.75**	**38.75**	**38.75**	**38.75**	**0.00083**	**0.036**	**0.0010**

CONTROLLED HAPs Summary (TPY)

CAS No.	HAP Chemicals	Maximum Single HAP
75-07-0	Acetaldehyde	3.31
107-02-8	Acrolein	3.62
71-43-2	Benzene	3.68
7782-50-5	Chlorine	0.07
75-15-0	Carbon disulfide	0.00
9882-8	Cumene	0.00
95-50-1	Dichlorobenzene	0.00
75-09-2	Dichloromethane	0.25
100-41-4	Ethylbenzene	0.03
206-44-0	Fluoranthene	0.01
86-73-7	Fluorene	0.03
50-00-0	Formaldehyde	3.99
110-54-3	Hexane	0.16
7647-01-0	Hydrogen chloride	124.36
67-56-1	Methanol	0.03
91-20-3	Naphthalene	0.09
85-01-8	Phenanathrene	0.06
115-07-1	Propylene	0.00
129-00-0	Pyrene	0.03
100-42-5	Styrene	1.66
108-88-3	Toluene	0.81
1330-20-7	Xylene	0.02
7440-36-0	Antimony	0.07
7440-38-2	Arsenic	0.19
7440-41-7	Beryllium	0.01
7440-43-9	Cadmium	0.04
7440-47-3	Chromium	0.18
7440-48-4	Cobalt	0.06
7439-92-1	Lead	0.42
7439-96-5	Manganese	14.02
7439-97-6	Mercury	0.03
7440-02-0	Nickel	0.29
7782-49-2	Selenium	0.02
	Other HAPs	0.49
Total HAPs Per Unit		**124.36**
Total Plantwide HAPs		**158.05**

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 3**
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Direct GHG Summary (TPY)

Pollutants	EP-18185 EH Fermentation CO2 Scrubber	EP-18180 EH Distillation Vent Scrubber	EP-06001 Firewater Pump Engine	EP-09001 Biogas Flare	EP-02701 Ash Pelletizer Dryer DC	EP-20001 Biomass-Fired Boiler #1	EP-20002 Biomass-Fired Boiler #2	EP-20003 Biomass-Fired Boiler #3	EP-20004 Biomass-Fired Boiler #4
CO_2	57,801	1,392.82	25.97	4,675	10,195	874,412	874,412	874,412	874,412
CH_4			0.00107	0.0010	0.19	154.53	154.53	154.53	154.53
CH_4 => CO_2 Equivalent[1]			0.02	0.02	4.06	3,245.05	3,245.05	3,245.05	3,245.05
N_2O			0.00021	0.00010	0.02	20.28	20.28	20.28	20.28
N_2O => CO_2 Equivalent[1]			0.07	0.03	5.99	6,287.29	6,287.29	6,287.29	6,287.29
Total CO_2 + CO_2e	**57,801**	**1,393**	**26.06**	**4,675.55**	**10,205**	**883,944**	**883,944**	**883,944**	**883,944**

(1) To incorporate and evaluate non-CO_2 gases, the mass estimates of these gases were converted to their CO_2 equivalent (CO_2e). To calculate the CO_2 equivalent, the mass of the non-CO_2 gas is multiplied by the non-CO_2 gas's Global Warming Potential (GWP), see note 2 below. The GWPs for CH_4 and N_2O are 21 and 310, respectively, as reported by the Intergovernmental Panel on Climate Change (IPCC).

(2) Global Warming Potentials (GWPs) were developed by the Intergovernmental Panel on Climate Change (IPCC) to quantify the globally averaged relative radiative forcing effects of a given GHG, using CO_2 as the reference gas. In 1996, the IPCC published a set of GWPs for the most commonly measured greenhouse gases in its Second Assessment Report (SAR). In 2001, the IPCC published its Third Assessment Report (TAR), which adjusted the GWPs to reflect new information on atmospheric lifetimes and an improved calculation of the radiative forcing of CO_2. However, SAR GWPs are still used by international convention and the U.S. to maintain the value of the CO_2 "currency". To maintain consistency with international practice, the California Climate Action Registry requires participants to use GWPs from the SAR when determining de minimis emissions, establishing baselines, and making baseline adjustments.

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 3**
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EP-01000
Paved Plant Roads

Basis: AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section, November 2006.

Emission Factor Equation: $\mathbf{E=[k(s/12)^a(W/3)^b]*[(365-P)/365]}$ Equation 13.2.2-1a

where:
E = particulate emission factor (pounds per vehicle mile traveled, lb/VMT)
k, a, b = dimensionless constants
s = surface material silt content (%)
W = mean vehicle weight of the vehicles traveling the road (tons)
P = number of "wet" days with at least 0.254 mm (0.01-in) of precipitation during the averaging period

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers for Paved Road Equation	k	4.9	1.5	0.15		Table 13.2.2-2
	a	0.7	0.9	0.9		Table 13.2.2-2
	b	0.45	0.45	0.45		Table 13.2.2-2
Mean Silt Content	s	4.8	4.8	4.8	%	Utah DEQ March 10, 2008 Memo
Average Weight of Vehicles	W	22.33	22.33	22.33	tons	Average weight, see calculation below
Mean Days > 0.01-in precipitation	P	75	75	75	days	1971-2000 Average Annual Precipitation
Paved Road Surface with Sweeping and Watering	CE	95	95	95	%	Utah DEQ March 10, 2008 Memo
Enforced Speed Limit	S	15	15	15	mph	Utah DEQ March 10, 2008 Memo

Emission Factors:

			Uncontrolled Emission Factors			Controlled Emission Factors		
		Daily Ops	PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$
ID	Source Description	(hr/day)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)
EP-01000	Paved Plant Roads	12	5.059	1.289	0.129	0.253	0.064	0.006

Uncontrolled PM/PM_{10}/$PM_{2.5}$

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-01000	Paved Plant Roads	165.61	1,987.27	251.55	42.21	506.48	64.11	4.22	50.65	6.41
Total		**165.61**		**251.55**	**42.21**		**64.11**	**4.22**		**6.41**

Controlled PM/PM_{10}/$PM_{2.5}$ Emissions:

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-01000	Paved Plant Roads	8.28	99.36	12.58	2.11	25.32	3.21	0.21	2.53	0.32
Total		**8.28**		**12.58**	**2.11**		**3.21**	**0.21**		**0.32**

EP-01000
Paved Plant Roads

Average Weight of Vehicles: Material Loaded/Unloaded	miles LOADED Per Year	% miles LOADED Per Year	miles EMPTY Per Year	% miles EMPTY Per Year	miles TOTAL Per Year	LOADED weight	EMPTY weight
Ethanol (Denatured)	1,648.98	1.66%	1,911.48	1.92%	3,560.45	40	15
Denaturant (Gasoline)	91.02	0.09%	78.52	0.08%	169.55	40	15
Biomass Delivery - Agricultural Residues	33,690.60	33.88%	33,690.60	33.88%	67,381.20	33	15
Lignin-Rich/Lean Stillage	4,193.82	4.22%	5,567.76	5.60%	9,761.58	40	15
Boiler Ash Waste (Ash Pellets)	6,560.30	6.60%	5,919.20	5.95%	12,479.50	17	6
Dirt/Fines Waste From Dust Collectors	2,347.58	2.36%	2,347.58	2.36%	4,695.15	16.5	5.5
Misc. Chemicals & Supplies	680.29	0.68%	725.52	0.73%	1,405.81	73	15
Facility-wide	**49,213**		**50,241**		**99,453**		

W = [(% of Miles LOADED) x (LOADED Weight)] + [(% of Miles EMPTY) x (EMPTY Weight)]
W = **22.33 tons**

Annual VMT Calculations:	Load Size	Annual Volume	Average % by Truck	Annual Volume by Truck	Trips / Year	Annual VMT
Ethanol (Denatured)	25 tons	62,033 ton/yr	100%	62,032.82 ton/yr	2,520	3,560.45
Denaturant (Gasoline)	25 tons	2,817 ton/yr	100%	2,817.00 ton/yr	120	169.55
Biomass Delivery	18 tons	1,260,600 wet ton/yr	100%	1,260,600.00 wet ton/yr	70,034	67,381.20
Lignin-Rich/Lean Stillage	25 tons	172,725 ton/yr	100%	172,725.30 ton/yr	6,909	9,761.58
Boiler Ash Waste (Ash Pellets)	11 tons	53,676 ton/yr	100%	53,676.47 ton/yr	9,274	12,479.50
Dirt/Fines Waste From Dust Collectors	11 tons	53,676 ton/yr	100%	53,676.47 ton/yr	4,880	4,695.15
Misc. Chemicals & Supplies	57.8 tons	57,503 ton/yr	Various	24,208.56 ton/yr	995	1,405.81
Facility-wide		**1,663,031 ton/yr**			**94,732**	**99,453.24**

Daily VMT Calculations:	Load Size	Daily Volume	Daily % by Truck	Daily Volume by Truck	Trips / Day	Daily VMT
Ethanol (Denatured)	25 tons	188 ton/day	100%	187.98 ton/day	8	11.30
Denaturant (Gasoline)	25 tons	75 ton/day	100%	75.00 ton/day	3	4.24
Biomass Delivery	18 tons	3,820 wet ton/day	100%	3,820.00 wet ton/day	213	204.93
Lignin-Rich/Lean Stillage	25 tons	750 ton/day	100%	750.00 ton/day	30	42.39
Boiler Ash Waste (Ash Pellets)	11 tons	792 ton/day	100%	792.00 ton/day	72	96.89
Dirt/Fines Waste From Dust Collectors	11 tons	330 ton/day	100%	330.00 ton/day	30	28.86
Misc. Chemicals & Supplies	58 tons	168 ton/day	Various	76.44 ton/day	3	4.24
Facility-wide		**6,123 ton/day**			**359**	**392.85**

EP-01000
Paved Plant Roads

Supporting Calculations:

Ethanol (Denatured)

** Denatured ethanol will primarily be shipped offsite by rail; however a conservative estimate of 100% shipped by truck is included as a worst-case scenario.

Ethanol (Denatured) Production - Annual	18.90	MMgal/yr
	62,033	ton/yr
Ethanol (Denatured) Shipped - Daily	57,273	gal/day
	188	ton/day
% Shipped by Truck	100%	
Ethanol (Denatured) Density	6.56	lb/gal
Truck Capacity	7,500	gal
	25	tons
Estimated Truck Trips	2,520	trips/yr
	8	trips/day

Truck Travel on Plant Roads	3,455	feet per trip LOADED	1,648.98	miles LOADED
	4,005	feet per trip EMPTY	1,911.48	miles EMPTY
			3,560.45	**miles TOTAL**

Denaturant (Gasoline)

Denaturant (Gasoline) Usage - Annual	0.90	MMgal/yr
	2,817	ton/yr
Denaturant (Gasoline) Received - Daily	22,500	gal/day
	75	ton/day
% Shipped by Truck	100%	
Denaturant (Gasoline) Density	6.26	lb/gal
Truck Capacity	7,500	gal
	25	tons
Estimated Truck Trips	120	trips/yr
	3	trips/day

Truck Travel on Plant Roads	4,005	feet per trip LOADED	91.02	miles LOADED
	3,455	feet per trip EMPTY	78.52	miles EMPTY
			169.55	**miles TOTAL**

Biomass Delivery - Agricultural Residues

Biomass Receiving - Annual	1,260,600	wet ton/yr
Biomass Receiving - Daily	3,820	wet ton/day
% Received by Truck	100%	
Truck Capacity	18	tons
Estimated Truck Trips	70,034	trips/yr
	213	trips/day
	18	trips/hr
	3	min/truck

Truck Travel on Plant Roads	2,540	feet per trip LOADED	33,690.60	miles LOADED
	2,540	feet per trip EMPTY	33,690.60	miles EMPTY
			67,381.20	**miles TOTAL**

EP-01000
Paved Plant Roads

Lignin-Rich/Lean Stillage

Lignin-Rich/Lean Stillage Handling	172,725	ton/yr
Lignin Shipping/Receiving - Daily	750	ton/day
% Shipped by Truck	100%	
Truck Capacity	25	tons
Estimated Truck Trips	6,909	trips/yr
	30	trips/day
	3	trips/hr
	20	min/truck

Truck Travel on Plant Roads	3,205	feet per trip LOADED	4,193.82	miles LOADED
	4,255	feet per trip EMPTY	5,567.76	miles EMPTY
			9,761.58	**miles TOTAL**

Boiler Ash Waste (Ash Pellets) Shipped Offsite

Boiler Ash Production - Annual	102,018	ton/yr
Boiler Ash Shipping - Daily	792	ton/day
% Shipped by Truck	100%	
Truck Capacity	11	tons
Estimated Truck Trips	9,274	trips/yr
	72	trips/day
	6	trips/hr
	10	min/truck

Truck Travel on Plant Roads	3,735	feet per trip LOADED	6,560.30	miles LOADED
	3,370	feet per trip EMPTY	5,919.20	miles EMPTY
			12,479.50	**miles TOTAL**

Dirt/Fines Waste From Dust Collectors

Dirt/Fines Production - Annual	53,676	ton/yr
Dirt/Fines Shipping - Daily	330	ton/day
% Shipped by Truck	100%	
Truck Capacity	11	tons
Estimated Truck Trips	4,880	trips/yr
	30	trips/day
	3	trips/hr
	20	min/truck

Truck Travel on Plant Roads	2,540	feet per trip LOADED	2,347.58	miles LOADED
	2,540	feet per trip EMPTY	2,347.58	miles EMPTY
			4,695.15	**miles TOTAL**

EP-01000
Paved Plant Roads

Misc. Chemicals, Enzymes & Supplies

**For the purpose of estimating the weighted vehicle average, the annual usage was divided by the total number of truck trips.

Chemicals Received - Annual	57,503	ton/yr
% Shipped by Truck	Various	
Truck Capacity**	57.8	tons
Estimated Truck Trips	995	trips/yr
	83	trips/mo
	3	trips/day

Truck Travel on Plant Roads	3,610	feet per trip LOADED	680.29	miles LOADED
	3,850	feet per trip EMPTY	725.52	miles EMPTY
			1,405.81	**miles TOTAL**

Misc. Chemicals & Enzymes Used	Usage (lb/day)	Usage (lb/yr)	Truck Capacity (lb/truck)	Truck Trips (trips/yr)
Chemicals				
Sulfuric Acid (94%) Usage	21,278	7,766,616	NA	Rail
Sodium Hydroxide (50%) Usage	6,864	2,505,360	49,500	51
Phosphoric Acid Usage	1,200	438,000	49,500	9
Aqueous Ammonia (<20%) Usage	112,581	41,092,187	NA	Rail
Magnesium Hydroxide (50%) Usage	3,650	1,332,250	49,500	27
Diamonium Phosphate Usage	156	57,096	49,500	2
Trona (Sodium Sesquicarbonate) Usage	48,576	17,730,240	NA	Rail
Diesel Usage	36,198	13,212,409	49,500	267
Media Liquid Usage	29,330	10,705,596	49,500	217
Antifoam Usage	5,928	2,163,720	49,500	44
Enzymes				
Cellulase Usage	47,916	17,489,340	49,500	354
Misc. Supplies				
Fluidized Based Sand Usage	21,120	321,200	22,000	15
Hazardous & Municipal Wastes	526	192,146	22,000	9
Total Annual Lbs		115,006,160		995
Total Annual Tons		57,503		

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 3**
Biorefinery Facility
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EP-01050
Biomass Laydown Roads

Basis: AP-42 Section 13.2.2 Unpaved Haul Roads, Final Section, November 2006.

Emission Factor Equation: $\mathbf{E=[k(s/12)^{a}(W/3)^{b}]*[(365-P)/365]}$ Equation 13.2.2-1a

where:
E = particulate emission factor (pounds per vehicle mile traveled, lb/VMT)
k, a, b = dimensionless constants
s = surface material silt content (%)
W = mean vehicle weight of the vehicles traveling the road (tons)
P = number of “wet” days with at least 0.254 mm (0.01-in) of precipitation during the averaging period

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers for Paved Road Equation	k	4.9	1.5	0.15		Table 13.2.2-2
	a	0.7	0.9	0.9		Table 13.2.2-2
	b	0.45	0.45	0.45		Table 13.2.2-2
Mean Silt Content	s	4.8	4.8	4.8	%	Utah DEQ March 10, 2008 Memo
Average Weight of Vehicles	W	24.00	24.00	24.00	tons	Average weight, see calculation below
Mean Days > 0.01-in precipitation	P	85	85	85	days	1971-2000 Average Annual Precipitation
Chemical Suppressant and Watering	CE	70	70	70	%	Utah DEQ March 10, 2008 Memo

Emission Factors:			Uncontrolled Emission Factors			Controlled Emission Factors		
		Daily Ops	PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$
ID	Source Description	(hr/day)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(lb/VMT)
EP-01050	Biomass Laydown Roads	12	5.045	1.286	0.129	1.514	0.386	0.039

EP-01050
Biomass Laydown Roads

Uncontrolled PM/PM$_{10}$/PM$_{2.5}$

		PM$_{30}$			PM$_{10}$			PM$_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-01050	Biomass Laydown Roads	8.41	100.96	17.45	2.14	25.73	4.45	0.21	2.57	0.44
Total		**8.41**		**17.45**	**2.14**		**4.45**	**0.21**		**0.44**

Controlled PM/PM$_{10}$/PM$_{2.5}$ Emissions:

		PM$_{30}$			PM$_{10}$			PM$_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-01050	Biomass Laydown Roads	2.52	30.29	5.24	0.64	7.72	1.33	0.06	0.77	0.13
Total		**2.52**		**5.24**	**0.64**		**1.33**	**0.06**		**0.13**

Average Weight of Vehicles:

Material Loaded/Unloaded	miles LOADED Per Year	% miles LOADED Per Year	miles EMPTY Per Year	% miles EMPTY Per Year	miles TOTAL Per Year	LOADED weight	EMPTY weight
Biomass Storage Field	2,264.55	32.74%	2,264.55	32.74%	4,529.09	33	15
Biomass Staging Area	1,194.20	17.26%	1,194.20	17.26%	2,388.41	33	15
Facility-wide	**3,459**		**3,459**		**6,917.50**		

W = [(% of Miles LOADED) x (LOADED Weight)] + [(% of Miles EMPTY) x (EMPTY Weight)]
W = **24.00 tons**

Annual VMT Calculations:	Load Size	Annual Volume	% by Truck	Annual Volume by Truck	Trips / Year	Annual VMT
Biomass Storage Field	18 tons	134,501 ton/yr	100%	134,500.59 ton/yr	14,946	4,529.09
Biomass Staging Area	18 tons	630,538 ton/yr	100%	630,537.50 ton/yr	70,060	2,388.41
Facility-wide		**765,038 ton/yr**			**85,006**	**6,917.50**

Daily VMT Calculations:	Load Size	Daily Volume	% by Truck	Daily Volume by Truck	Trips / Day	Daily VMT
Biomass Storage Field	18 tons	955 ton/day	100%	955.00 ton/day	54	16.36
Biomass Staging Area	18 tons	1,910 ton/day	100%	1,910.00 ton/day	107	3.65
Facility-wide		**2,865 ton/day**			**161**	**20.01**

EP-01050
Biomass Laydown Roads

Supporting Calculations:

Biomass Storage Field with Staging Area

**Biomass storage field assumed to cycle once per month. Biomass bale delivery to storage field includes only traffic on unpaved storage haul roads.
**Biomass storage field is constantly active as bales are brought onsite and stored as well as retrieved for use in the process during the night shift as needed.

Biomass Storage Field - Annual	134,501	ton/yr
Biomass Storage Field - Daily	955	ton/day
% Received by Truck	100%	
Truck Capacity	18	tons
Estimated Truck Trips	14,946	trips/yr
	54	trips/day
	5	trips/hr
	12	min/truck

Truck Travel on Plant Roads	800	feet per trip LOADED	2,264.55	miles LOADED
	800	feet per trip EMPTY	2,264.55	miles EMPTY
			4,529.09	**miles TOTAL**

Biomass Staging Area

**Biomass staging area is constantly active as bales are brought onsite and stored as well as retrieved for use in the process during the night shift.

Biomass Staging Area - Annual	630,538	ton/yr
Biomass Staging Area - Daily	1,910	ton/day
% Received by Truck	100%	
Truck Capacity	18	tons
Estimated Truck Trips	70,060	trips/yr
	107	trips/day
	9	trips/hr
	7	min/truck

Truck Travel on Plant Roads	90	feet per trip LOADED	1,194.20	miles LOADED
	90	feet per trip EMPTY	1,194.20	miles EMPTY
			2,388.41	**miles TOTAL**

Abengoa Bioenergy Biomass of Kansas, LLC	**Rev. 3**
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EP-02000
Equipment Leaks

Basis: Leak Rates and VOC control from: *Protocol for Leak Emission Rates,* EPA-453/R-95-017, November 1995.
Leak Rate (SOCMI average) multiplied by number of components.
Component count based on estimate for similar sized ethanol facilities.
HAP composition is the same in all VOC emissions for source identified.
Composition of HAPs is based on an engineering estimate.

Ethanol HAPs:		
	Acetaldehyde	200 ppmw
	Methanol	200 ppmw
	Acrolein	20 ppmw
	Formaldehyde	100 ppmw

Component Count Criteria:

Streams with less than 1% VOC content (by water weight) are assumed negligible and are not counted.
Streams with less than 20% VOC (Vapor Pressure >0.3 kPa at 20 ^{o}C) content (by water weight) are defined as "Heavy Liquids".
Components in vacuum service are not inventoried and not to be inspected due to leak free nature.
All other streams are "Light Liquid" or "Gas/Vapor".

VOC Emissions:

		Fermentation		Distillation					Storage	
Plant Area:		Pre-Fermenter	Beer Well	Beer Preheater	Stripper	Rectifier	Molecular Sieve Purge	Molecular Sieve Product	Finished Product	Total Plant
%VOC in Product at Area:		10%	15%	15%	50%	93%	75%	100%	100%	
Equipment [(1)]	Leak Rate (kg/hr/source)									
Valves:										
Gas	0.00597	0.000597	0.0008955	0.0008955	0.002985	0.0055521	0.0044775	0.00597	0.00597	
	Count	3	2	0	3	6	2	5	1	22
	Emissions	0.002	0.002	0	0.009	0.033	0.009	0.030	0.00597	0.091
Light Liquid	0.00403	0.000403	0.0006045	0.0006045	0.002015	0.0037479	0.0030225	0.00403	0.00403	
	Count	0	0	0	6	4	2	6	6	24
	Emissions	0	0	0	0.012	0.015	0.006	0.024	0.024	0.081
Heavy Liquid	0.00023	0.000023	0.0000345	0.0000345	0.000115	0.0002139	0.0001725	0.00023	0.00023	
	Count	14	9	5	0	0	0	0	0	28
	Emissions	0.0003	0.0003	0.0002	0	0	0	0	0	0.001
Pumps:										
Light Liquid	0.0199	0.00199	0.002985	0.002985	0.00995	0.018507	0.014925	0.0199	0.0199	
	Count	0	0	0	1	1	1	1	1	5
	Emissions	0	0	0	0.010	0.019	0.015	0.020	0.020	0.083
Heavy Liquid	0.00862	0.000862	0.001293	0.001293	0.00431	0.0080166	0.006465	0.00862	0.00862	
	Count	2	2	0	0	0	0	0	0	4
	Emissions	0.0017	0.0026	0.0000	0	0	0	0	0	0.004
Other:										
Relief Valves	0.104	0.0104	0.0156	0.0156	0.052	0.09672	0.078	0.104	0.104	
	Count	1	1	1	1	1	1	1	0	7
	Emissions	0.0104	0.0156	0.0156	0.052	0.09672	0.078	0.104	0	0.372
Connectors	0.00183	0.000183	0.0002745	0.0002745	0.000915	0.0017019	0.0013725	0.00183	0.00183	
	Count	49	32	13	24	26	9	29	17	199
	Emissions	0.0090	0.0088	0.0036	0.02196	0.0442494	0.0123525	0.05307	0.03111	0.184
Sample Valves	0.015	0.0015	0.00225	0.00225	0.0075	0.01395	0.01125	0.015	0.015	
	Count	1	1	1	1	1	0	0	1	6
	Emissions	0.0015	0.0023	0.0023	0.0075	0.01395	0	0	0.015	0.042
Uncontrolled VOC Total	**kg/hr**									**0.86**
	lb/hr									**1.89**
	ton/yr									**8.30**

EP-02000
Equipment Leaks

Equipment	LDAR Control [1, 2] (% Eff.)	Emissions
Valves:		
Gas	87%	0.012
Light Liquid	84%	0.013
Heavy Liquid	84%	0.000
Pumps:		
Light Liquid	69%	0.026
Heavy Liquid	69%	0.001
Other:		
Relief Valves	87%	0.048
Connectors	55%	0.083
Sample Valves	84%	0.007
Controlled VOC Total	**kg/hr**	**0.190**
	lb/hr	**0.42**
	ton/yr	**1.84**

(1) Control effectiveness for Valves and Pumps obtained with monthly monitoring 10,000 ppmv leak definition, as presented in Table 5-2. Heavy Liquid Valves and Pumps control efficiencies assumed equivalent to the Light Liquid Valves and Pumps.

(2) Control effectiveness for Connectors were estimated based on Equations 1 through 4, in Section 5 and an occurrence rate of 1%. The calculations demonstrating how the LDAR control was estimated are included on the following page. Control effectiveness for Sample Valves (Sampling Connections) were assumed equivalent to Light Liquid Valves.

Uncontrolled HAPs Emissions:

ID	Source Description	VOC Emissions (ton/yr)	Acetaldehyde (ton/yr)	Methanol (ton/yr)	Acrolein (ton/yr)	Formaldehyde (ton/yr)	
EP-02000	Equipment Leaks	8.30	0.002	0.002	0.00017	0.00083	**Total**
Total			**0.002**	**0.002**	**0.00017**	**0.00083**	**0.0043**

Controlled HAPs Emissions:

ID	Source Description	VOC Emissions (ton/yr)	Acetaldehyde (ton/yr)	Methanol (ton/yr)	Acrolein (ton/yr)	Formaldehyde (ton/yr)	
EP-02000	Equipment Leaks	1.84	0.000	0.000	0.00004	0.00018	**Total**
Total			**0.000**	**0.000**	**0.00004**	**0.00018**	**0.0010**

EP-02000
Equipment Leaks

SOCMI Connectors LDAR Control Calculation

Initial Leak Rate =
ILR = 0.00183 From Figure 5-4 - SOCMI Connector Average Leak Rate vs. Fraction Leaking at Several Leak Definitions (Includes 10,000 ppmv leak definition)
Precise Value Obtained from EPA-453/R-95-017, Table 2-1, Page 2-12.

Table 5-4 Equations Relating Average Leak Rate to Fraction Leaking at SOCMI Units	
Connector with 10,000 ppmv leak definition:	ALR = (0.11 x LKFRACT) + 8.1E-05

Zi = LKFRACT
0.00183 = (0.11 x LKFRACT) + 8.1E-05

LKFRACT = 0.0159
Z1 = 0.0159

Yi = Zi - (FR x Zi) + (FR x Zi x R) (EPA-453/R-95-017, Page 5-56)
Zi+1 = Oc x (1-Yi) + Yi
Oc = 1.0%

Y1 =	0.00231			
Z1 =	0.0159			
R =	0.1			
FR =	0.95			
Y2 =	0.00178			
Z2 =	0.01228			
R2 =	0.1			
FR2 =	0.95			
Y3 =	0.001706			
Z3 =	0.01176			
R3 =	0.1			
FR3 =	0.95			
Y4 =	0.001695			
Z4 =	0.01169			
R4 =	0.1			
FR4 =	0.95			
Y5 =	0.001693			
Z5 =	0.01168			
R5 =	0.1			
FR5 =	0.95			
Y6 =	0.001693			
Z6 =	0.01168			
R6 =	0.1			
FR6 =	0.95			
Y7 =	0.001693			
Z7 =	0.01168			
R7 =	0.1			
FR7 =	0.95			
Y8 =	0.001693	= After LDAR monitoring (%)	Avg LDAR monitor =	0.00668
Z8 =	0.01168	= Prior to LDAR monitoring (%)		
R8 =	0.1		From Table 5-4 Gas Valve Eqn:	**FLR = 0.000816**
FR8 =	0.95			

Eff = (ILR-FLR) / ILR x 100 (EPA-453/R-95-017, Page 5-57)

Where:
Eff = Control Effectiveness (Percent)
FLR = Final Leak Rate (kg/hr/source) **FLR = 0.000816**
ILR = Initial Leak Rate (kg/hr/source) **ILR = 0.00183**

Eff = (0.00183-0.000816) / 0.00183 x 100 = 55 % Conservative LDAR Control Effectiveness

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

AREA 02100
Product Process and Storage Tanks

Vendor: TBD

Product Process and Storage Tank Specifications

Criteria: Internal pontoon floating roof with fixed tank roof.
Floating roof to have metallic shoe seal and low profile secondary seal.
Vapor seal and sleeve all penetrations of floating roof.

Ethanol HAPs	Acetaldehyde	200	ppmw
	Methanol	200	ppmw
	Acrolein	20	ppmw
	Formaldehyde	100	ppmw

		Tank	Tank Dimensions				Maximum	Tank
		Capacity	Diameter		Height		Throughput	Paint
ID	Source Description	(gals)	(ft)	(m)	(ft)	(m)	(gals/yr)	Color
T-02107	EH Product Shift Tank #1	45,200	20	6.10	20	6.10	9,000,000	White
T-02108	EH Product Shift Tank #2	45,200	20	6.10	20	6.10	9,000,000	White
T-02101	EH Product Off-Spec Tank	45,200	20	6.10	20	6.10	900,000	White
T-02102	EH Ethanol Product Storage Tank	460,000	43	13.11	43	13.11	18,882,000	White
T-02105	EH Denaturant Storage Tank	22,500	14	4.27	20	6.10	882,000	White

Product Process and Storage Tank Emissions

Basis *:* *TANKS* , version 4.09D, October 2005.
Denatured ethanol storage tanks contain 4.8% gasoline (denaturant) by weight.
HAP composition is the same in all VOC emissions for source identified.

VOC Emissions:

		Rim Seal	Withdrawal	Deck Fitting	Deck Seam	Emission Rate		
		Loss	Loss	Loss	Loss	VOC, Tanks 4.09		
ID	Source Description	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/hr)	(lb/yr)	(ton/yr)
T-02107	EH Product Shift Tank #1	70.44	100.18	69.08	0	0.027	239.70	0.1199
T-02108	EH Product Shift Tank #2	70.44	100.18	69.08	0	0.027	239.70	0.1199
T-02101	EH Product Off-Spec Tank	70.44	10.02	69.08	0	0.017	149.54	0.0748
T-02102	EH Ethanol Product Storage Tank	205.38	96.9	121.83	0	0.048	424.11	0.2121
T-02105	EH Denaturant Storage Tank	975.45	11.88	1284.31	0	0.259	2271.64	1.1358
Total								**1.66**

AREA 02100
Product Process and Storage Tanks

Etoh HAPs Emissions:

ID	Source Description	Acetaldehyde (lb/yr)	Acetaldehyde (ton/yr)	Methanol (lb/yr)	Methanol (ton/yr)	Acrolein (lb/yr)	Acrolein (ton/yr)	Formaldehyde (lb/yr)	Formaldehyde (ton/yr)
T-02107	EH Product Shift Tank #1	4.79E-02	2.40E-05	4.79E-02	2.40E-05	4.79E-03	2.40E-06	2.40E-02	1.20E-05
T-02108	EH Product Shift Tank #2	4.79E-02	2.40E-05	4.79E-02	2.40E-05	4.79E-03	2.40E-06	2.40E-02	1.20E-05
T-02101	EH Product Off-Spec Tank	2.99E-02	1.50E-05	2.99E-02	1.50E-05	2.99E-03	1.50E-06	1.50E-02	7.48E-06
T-02102	EH Ethanol Product Storag	8.48E-02	4.24E-05	8.48E-02	4.24E-05	8.48E-03	4.24E-06	4.24E-02	2.12E-05
Total	**2.74E-04**		**1.05E-04**		**1.05E-04**		**1.05E-05**		**5.27E-05**

Gasoline HAPs Emissions:

ID	Source Description	Pollutant	Mass Fraction (1)	VOC (ton/yr)	% Gasoline by weight	HAPs (2, 3) (lb/hr)	HAPs (lb/yr)	HAPs (ton/yr)
T-02102	EH Ethanol Product Storage Tank	Benzene	0.0025	0.21	4.76%	5.76E-06	0.05	2.52E-05
		Cumene	0.0001	0.21	4.76%	2.30E-07	0.00	1.01E-06
		Toluene	0.005	0.21	4.76%	1.15E-05	0.10	5.04E-05
		Xylene	0.0005	0.21	4.76%	1.15E-06	0.01	5.04E-06
		Ethylbenzene	0.00005	0.21	4.76%	1.15E-07	0.00	5.04E-07
		Carbon disulfide	0.00002	0.21	4.76%	4.61E-08	0.00	2.02E-07
T-02105	EH Denaturant Storage Tank	Benzene	0.0025	1.14	100%	6.48E-04	5.68	2.84E-03
		Cumene	0.0001	1.14	100%	2.59E-05	0.23	1.14E-04
		Toluene	0.005	1.14	100%	1.30E-03	11.36	5.68E-03
		Xylene	0.0005	1.14	100%	1.30E-04	1.14	5.68E-04
		Ethylbenzene	0.00005	1.14	100%	1.30E-05	0.11	5.68E-05
		Carbon disulfide	0.00002	1.14	100%	5.19E-06	0.05	2.27E-05
Total								**9.36E-03**

(1) Mass fraction is based on Gasoline Specification (RVP-13).
(2) HAPs from Gasoline calculated as (Mass Fraction) x (Gasoline Storage Tank VOCs)
(3) HAPs from Denaturant added to Ethanol calculated as (% Gasoline by Weight) x (Denatured Etoh Storage Tank VOCs) x (Mass Fraction)

Corrosion Inhibitor

Vendor recommended adding DCI-11 to the oxygenate (gasoline) so that a concentration of 6-12 mg/L is provided in the finished

Max. Denatured Ethanol Production - Permit	18.90	MMgpy
	1.24E+08	lb/yr
Midpoint of Recommended Concentration	9	mg/L
	7.51E-05	lb/gal
Density of Product	7.84	lb/gal
Required Product	1,419.56	lb/yr
	182	gal/yr
DCI-11 HAPs Composition:		
Methanol (67-56-1)	25%	
	354.89	lb/yr
Xylene (1330-20-7)	10%	
	141.96	lb/yr
Ethylbenzene (100-41-4)	1%	
	14.20	lb/yr
Percent of Total Liquid Weight:		
Methanol (67-56-1)	0.000286%	
Xylene (1330-20-7)	0.000114%	
Ethylbenzene (100-41-4)	0.000011%	

Due to the very small amount of corrosion inhibitor added to the denatured ethanol, the tank emissions are unchanged.

EP-02100
Vapor Recovery System and Loading Losses

Loading Losses

Basis: AP-42 Section 5.2 Transportation and Marketing of Petroleum Liquids, Final Section, January 1995.
California Climate Action Registry (CCAR) General Reporting Protocol, Version 2.2, March 2007.
Tanker trucks receiving denatured ethanol previously carried natural gasoline.
All rail cars assumed dedicated to denatured ethanol transportation.
Emissions controlled by John Zink carbon adsorption hydrocarbon vapor recovery system. Emissions guaranteed controlled to at least 0.0835 lb/1000 gallons loaded; or approximately 98.2% destruction efficiency, rounded to 98%.
Volatile organic compounds are absorbed in activated carbon beds, then returned to liquid product tanks.

Criteria:

	Annual Ethanol (Denatured) Loadout	18,900,000	gal/yr
	Annual Gasoline (Denaturant) Loadout	900,000	gal/yr
	Receiving Schedule	3,960	hr/yr
	% Loadout by Truck	100%	
	% Loadout by Rail	0%	
Ethanol HAPs:	Acetaldehyde	200	ppmw
	Methanol	200	ppmw
	Acrolein	20	ppmw
	Formaldehyde	100	ppmw

Emission Factor Equation: **L_L = 12.46(SPM)/T** Equation 5.2-1

where:
L_L = loading loss, pounds per 1000 gallons (lb/1000 gal) of liquid loaded
S = saturation factor
P = true vapor pressure of liquid loaded per square inch absolute (psia)
M = molecular weight of vapors (pounds per pound-mole, lb/lb-mole)
T = temperature on bulk liquid loaded (deg R)

		Tanker Truck	Rail Car	Unit	Notes
Saturation Factor, Submerged Loading	S	0.6	0.5		Table 5.2-1
True Vapor Pressure	P				
Ethanol (Denatured)		0.7494	0.7494	psia	Average vapor pressure from Tanks 4.09
Gasoline (Denaturant)		6.5993	6.5993	psia	Average vapor pressure from Tanks 4.09
Molecular Weight of Vapors	M				
Ethanol (Denatured)		49.60	49.60	lb/lb-mole	From Tanks 4.09
Gasoline (Denaturant)		62.00	62.00	lb/lb-mole	From Tanks 4.09
Temperature of Bulk Liquid	T				
Ethanol (Denatured)		514.87	514.87	deg R	From Tanks 4.09, average ambient temperature for Dodge City, KS
Gasoline (Denaturant)		514.87	514.87	deg R	From Tanks 4.09, average ambient temperature for Dodge City, KS.
Collection Efficiency	%	90%	90%		Vendor
Destruction Efficiency	%	98.0%	98.0%		Vendor
Overall Reduction Efficiency	%	88.2%	88.2%		ColEff x DisEff

Emission Factors:

Material	Loadout Method	Uncontrolled VOC (lb/1000 gal)	Controlled VOC (lb/1000 gal)	Fugitive VOC (lb/1000 gal)
Ethanol	Tanker Truck	0.5397	0.0637	0.054
Ethanol	Rail Car	0.4498	0.0531	0.045
Gasoline	Tanker Truck	5.941	0.7010	0.594

VOC Emissions:

		Uncontrolled VOC		EP-1250 Controlled VOC		EP-02100FUG Fugitive VOC	
Material	Loadout Method	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Ethanol	Tanker Truck	2.576	5.10	0.304	0.60	0.258	0.51
Ethanol	Rail Car	0.000	0.00	0.000	0.00	0.000	0.00
Gasoline	Tanker Truck	1.350	2.67	0.159	0.32	0.135	0.27
Total			**7.77**		**0.92**		**0.78**

EP-02100
Vapor Recovery System and Loading Losses

EP-02100 Etoh Uncontrolled HAPs Emissions:

Material	Loadout Method	VOC (ton/yr)	Acetaldehyde (ton/yr)	Methanol (ton/yr)	Acrolein (ton/yr)	Formaldehyde (ton/yr)	
Ethanol	Tanker Truck	5.10	1.02E-03	1.02E-03	1.02E-04	5.10E-04	
Ethanol	Rail Car	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Total**
Total			**1.02E-03**	**1.02E-03**	**1.02E-04**	**5.10E-04**	**2.65E-03**

EP-02100 Etoh Controlled HAPs Emissions:

Material	Loadout Method	VOC (ton/yr)	Acetaldehyde (ton/yr)	Methanol (ton/yr)	Acrolein (ton/yr)	Formaldehyde (ton/yr)	
Ethanol	Tanker Truck	0.60	1.20E-04	1.20E-04	1.20E-05	6.02E-05	
Ethanol	Rail Car	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Total**
Total			**1.20E-04**	**1.20E-04**	**1.20E-05**	**6.02E-05**	**3.13E-04**

EP-02100FUG Etoh Fugitive HAPs Emissions:

Material	Loadout Method	VOC (ton/yr)	Acetaldehyde (ton/yr)	Methanol (ton/yr)	Acrolein (ton/yr)	Formaldehyde (ton/yr)	
Ethanol	Tanker Truck	0.51	1.02E-04	1.02E-04	1.02E-05	5.10E-05	
Ethanol	Rail Car	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**Total**
Total			**1.02E-04**	**1.02E-04**	**1.02E-05**	**5.10E-05**	**2.65E-04**

EP-02100 Gasoline (Denaturant) Uncontrolled HAPs Emissions:

Material	Loadout Method	Pollutant	% Gasoline	Mass Fraction [1]	VOC Uncontrolled (ton/yr)	HAPs [2, 3] Uncontrolled (ton/yr)
Ethanol	Tanker Truck	Benzene	4.90%	0.0025	5.10	6.25E-04
		Cumene	4.90%	0.0001	5.10	2.50E-05
		Toluene	4.90%	0.005	5.10	1.25E-03
		Xylene	4.90%	0.0005	5.10	1.25E-04
		Ethylbenzene	4.90%	0.00005	5.10	1.25E-05
		Carbon disulfide	4.90%	0.00002	5.10	5.00E-06
Ethanol	Rail Car	Benzene	4.90%	0.0025	0.00	0.00E+00
		Cumene	4.90%	0.0001	0.00	0.00E+00
		Toluene	4.90%	0.005	0.00	0.00E+00
		Xylene	4.90%	0.0005	0.00	0.00E+00
		Ethylbenzene	4.90%	0.00005	0.00	0.00E+00
		Carbon disulfide	4.90%	0.00002	0.00	0.00E+00
Gasoline	Tanker Truck	Benzene	100%	0.0025	2.67	6.68E-03
		Cumene	100%	0.0001	2.67	2.67E-04
		Toluene	100%	0.005	2.67	1.34E-02
		Xylene	100%	0.0005	2.67	1.34E-03
		Ethylbenzene	100%	0.00005	2.67	1.34E-04
		Carbon disulfide	100%	0.00002	2.67	5.35E-05
Total						**0.02**

(1) Mass fraction is based on Gasoline Specification (RVP-13).
(2) HAPs from Gasoline calculated as (Mass Fraction) x (Gasoline Storage Tank VOCs)
(3) HAPs from Denaturant added to Ethanol calculated as (% Gasoline) x (Denatured Etoh Storage Tank VOCs) x (Mass Fraction)

EP-02100
Vapor Recovery System and Loading Losses

Gasoline (Denaturant) Controlled and Fugitive HAPs Emissions:					VOC		HAPs (2, 3)	
				Mass	EP-02100 Controlled	EP-02100FUG Fugitive	EP-02100 Controlled	EP-02100FUG Fugitive
Material	Loadout Method	Pollutant	% Gasoline	Fraction (1)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)
Ethanol	Tanker Truck	Benzene	4.90%	0.0025	0.60	0.51	7.37E-05	6.25E-05
		Cumene	4.90%	0.0001	0.60	0.51	2.95E-06	2.50E-06
		Toluene	4.90%	0.005	0.60	0.51	1.47E-04	1.25E-04
		Xylene	4.90%	0.0005	0.60	0.51	1.47E-05	1.25E-05
		Ethylbenzene	4.90%	0.00005	0.60	0.51	1.47E-06	1.25E-06
		Carbon disulfide	4.90%	0.00002	0.60	0.51	5.90E-07	5.00E-07
Ethanol	Rail Car	Benzene	4.90%	0.0025	0.00	0.00	0.00E+00	0.00E+00
		Cumene	4.90%	0.0001	0.00	0.00	0.00E+00	0.00E+00
		Toluene	4.90%	0.005	0.00	0.00	0.00E+00	0.00E+00
		Xylene	4.90%	0.0005	0.00	0.00	0.00E+00	0.00E+00
		Ethylbenzene	4.90%	0.00005	0.00	0.00	0.00E+00	0.00E+00
		Carbon disulfide	4.90%	0.00002	0.00	0.00	0.00E+00	0.00E+00
Gasoline	Tanker Truck	Benzene	100%	0.0025	0.32	0.27	7.89E-04	6.68E-04
		Cumene	100%	0.0001	0.32	0.27	3.15E-05	2.67E-05
		Toluene	100%	0.005	0.32	0.27	1.58E-03	1.34E-03
		Xylene	100%	0.0005	0.32	0.27	1.58E-04	1.34E-04
		Ethylbenzene	100%	0.00005	0.32	0.27	1.58E-05	1.34E-05
		Carbon disulfide	100%	0.00002	0.32	0.27	6.31E-06	5.35E-06
Total							**0.00**	**0.00**

(1) Mass fraction is based on Gasoline Specification (RVP-13) MSDS.
(2) HAPs from Gasoline calculated as (Mass Fraction) x (Gasoline Storage Tank VOCs)
(3) HAPs from Denaturant added to Ethanol calculated as (% Gasoline) x (Denatured Etoh Storage Tank VOCs) x (Mass Fraction)

Abengoa Bioenergy Biomass of Kansas, LLC **Biorefinery Facility** **Hugoton, Kansas**	**Rev. 3**

AREA 02700
Ash Pelletizing

Criteria Pollutants

Basis: AP-42 Section 1.4 Natural Gas Combustion, Final Section, July 1998.
California Climate Action Registry (CCAR) General Reporting Protocol, Version 3.1, January 2009.
Vendor supplied destruction efficiencies used to estimate emissions.
Calculations include use of a waste heat evaporator.
PTE based on 100% natural gas.
PM/PM_{10}/$PM_{2.5}$ emissions are controlled in two (2) separate baghouses, one at the dryer exhaust and one at the cooler.
CO_2 emissions from the ash dryer are from natural gas combustion only.

Criteria:

Number of Dryers	1		
Dryer Heat Input	20.00	MMBtu/hr	
Ash Pellets Production	102,018	ton/yr	
Ash Pellets Production	12	ton/hr	
Receiving Schedule	3,960	hr/yr	**Based on 12 hr/day, 330 day/yr.
Annual Operations	8,760	hr/yr	
Natural Gas Heat Value	1,020	BTU/scf	

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-02701	Ash Pelletizer Dryer DC	10,000	24	75	3.14	53.05	16.17	300	422
EP-02702	Ash Pelletizer Cooler DC	5,000	18	65	1.77	47.16	14.37	90	305
EP-02710	Ash Pellets Load-Out Silo	589	6	65	0.20	50.00	15.24	Ambient	Ambient
EP-02711	Ash Pellets Load-Out Silo Spo	1,400	10	40	0.55	42.78	13.04	Ambient	Ambient

Emission Factor Equation: PM/PM_{10} Emissions (lb/hr) = (cfm) x (gr/dscf) x (60 min/hr) / (gr/lb)

BACT Emission Factor	0.004	gr/dscf	All PM is assumed to be less than 1.0 micrometer in diameter.
Conversion Factor	7,000	gr/lb	
Conversion Factor	60	min/hr	

Combustion Emission Factors:

Criteria Pollutants	EF	Unit	Notes
NO_x	44.88	lb/MMscf	Maximum BACT Low-NOx Burner (LNB) = 0.04 MMBtu/hr (or 30 ppm @ 3% O_2) plus NOx from process generated NOx (estimated at 10% of the NOx generated from fuel combustion)
SO_2	0.60	lb/MMscf	Table 1.4-2
CO	81.60	lb/MMscf	MMBtu/hr (or 50 ppm @ 3% Oxygen) plus CO from process generated CO (estimated to be equal to the CO generated from fuel combustion)
VOC	5.5	lb/MMscf	Table 1.4-2
Lead	0.0005	lb/MMscf	Table 1.4-2
GHG Pollutants			
Natural Gas CO_2	118,707.50	lb/MMscf	CCAR Table C.7 (53.06 kg CO_2/MMBtu, 100% Oxidization)
CH_4	2.25	lb/MMscf	CCAR Table C.8 (0.001 kg CH_4/MMBtu)
N_2O	0.22	lb/MMscf	CCAR Table C.8 (0.0001 kg N_2O/MMBtu)

(1) Emission factors for NOx, CO , and NH_3 in parts per million (ppm) converted to lb/MMBtu as follows:

EF (lb/MMBtu) = (ppm) x (k) x (F) x (20.9 / (20.9-%O_2))

Where:

NO_x =	30	ppm
CO =	50	ppm
%O_2 =	3	%
k =	unit conversion, (2.59E-09 x Molecular Weight (M)) lb/dscf = 1 ppm	
k (for NO_2) =	1.19E-07	(lb/scf)/ppm
k (for CO) =	7.25E-08	(lb/scf)/ppm
F =	8710	dscf/MMBtu, From Table 19-2 of Method 19 for Natural Gas
Molecular weight of NO_x as NO_2 =	46	
Molecular weight of CO =	28	

AREA 02700
Ash Pelletizing

Combustion Emissions:	Control Efficiency	EP-02701 Ash Pelletizer Dryer Uncontrolled		EP-02701 Ash Pelletizer Dryer Controlled		BACT
Criteria Pollutants	(%)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	lb/MMBtu
NO_x	0%	0.88	3.85	0.88	3.85	0.044
SO_2	0%	0.01	0.05	0.01	0.05	0.0006
CO	0%	1.60	7.01	1.60	7.01	0.080
VOC	0%	0.11	0.47	0.11	0.47	0.005
Lead	0%	9.80E-06	4.29E-05	9.80E-06	4.29E-05	--
GHG Pollutants						
Natural Gas CO_2	0%	2,328	10,195	2,328	10,195	--
CH_4	0%	0.04	0.19	0.04	0.193	--
N_2O	0%	0.00	0.02	0.00	0.019	--

PM, PM_{10} & $PM_{2.5}$ Emissions:

ID	Emission Source	PM		PM_{10}		$PM_{2.5}$		Notes:
		(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	
EP-02701	Ash Pelletizer Dryer DC	0.34	1.50	0.34	1.50	0.34	1.50	Note 1
EP-02702	Ash Pelletizer Cooler DC	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-02710	Ash Pellets Load-Out Silo	0.02	0.09	0.02	0.09	0.02	0.09	Notes 1, 2
EP-02711	Ash Pellets Load-Out Silo Spout	0.05	0.10	0.05	0.10	0.05	0.10	Note 3

(1) Equipment assumed to operate 24 hr/day, 365 day/yr.
(2) EP-02710 is related to emissions generated within the silo while the silo is being filled from the ash pelletizer dryer.
(3) EP-02711 is for the load-out spout specifically. EP-02711 will be equipped with a fabric filter to control dust emissions generated from dumping material into a truck. EP-02711 will operate intermittent, assumed not more than 12 hours per days, 330 days per year.

HAPs from Natural Gas Combustion

Basis: AP-42 Section 1.4 Natural Gas Combustion, Final Section, July 1998.
HAPs emission from Natural Gas Combustion in the DDGS dryer.
Only factors for pollutants noted as HAPs as defined by Section 112(b) of the Clean Air Act listed.
AP-42 factors marked as "less than" are omitted as emissions from such pollutants are negligible.

Criteria:

Annual Operations	8,760	hr/yr
Natural Gas Heat Value	1,020	BTU/scf
Dryer Heat Input	20	MMBtu/hr
Dryer Heat Input	0.01961	MMscf/hr

Pollutant	Emission Factor [1] lb/MMscf	Emissions (lb/hr)	(lb/yr)	(ton/yr)
2-Methylnaphthalene	2.40E-05	4.71E-07	4.12E-03	2.06E-06
Benzene	2.10E-03	4.12E-05	3.61E-01	1.80E-04
Dichlorobenzene	1.20E-03	2.35E-05	2.06E-01	1.03E-04
Fluoranthene	3.00E-06	5.88E-08	5.15E-04	2.58E-07
Fluorene	2.80E-06	5.49E-08	4.81E-04	2.40E-07
Formaldehyde	7.50E-02	1.47E-03	1.29E+01	6.44E-03
Hexane	1.8	3.53E-02	3.09E+02	1.55E-01
Naphthalene	6.10E-04	1.20E-05	1.05E-01	5.24E-05
Phenanathrene	1.70E-05	3.33E-07	2.92E-03	1.46E-06
Pyrene	5.00E-06	9.80E-08	8.59E-04	4.29E-07
Toluene	3.40E-03	6.67E-05	5.84E-01	2.92E-04
Arsenic	2.00E-04	3.92E-06	3.44E-02	1.72E-05
Cadmium	1.10E-03	2.16E-05	1.89E-01	9.45E-05
Chromium	1.40E-03	2.75E-05	2.40E-01	1.20E-04
Cobalt	8.40E-05	1.65E-06	1.44E-02	7.21E-06
Manganese	3.80E-04	7.45E-06	6.53E-02	3.26E-05
Mercury	2.60E-04	5.10E-06	4.47E-02	2.23E-05
Nickel	2.10E-03	4.12E-05	3.61E-01	1.80E-04
Total		**3.70E-02**		**1.62E-01**

(1) Table 1.4-3 and Table 1.4-4

AREA 02700
Ash Pelletizing

Ash Pellets Load-Out From Silo Fugitive Emissions

Basis: AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.
Ash Pellets will be typically shipped offsite either by trucks or rail cars that are loaded from the elevated Ash Pellets Load-Out Silo (EP-02710) or an elevated conveyor system connected to the silo. For the purposes of calculating PTE, all load-out was assumed to truck. The trucks will be filled using the Ash Pellets Load-Out Spout (EP-02711). The particulate emissions generated from the loading of material from the silo to the trucks or rail cars was assumed equivalent to the particulate emissions generated by the drop operation for
An alternative ash pellets handling scenarios includes storing excess ash pellets at the ash pellet storage pit. Ash pellets trucked and dumped at the ash pellet storage pit to be loaded later onto trucks using a front end loader for off-site transport. The particulate emissions generated from the loading of the storage pile and the loading of trucks was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles. See the ash pellets storage pit emission calculations for ash pellets storage
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Ash Production Rate	23,292	lb/hr
Ash Pellets Shipping Rate	66	ton/hr
Annual Ash Production	102,018	ton/yr
% Loadout by Truck	100%	

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	5	5	5	%	Vendor Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Ash Pellet Load-Out Operations (Drop Operations)	2.12E-03	1.00E-03	1.52E-04	lb/ton	Equation 13.2.4-1

PM Emissions:

		Throughput		Emission Factor	Uncontrolled PM		Capture Efficiency	Fugitive Emissions	
ID	Emission Source	(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-02710FUG	Ash Pellets Load-Out from Silo	66	102,018	2.12E-03	0.14	0.11	0%	0.14	0.11
Total					**0.14**	**0.11**		**0.14**	**0.11**

PM_{10} Emissions:

		Throughput		Emission Factor	Uncontrolled PM_{10}		Capture Efficiency	Fugitive Emissions	
ID	Emission Source	(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-02710FUG	Ash Pellets Load-Out from Silo	66	102,018	1.00E-03	0.07	0.05	0%	0.07	0.05
Total					**0.07**	**0.05**		**0.07**	**0.05**

$PM_{2.5}$ Emissions:

		Throughput		Emission Factor	Uncontrolled $PM_{2.5}$		Capture Efficiency	Fugitive Emissions	
ID	Emission Source	(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-02710FUG	Ash Pellets Load-Out from Silo	66	102,018	1.52E-04	0.010	0.008	0%	0.010	0.008
Total					**0.010**	**0.008**		**0.010**	**0.008**

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

EP-04001
Enzymatic Hydrolysis Cooling Water Tower (CWT)

Basis: AP-42, Section 13.4 Wet Cooling Towers, Final Section, January 1995.
Circulation rate, total dissolved solids and drift losses is based on Rev 0 PFD, Vogelbusch Process Design (including a 20% safety margin), and US Water Preliminary Water Balance with CWT operating at four cycles.
Particulate emissions (PM) assumed condensible, therefore all assumed to be less than 1.0 micrometer in diameter.
The circulation rate is based on EH and balance of plant needs.

Emission Factor Equation: $PM/PM_{10}/PM_{2.5}$ Emissions (lb/hr) = (Circulation Rate) x (TDS / 1,000,000) x (Drift Loss) x (Water Density)

Criteria:

Drift Rate	0.0002%		
Number of Cells	1		
Cooling Tower Water Density	8.31	lb/gal	
TDS	2,263	ppm	
Circulation Rate	14,400	gpm	Includes a 20% safety margin
Circulation Rate	864,000	gal/hr	
Annual Operations	8,760	hr/yr	

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-04001	EH Cooling Water Tower								
EP04001A	Cell 1	1,258,000	396	44	855.30	24.51	7.47	72	295

$PM/PM_{10}/PM_{2.5}$ Emissions:

ID	Emission Source	PM (lb/hr)	PM (ton/yr)	PM_{10} (lb/hr)	PM_{10} (ton/yr)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (ton/yr)
EP-04001	EH Cooling Water Tower	0.03	0.14	0.03	0.14	0.03	0.14
Total			**0.14**		**0.14**		**0.14**

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

EP-21001
Cogeneration Cooling Water Tower (CWT)

Basis: AP-42, Section 13.4 Wet Cooling Towers, Final Section, January 1995.
Circulation rate, total dissolved solids and drift losses is based on US Water Preliminary Water Balance with CWT (with flooded condenser) operating at four cycles.
Particulate emissions (PM) assumed condensible, therefore all assumed to be less than 1.0 micrometer in diameter.

Emission Factor Equation: $PM/PM_{10}/PM_{2.5}$ Emissions (lb/hr) = (Circulation Rate) x (TDS / 1,000,000) x (Drift Loss) x (Water Density)

Criteria:

Drift Rate	0.0002%		
Number of Cells	5		
Cooling Tower Water Density	8.31	lb/gal	
TDS	2,225	ppm	
Circulation Rate	72,000	gpm	Includes a 20% safety margin
Circulation Rate	4,320,000	gal/hr	
Annual Operations	8,760	hr/yr	

Source Details:

ID	Emission Source	Stack Flow Rate	Stack Diameter	Release Height	Stack Area	Gas Velocity		Gas Exit Temperature	
		(cfm)	(in)	(ft)	(ft^2)	(ft/s)	(m/s)	(deg F)	(deg K)
EP-21001	CoGen Cooling Water Tower								
EP21001A	Cell 1	1,258,000	396	44	855.30	24.51	7.47	72	295
EP21001B	Cell 2	1,258,000	396	44	855.30	24.51	7.47	72	295
EP21001C	Cell 3	1,258,000	396	44	855.30	24.51	7.47	72	295
EP21001D	Cell 4	1,258,000	396	44	855.30	24.51	7.47	72	295
EP21001E	Cell 5	1,258,000	396	44	855.30	24.51	7.47	72	295

$PM/PM_{10}/PM_{2.5}$ Emissions:

ID	Emission Source	PM		PM_{10}		$PM_{2.5}$	
		(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EP-21001	CoGen Cooling Water Tower	0.16	0.70	0.16	0.70	0.16	0.70
Total			**0.70**		**0.70**		**0.70**

EP-20001 through EP-20004
Biomass-Fired Boilers #1 through #4

Fuel Configuration

Basis:
AP-42 Section 1.6 Wood Residue Combustion in Boilers, Final Section, September 2003.
Vendor supplied uncontrolled and controlled emissions based on ABHK blended fuel specifications.
The Biomass-Fired Boiler system consists of four (4) bubbling fluidized bed (BFB) boilers.
Gaseous fuel will be supplied to the Biomass-Fired Boiler system from the wastewater treatment system to optimize the energy available from the biogas.
ABNT Cogeneration Model used to determine blended fuel rate, composition and HHV. Final engineering of the Biomass-Fired Boiler system has not been completed.
California Climate Action Registry (CCAR) General Reporting Protocol, Version 3.1, January 2009.
EH Stillage Cake is assumed similar to Starch WDGS. Wood residue has a heating value that ranges from about 4,500 Btu/lb wet, as-fired basis to 8,000 Btu/lb dry wood. The moisture contents can vary from 5 to 75 wt% depending of residue type and storage operations.
Distillers biomass thin stillage (EH syrup) is sent directly to wastewater treatment. The evaporators have been removed from the project d

Solid Fuel	Worst Case Fuel Blend			Alternate Fuel Blend			
Fuel Component (Dry Basis)	EH Stillage (wt%)	Corn Stover (wt%)	Blended Biomass (wt%)	EH Stillage (wt%)	Corn Stover (wt%)	Wood Residues (wt%)	Blended Biomass (wt%)
Carbon	48.21	46.19	46.43	48.21	46.19	50.00	48.13
Hydrogen	4.84	5.6	5.51	4.84	5.6	5.98	5.68
Oxygen	26.96	40.16	38.60	26.96	40.16	42.57	39.68
Nitrogen	1.16	0.6	0.67	1.16	0.6	0.22	0.50
Sulfur	0.37	0.07	0.11	0.37	0.07	0.05	0.10
Ash	18.46	7.14	8.48	18.46	7.14	1.15	5.80
Chlorine	0.05	0.24	0.22	0.05	0.24	0.03	0.12
Total wt%	100.05	100.00	100.01	100.05	100.00	100.00	100.01
Moisture	67%	15%	21.14%	67%	15%	25%	25.61%
Fee Rate (dry ton/day)	330	2,465	2,795	330	1,215	1,250	2,795
Feed Rate (wet lb/hr)	83,333	241,667	325,000	83,333	119,118	138,889	341,340

Solid Fuel Energy Usage:							
HHV (Btu/dry lb)	8,186	7,840	7,881	8,186	7,840	8380	8,122
HHV (MMBtu/dry ton)	16.37	15.68	15.76	16.37	15.68	16.76	16.24
Energy (MMBtu/hr)	225	1,610	1,836	225	794	873	1,892

EP-20001 through EP-20004 Biomass-Fired Boilers #1 through #4

Gaseous Fuel Specifications:

Fuel Components	WWT Biogas mol frac	12009 Digester Vent Gas mol frac	14004 pH Tank Vent mol frac	Various Propagator Vents mol frac	1919.0 Ammonia Tank Vent mol frac	Blended Fuel Gas mol frac	Component HHV (Btu/scf)	Component LHV (Btu/scf)
CO	0	0	0	0	0	0	322	322
H_2	0	0	0	0	0	0	325	275
H_2S	1.00E-04	0	0	0	0	3.34E-05	647	596
NH_3	0	0	0	0	3.51E-02	9.36E-07	441	365
Methane, CH_4	6.50E-01	0	1.13E-04	2.37E-08	0	2.17E-01	1,013	913
Ethane, C_2H_6	0	0	0	0	0	0	1,792	1,641
Ethanol, C_2H_5OH	0	8.12E-06	0	0	0	1.21E-07	1,792	1,641
Acetic Acid/Furfural	0	4.12E-03	7.93E-05	2.26E-05	0	7.61E-05	1,037.7	946.5
Ethylene, C_2H_4	0	0	0	0	0	0	1,614	1,513
Tars, $C_{10}H_8$	0	0	0	0	0	0	5,854	5,654
CO_2	3.50E-01	0	0	2.12E-02	0	1.31E-01	--	--
H_2O/Inerts	0	0.9960	0.9995	0.9788	0.9660	0.65	--	--
Total mol frac	1.00	1.00	1.00	1.00	1.00	1.00		

↓↓↓↓↓

Fuel Components	16002 Propagator Vent mol frac	16016.0 Propagator Vent mol frac	16019.0 Propagator Vent mol frac	16022.0 Propagator Vent mol frac	16025.0 Propagator Vent mol frac
CO	0	0	0	0	0
H_2	0	0	0	0	0
H_2S	0	0	0	0	0
NH_3	0	0	0	0	0
Methane, CH_4	1.13E-05	0	0	0	0
Ethane, C_2H_6	0	0	0	0	0
Ethanol, C_2H_5OH	0	0	0	0	0
Acetic Acid/Furfural	1.22E-04	0	2.38E-05	0	2.28E-05
Ethylene, C_2H_4	0	0	0	0	0
Tars, $C_{10}H_8$	0	0	0	0	0
CO_2	0	0	6.10E-03	9.46E-03	2.32E-02
H_2O/Inerts	0.9996	0.9960	0.9939	0.9905	0.9768
Total mol frac	1.00	1.00	1.00	1.00	1.00
Volumetric Flow (lb-mol/hr)	1.71	2.27	14.91	96.08	702.85

Gaseous Fuel Energy Usage:

Gas HHV (Btu/scf)	658.41	4.29	0.20	0.02	15.49	220.22
Gas LHV (Btu/scf)	593.42	3.91	0.18	0.02	12.82	198.48
Volumetric Flow (lb-mol/hr)	420.24	18.73	0.05	817.82	0.03	1,256.87
Volumetric Flow (MMscf/hr)	0.16	0.01	0.00	0.31	0.00	0.48
Energy (MMBtu/hr)	105.00	0.03	0.00	0.01	0.000	105.04

Criteria:

Number of Solids-Fired Boilers	4		
Total Area 20000 Heat Input - Permit	2,000	MMBtu/hr	Based on fuel energy, rounded up
Heat Input Per Boiler	500	MMBtu/hr	
Annual Operations	8,760	hr/yr	

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-20001	Biomass-Fired Boiler #1	220,000	120	120	78.54	46.69	14.23	380	466
EP-20002	Biomass-Fired Boiler #2	220,000	120	120	78.54	46.69	14.23	380	466
EP-20003	Biomass-Fired Boiler #3	220,000	120	120	78.54	46.69	14.23	380	466
EP-20004	Biomass-Fired Boiler #4	220,000	120	120	78.54	46.69	14.23	380	466

EP-20001 through EP-20004
Biomass-Fired Boilers #1 through #4

Biomass-Fired Boiler Emissions

Emission Factors:		Solid	Gaseous	Total	
Criteria Pollutants		(lb/dry ton)	(lb/hr)	(lb/MMBtu)	Notes
NO_X		3.50	Negligible	0.22	Predicted NOx for similar fuel combustion for BFB from vendor testing (~ 8% fuel N conversion to NOx). Low combustion temps (<1500 ^oF) minimize thermal NOx.
SO_2		4.22	2.69	0.29	Predicted SOx for similar fuel combustion for BFB from vendor testing (100% fuel S conversion to SOx).
CO		2.16	0	0.14	Predicted CO for similar fuel combustion for BFB from vendor testing.
VOC		0.268	Negligible	0.017	Table 1.6-3
PM	Filterable	--		1.409	Table 1.6-1 Filterable PM from wood residue combustion, bark and wet wood. Adjusted to meet vendor test data.
PM_{10}	Filterable	--		1.258	Table 1.6-1 Filterable PM_{10} from wood residue combustion, bark and wet wood. Adjusted to meet vendor test data.
$PM_{2.5}$	Filterable	--		1.082	Table 1.6-1 Filterable $PM_{2.5}$ from wood residue combustion, bark and wet wood. Adjusted to meet vendor test data.
PM	Condensible	--		0.017	Table 1.6-1 Condensible PM from wood residue combustion, bark and wet wood.
PM_{10}	Condensible	--		0.017	Table 1.6-1 Condensible PM from wood residue combustion, bark and wet wood.
$PM_{2.5}$	Condensible	--		0.017	Table 1.6-1 Condensible PM from wood residue combustion, bark and wet wood.
Lead		7.57E-04	Negligible	4.80E-05	Table 1.6-4
NH_3		--		4.76E-03	Predicted 10 ppmv NH_3 slip from boiler vendor. Includes NH_3 from gaseous fuel source.
GHG Pollutants					
CO_2		3,404.76	19,250.11	399.27	Boiler fuel criteria engineering calculations - 100% conversion fuel carbon to CO_2.
CH_4		--		0.071	CCAR Table C.8 (0.032 kg CH_4/MMBtu). Methane is a combustible boiler fuel.
N_2O		--		0.0093	CCAR Table C.8 (0.0042 kg N_2O/MMBtu).

(1) Emission factors for NH_3 in parts per million (ppm) converted to lb/MMBtu as follows:

EF (lb/MMBtu) = (ppm) x (k) x (F) x (20.9/(20.9-%O_2))

Where:

NH_3 = 10 ppm
%O_2 = 3 %
k = unit conversion, (2.59E-09 x Molecular Weight (M)) lb/dscf = 1 ppm
k (for NH_3) = 4.41E-08 (lb/scf)/ppm
F = 9240 dscf/MMBtu, From Table 19-2 of Method 19 for Wood Residue
Molecular weight of NH_3 = 17.03

Emissions:		Control Efficiency	20004 Biomass-Fired Boilers Uncontrolled		20004 Biomass-Fired Boilers Controlled		**EP-20001 to EP-20004 Emissions Per Boiler**		BACT
Criteria Pollutants		(%)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	**(lb/hr)**	**(ton/yr)**	(lb/MMBtu)
NO_X		35%	444.35	1,946.26	288.83	1,265.07	**72.21**	**316.27**	0.14
SO_2		90%	586.28	2,567.90	58.63	256.79	**14.66**	**64.20**	0.03
CO		0%	274.08	1200.48	274.08	1,200.48	**68.52**	**300.12**	0.14
VOC		0%	34.00	148.92	34.00	148.92	**8.50**	**37.23**	0.02
PM	Filterable	99%	2,818.79	12,346.31	28.19	123.46	**7.05**	**30.87**	0.014
PM_{10}	Filterable	99%	2,516.78	11,023.49	25.17	110.23	**6.29**	**27.56**	0.013
$PM_{2.5}$	Filterable	99%	2,164.43	9,480.20	21.64	94.80	**5.41**	**23.70**	0.011
PM	Condensible	0%	34.00	148.92	34.00	148.92	**8.50**	**37.23**	0.017
PM_{10}	Condensible	0%	34.00	148.92	34.00	148.92	**8.50**	**37.23**	0.017
$PM_{2.5}$	Condensible	0%	34.00	148.92	34.00	148.92	**8.50**	**37.23**	0.017
Lead		0%	9.60E-02	4.20E-01	9.60E-02	4.20E-01	**2.40E-02**	**1.05E-01**	--
NH_3		0%	--	--	9.52	41.70	**2.38**	**10.42**	--
GHG Pollutants									
CO_2		0%	798,550	3,497,648	798,550	3,497,648	**199,637**	**874,412**	--
CH_4		0%	141.12	618.11	141.12	618.11	**35.28**	**154.53**	--
N_2O		0%	18.52	81.13	18.52	81.13	**4.63**	**20.28**	--

EP-20001 through EP-20004
Biomass-Fired Boilers #1 through #4

HAPs Emissions from Combustion in Areas 20000

Basis: AP-42 Section 1.6 Wood Residue Combustion in Boilers, Final Section, September 2003.
Speciated HAP emission factors, with the exception of hydrogen chloride, are based on the "Average Emission Factor" provided in AP-42.
Control of acetaldehyde, acrolein, benzene, formaldehyde, naphthalene, styrene and toluene assumed 90% reduction assumed for bubbling bed fluidized bed combustion and good combustion practices. Particulate HAPs (metals) AP-42 emission factors actors are for boilers with no controls or with particulate matter controls; therefore, no additional control for the baghouses were applied.
Chlorine emission factor obtained from AP-42 Section 1.6 Wood Residue Combustion in Boilers.
Hydrogen chloride emission factor based on the worst case assumptions that 100% of fuel chlorine becomes hydrogen chloride and control efficiency obtained from Vendor specifications.
Control options of hydrogen chloride are essentially the same as for other acid gases and particulate matter emissions. The proposed control for acid gases and particulate matter are BACT, which will provide a consistently achievable 95% control efficiency for hydrogen chloride emissions, thereby meeting the established case-by-case MACT requirements.
and Natural Resources, Division of Air Quality, June 11, 2008 Memorandum: *Emission Factors for Wood-Fired Industrial Boilers for 1,2,3,6,7,8-HxCDD.*
Only factors for pollutants noted as HAPs as defined by Section 112(b) of the Clean Air Act listed.

Criteria:

Annual Operations	8,760	hr/yr
Boiler Heat Input	2,000	MMBtu/hr

Pollutant	Emission Factor (lb/MMBtu)	Control Efficiency (%)	Biomass-Fired Boilers Uncontrolled (lb/hr)	Biomass-Fired Boilers Uncontrolled (ton/yr)	Biomass-Fired Boilers Controlled (lb/hr)	Biomass-Fired Boilers Controlled (ton/yr)
TOTAL HAPs	**--**	**--**	**607.18**	**2,659.43**	**35.30**	**154.62**
Acetaldehyde	8.30E-04	90%	1.66	7.27	0.17	0.73
Acrolein	4.00E-03	90%	8.00	35.04	0.80	3.50
Benzene	4.20E-03	90%	8.40	36.79	0.84	3.68
Formaldehyde	4.40E-03	90%	8.80	38.54	0.88	3.85
Naphthalene	9.70E-05	90%	0.19	0.85	0.02	0.08
Styrene	1.90E-03	90%	3.80	16.64	0.38	1.66
Toluene	9.20E-04	90%	1.84	8.06	0.18	0.81
Chlorine	7.90E-04	99%	1.58	6.92	0.02	0.07
Hydrogen chloride	2.84E-01	95%	567.87	2,487.28	28.39	124.36
Dichloromethane (methylene chloride)	2.90E-04	90%	0.58	2.54	0.06	0.25

Pollutant	Emission Factor (lb/MMBtu)	Control Efficiency (%)	Biomass-Fired Boilers Uncontrolled (lb/hr)	Biomass-Fired Boilers Uncontrolled (ton/yr)	Biomass-Fired Boilers Controlled (lb/hr)	Biomass-Fired Boilers Controlled (ton/yr)
Metals:			3.411	14.939	3.411	14.939
Antimony	7.90E-06	0%	1.58E-02	6.92E-02	1.58E-02	6.92E-02
Arsenic	2.20E-05	0%	4.40E-02	1.93E-01	4.40E-02	1.93E-01
Beryllium	1.10E-06	0%	2.20E-03	9.64E-03	2.20E-03	9.64E-03
Cadmium	4.10E-06	0%	8.20E-03	3.59E-02	8.20E-03	3.59E-02
Chromium, total	2.10E-05	0%	4.20E-02	1.84E-01	4.20E-02	1.84E-01
Chromium, hexavalent	3.50E-06	0%	7.00E-03	3.07E-02	7.00E-03	3.07E-02
Cobalt	6.50E-06	0%	1.30E-02	5.69E-02	1.30E-02	5.69E-02
Manganese	1.60E-03	0%	3.20E+00	1.40E+01	3.20E+00	1.40E+01
Mercury	3.50E-06	0%	7.00E-03	3.07E-02	7.00E-03	3.07E-02
Nickel	3.30E-05	0%	6.60E-02	2.89E-01	6.60E-02	2.89E-01
Selenium	2.80E-06	0%	5.60E-03	2.45E-02	5.60E-03	2.45E-02

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Biomass-Fired Boilers #1 through #4

	Emission Factor	Control Efficiency	Biomass-Fired Boilers Uncontrolled		Biomass-Fired Boilers Controlled	
Pollutant	(lb/MMBtu)	(%)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Minor HAPs:			9.83E-01	4.31E+00	9.83E-02	4.31E-01
Acetophenone	3.20E-09	90%	6.40E-06	2.80E-05	6.40E-07	2.80E-06
Benzoic acid (chloramben)	4.70E-08	90%	9.40E-05	4.12E-04	9.40E-06	4.12E-05
bis(2-Ethylhexyl)phthalate (DEHP)	4.70E-08	90%	9.40E-05	4.12E-04	9.40E-06	4.12E-05
Bromomethane (methl bromide)	1.50E-05	90%	3.00E-02	1.31E-01	3.00E-03	1.31E-02
Carbon tetrachloride	4.50E-05	90%	9.00E-02	3.94E-01	9.00E-03	3.94E-02
Chlorobenzene	3.30E-05	90%	6.60E-02	2.89E-01	6.60E-03	2.89E-02
Chloroform	2.80E-05	90%	5.60E-02	2.45E-01	5.60E-03	2.45E-02
Chloromethane (methyl chloride)	2.30E-05	90%	4.60E-02	2.01E-01	4.60E-03	2.01E-02
1,2-Dichloroethane (ethylene dichloride)	2.90E-05	90%	5.80E-02	2.54E-01	5.80E-03	2.54E-02
1,2-Dichloropropane (propylene dichloride)	3.30E-05	90%	6.60E-02	2.89E-01	6.60E-03	2.89E-02
2,4-Dinitrophenol	1.80E-07	90%	3.60E-04	1.58E-03	3.60E-05	1.58E-04
Ethylbenzene	3.10E-05	90%	6.20E-02	2.72E-01	6.20E-03	2.72E-02
Pentachlorophenol	5.10E-08	90%	1.02E-04	4.47E-04	1.02E-05	4.47E-05
4-Nitrophenol	1.10E-07	90%	2.20E-04	9.64E-04	2.20E-05	9.64E-05
Phenol	5.10E-05	90%	1.02E-01	4.47E-01	1.02E-02	4.47E-02
Propionaldehyde	6.10E-05	90%	1.22E-01	5.34E-01	1.22E-02	5.34E-02
Tetrachloroethene	3.80E-05	90%	7.60E-02	3.33E-01	7.60E-03	3.33E-02
1,1,1-Trichloroethane (methyl chloroform)	3.10E-05	90%	6.20E-02	2.72E-01	6.20E-03	2.72E-02
Trichloroethene	3.00E-05	90%	6.00E-02	2.63E-01	6.00E-03	2.63E-02
2,4,6-Trichlorophenol	2.20E-08	90%	4.40E-05	1.93E-04	4.40E-06	1.93E-05
Vinyl chloride	1.80E-05	90%	3.60E-02	1.58E-01	3.60E-03	1.58E-02
o-Xylene	2.50E-05	90%	5.00E-02	2.19E-01	5.00E-03	2.19E-02

	Emission Factor	Biomass-Fired Boilers Uncontrolled		Biomass-Fired Boilers Controlled	
Pollutant	(lb/MMBtu)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Dibenzo furans:		3.74E-06	1.64E-05	3.74E-06	1.64E-05
Heptachlorodibenzo-p-furans	2.40E-10	4.80E-07	2.10E-06	4.80E-07	2.10E-06
Hexachlorodibenzo-p-furans	2.80E-10	5.60E-07	2.45E-06	5.60E-07	2.45E-06
Octachlorodibenzo-p-furans	8.80E-11	1.76E-07	7.71E-07	1.76E-07	7.71E-07
Pentachlorodibenzo-p-furans	4.20E-10	8.40E-07	3.68E-06	8.40E-07	3.68E-06
2,3,7,8-Tetrachlorodibenzo-p-furans	9.00E-11	1.80E-07	7.88E-07	1.80E-07	7.88E-07
Tetrachlorodibenzo-p-furans	7.50E-10	1.50E-06	6.57E-06	1.50E-06	6.57E-06

	Emission Factor	Biomass-Fired Boilers Uncontrolled		Biomass-Fired Boilers Controlled	
Pollutant	(lb/MMBtu)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Polychlorinated biphenyls:		1.59E-05	6.94E-05	1.59E-05	6.94E-05
Decachlorobiphenyl	2.70E-10	5.40E-07	2.37E-06	5.40E-07	2.37E-06
Dichlorobiphenyl	7.40E-10	1.48E-06	6.48E-06	1.48E-06	6.48E-06
Heptachlorobiphenyl	6.60E-11	1.32E-07	5.78E-07	1.32E-07	5.78E-07
Hexachlorobiphenyl	5.50E-10	1.10E-06	4.82E-06	1.10E-06	4.82E-06
Pentachlorobiphenyl	1.20E-09	2.40E-06	1.05E-05	2.40E-06	1.05E-05
Trichlorobiphenyl	2.60E-09	5.20E-06	2.28E-05	5.20E-06	2.28E-05
Tetrachlorobiphenyl	2.50E-09	5.00E-06	2.19E-05	5.00E-06	2.19E-05

EP-20001 through EP-20004
Biomass-Fired Boilers #1 through #4

Pollutant	Emission Factor (lb/MMBtu)	Biomass-Fired Boilers Uncontrolled (lb/hr)	Biomass-Fired Boilers Uncontrolled (ton/yr)	Biomass-Fired Boilers Controlled (lb/hr)	Biomass-Fired Boilers Controlled (ton/yr)
Polycyclic Organic Matter:		5.59E-02	2.45E-01	5.59E-02	2.45E-01
Benzo(a)anthracene	6.50E-08	1.30E-04	5.69E-04	1.30E-04	5.69E-04
Benzo(a)pyrene	2.60E-06	5.20E-03	2.28E-02	5.20E-03	2.28E-02
Benzo(b)fluoranthene	1.00E-07	2.00E-04	8.76E-04	2.00E-04	8.76E-04
Benzo(e)pyrene	2.60E-09	5.20E-06	2.28E-05	5.20E-06	2.28E-05
Benzo(g,h,i)perylene	9.30E-08	1.86E-04	8.15E-04	1.86E-04	8.15E-04
Benzo(j,k)fluoranthene	1.60E-07	3.20E-04	1.40E-03	3.20E-04	1.40E-03
Benzo(k)fluoranthene	3.60E-08	7.20E-05	3.15E-04	7.20E-05	3.15E-04
Chrysene	3.80E-08	7.60E-05	3.33E-04	7.60E-05	3.33E-04
Dibenzo(a,h)anthracene	9.10E-09	1.82E-05	7.97E-05	1.82E-05	7.97E-05
Indeno(1,2,3,c,d)pyrene	8.70E-08	1.74E-04	7.62E-04	1.74E-04	7.62E-04
Acenaphthene	9.10E-07	1.82E-03	7.97E-03	1.82E-03	7.97E-03
Fluorene	3.40E-06	6.80E-03	2.98E-02	6.80E-03	2.98E-02
Anthracene	3.00E-06	6.00E-03	2.63E-02	6.00E-03	2.63E-02
Phenanthrene	7.00E-06	1.40E-02	6.13E-02	1.40E-02	6.13E-02
Fluoranthene	1.60E-06	3.20E-03	1.40E-02	3.20E-03	1.40E-02
Pyrene	3.70E-06	7.40E-03	3.24E-02	7.40E-03	3.24E-02
Perylene	5.20E-10	1.04E-06	4.56E-06	1.04E-06	4.56E-06
Acenaphthylene	5.00E-06	1.00E-02	4.38E-02	1.00E-02	4.38E-02
2-Methylnaphthalene	1.60E-07	3.20E-04	1.40E-03	3.20E-04	1.40E-03
2-Chloronaphthalene	2.40E-09	4.80E-06	2.10E-05	4.80E-06	2.10E-05

Pollutant	Emission Factor (lb/MMBtu)	Biomass-Fired Boilers Uncontrolled (lb/hr)	Biomass-Fired Boilers Uncontrolled (ton/yr)	Biomass-Fired Boilers Controlled (lb/hr)	Biomass-Fired Boilers Controlled (ton/yr)
Dioxins:		1.40E-04	6.13E-04	1.40E-04	6.13E-04
Heptachlorodibenzo-p-dioxins	2.00E-09	4.00E-06	1.75E-05	4.00E-06	1.75E-05
Hexachlorodibenzo-p-dioxins	3.19E-11	6.38E-08	2.79E-07	6.38E-08	2.79E-07
Octachlorodibenzo-p-dioxins	6.60E-08	1.32E-04	5.78E-04	1.32E-04	5.78E-04
Pentachlorodibenzo-p-dioxins	1.50E-09	3.00E-06	1.31E-05	3.00E-06	1.31E-05
2,3,7,8-Tetrachlorodibenzo-p-dioxins	8.60E-12	1.72E-08	7.53E-08	1.72E-08	7.53E-08
Tetrachlorodibenzo-p-dioxins	4.70E-10	9.40E-07	4.12E-06	9.40E-07	4.12E-06

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EP-06001
Firewater Pump Engine (Emergency)

Basis: AP-42 Section 3.3 Gasoline and Diesel Industrial Engines, Final Section, October 1996.
New Source Performance Standard (NSPS) Subpart IIII (Tier 3 standards from 40 CFR 89.112 Table 1, 450≤kW≤560). For emergency engines with maximum engine power greater than 50 horsepower (hp) the manufacturer must certify, pursuant to 40 CFR 60.4202(a)(2), that the engine meets the standards for new non-road compression ignition engines for the same model year and maximum power listed in 40 CFR 89.112. It is assumed that the model to be chosen for this facility will be a 2008 or newer model.
The NSPS Subpart IIII does not have individual limits for NOx or VOC. Instead the limit is applicable to the sum of the two pollutants. Therefore, each pollutant has been estimated at their worst-case, while the limit is applicable to their sum.
California Climate Action Registry (CCAR) General Reporting Protocol, Version 3.1, January 2009.
Emergency firewater pump engine assumed to be a 460 Hp diesel engine. This size engine falls into the NSPS emission standards
Equipment for emergency purposes only.
Standards of Performance Compression Ignition Internal Combustion Engines. This rule does not regulate hours of operations during an emergency.

Criteria:

Annual Operations	100	hrs/yr
Weekly Operations	115.4	min/wk
Brake Specific Fuel Consumption	7,000	Btu/Hp-hr
Diesel Heating Value	19,300	Btu/lb
Density of Diesel	7.1	lb/gal
Unit Size Rating	460	Hp
Unit Size Rating	343.02	kW
Unit Size Rating	3,220,000	Btu/hr

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-06001	Firewater Pump	1,750	12	14	0.79	37.14	11.32	770	683

Emission Factors:

Criteria Pollutants	EF	Unit	Notes
NO_x	4.0	g/kW-hr	NSPS Subpart IIII
SO_2	0.002050	lb/hp-hr	Table 3.3-1
CO	3.50	g/kW-hr	NSPS Subpart IIII
VOC	4.0	g/kW-hr	NSPS Subpart IIII
$PM/PM_{10}/PM_{2.5}$	0.20	g/kW-hr	NSPS Subpart IIII
GHG Pollutants			
CO_2	1.13	lb/hp-hr	CCAR Table C.7 (73.15 kg CO_2/MMBtu, 100% Oxidization)
CH_4	0.000046	lb/hp-hr	CCAR Table C.8 (0.003 kg CH_4/MMBtu)
N_2O	0.000009	lb/hp-hr	CCAR Table C.8 (0.0006 kg N_2O/MMBtu)

Emissions:

Criteria Pollutants	(lb/hr)	(ton/yr)
NO_x	3.03	0.15
SO_2	0.94	0.047
CO	2.65	0.132
VOC	3.03	0.151
$PM/PM_{10}/PM_{2.5}$	0.15	0.008
GHG Pollutants		
CO_2	519.4	26.0
CH_4	0.0213	0.0011
N_2O	0.0043	0.0002

EP-06001
Firewater Pump Engine (Emergency)

HAPs from Diesel Combustion

Basis: AP-42 Section 3.3 Gasoline and Diesel Industrial Engines, Final Section, October 1996.
HAPs emission from diesel combustion in the Firewater Pump.
Only factors for pollutants noted as HAPs as defined by Section 112(b) of the Clean Air Act listed.
AP-42 factors marked as "less than" are omitted as emissions from such pollutants are negligible.

Criteria:

Annual Operations	100	hrs/yr
Weekly Operations	115.4	min/wk
Unit Size Rating	460	Hp

Pollutant	Emission Factor (1) (lb/hp-hr)	Emissions (lb/hr)	Emissions (ton/yr)
Benzene	6.53E-06	3.00E-03	1.50E-04
Toluene	2.86E-06	1.32E-03	6.58E-05
Xylenes	2.00E-06	9.18E-04	4.59E-05
Propylene	1.81E-05	8.31E-03	4.15E-04
Formaldehyde	8.26E-06	3.80E-03	1.90E-04
Acetaldehyde	5.37E-06	2.47E-03	1.23E-04
Naphthalene	5.94E-07	2.73E-04	1.37E-05
Total			**1.00E-03**

(1) Table 3.3-2. Emission factor converted from lb/MMBtu to lb/hp-hr using a conversion factor of 7,000 Btu/hp-hr.

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EP-09001
Biogas Flare (SSM Equipment)

Biogas Flare Configuration

Basis: AP-42 Section 1.4 Natural Gas Combustion, Final Section, July 1998.
AP-42 Section 13.5 Industrial Flares, Final Section, September 1991.
California Climate Action Registry (CCAR) General Reporting Protocol, Version 3.1, January 2009.
Pilot heat input based on typical size.
Flare will be equipped with an electric igniter.
Flare will not operate more than 500 hours per year in support of the Wastewater Treatment Biogas System only.

Fuel Specifications:

Fuel Component	Molecular Weight	Biogas Flow mole fraction	Component HHV (Btu/scf)	Component LHV (Btu/scf)
H_2S	34.08	1.00E-04	647	596
Methane, CH_4	16.04	0.65	1013	913
CO_2	44.01	3.50E-01	--	--
H_2O/Inerts	--	0	--	--
Total moles		1.00		
Gas HHV (Btu/scf)		658.41		
Gas LHV (Btu/scf)		593.42		

Energy Usage:

Gas Volumetric Flow (lb-mol/hr)	420.24
Gas Volumetric Flow (MMscf/hr)	0.16
Energy (MMBtu/hr)	105.00

Fuel Component	Combustion Reaction	Combustion (Stoichiometric Calculations) CO_2	SO_2
H_2S	$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$	0	1
Methane, CH_4	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	1	0
Component Fraction Sums		0.65	0.0001

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Combustion Exhaust	Value	Units	Notes/Equations
Biogas SO_2	16.88	lb/MMscf	[Gas Flow$_{lb\text{-}mol/hr}$ * [(S (Component * Component Ratio to SO_2) * 100%) * SO_2 MW]
Assumes 100% Conversion H_2S to SO_2	0.03	lb/MMBtu	Gas Flow$_{MMscf/hr}$ **OR** Gas Flow$_{MMBtu/hr}$
Biogas CO_2	75,370.04	lb/MMscf	Gas Flow$_{lb\text{-}mol/hr}$ * [(C (Component * Component Ratio to CO_2)) + (CO_2 Component)] * CO_2 MW
Assumes 100% Conversion CH_4 to CO_2	176.12	lb/MMBtu	Gas Flow$_{MMscf/hr}$ **OR** Gas Flow$_{MMBtu/hr}$

Natural Gas Pilot Emission Factors:

Criteria Pollutants	EF	Unit	Notes
NO_x	100.00	lb/MMscf	Table 1.4-1 Small Boilers, Uncontrolled
SO_2	0.60	lb/MMscf	Table 1.4-2
CO	84	lb/MMscf	Table 1.4-1 Small Boilers, Uncontrolled
VOC	5.5	lb/MMscf	Table 1.4-2
PM/PM_{10}/$PM_{2.5}$	7.6	lb/MMscf	Table 1.4-2 All PM is assumed to be less than 1.0 micrometer in diameter.
Lead	0.0005	lb/MMscf	Table 1.4-2
GHG Pollutants			
CO_2	119,337	lb/MMscf	CCAR Table C.7 (53.06 kg CO_2/MMBtu, 100% Oxidization)
CH_4	2.25	lb/MMscf	CCAR Table C.8 (0.001 kg CH_4/MMBtu)
N_2O	0.22	lb/MMscf	CCAR Table C.8 (0.0001 kg N_2O/MMBtu)

Biogas Flaring Emission Factors:

Criteria Pollutants	EF	Unit	Notes:
NO_X	0.068	lb/MMBtu	Table 13.5-1 Thermal NOx emissions from combustion.
SO_2	0.03	lb/MMBtu	Boiler Fuel Criteria Engineering Calculations. Based on 100% conversion fuel sulfur to SO_2.
CO	0.37	lb/MMBtu	Table 13.5-1 Product of incomplete combustion.
GHG Pollutants			
CO_2	176.12	lb/MMBtu	Boiler Fuel Criteria Engineering Calculations.
CH_4	0.00	lb/MMBtu	CH_4 conversion to CO_2 is assumed 100%

_EP-09001_
Biogas Flare (SSM Equipment)

Criteria:

Flare Size	105.00 MMBtu/hr
Heating Value	658.41 Btu/scf
Pilot Fuel Gas	100 scf/hr
Flare Annual Operations	500 hr/yr
Pilot Annual Operations	8,760 hr/yr

Emissions:	Pilot Emissions		Flaring Emissions		Total Emissions	
Criteria Pollutants	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
NO_x	1.00E-02	4.38E-02	7.14	1.79	7.15	1.83
SO_2	6.00E-05	2.63E-04	2.69	0.67	2.69	0.67
CO	8.40E-03	3.68E-02	38.85	9.71	38.86	9.75
VOC	5.50E-04	2.41E-03	0.00	0.00	5.50E-04	2.41E-03
$PM/PM_{10}/PM_{2.5}$	7.60E-04	3.33E-03	0.00	0.00	7.60E-04	3.33E-03
Lead	5.00E-08	2.19E-07	0.00	0.00	5.00E-08	2.19E-07
GHG Pollutants						
CO_2	11.93	52.27	18,493	4,623	18,504.85	4,675.50
CH_4	2.25E-04	9.85E-04	0.00	0.00	2.25E-04	9.85E-04
N_2O	2.25E-05	9.85E-05	0.00	0.00	2.25E-05	9.85E-05

HAPs from Natural Gas Combustion

Basis: AP-42 Section 1.4 Natural Gas Combustion, Final Section, July 1998
HAPs emission from Natural Gas Combustion in the Flare and Pilot.
Only factors for pollutants noted as HAPs as defined by Section 112(b) of the Clean Air Act listed.
AP-42 factors marked as "less than" are omitted as emissions from such pollutants are negligible.

Criteria:

Pilot Fuel Gas	100 scf/hr
Annual Operations	8,760 hr/yr

	Emission Factor (1)	Emissions		
Pollutant	($lb/10^6$ scf)	(lb/hr)	(lb/yr)	(ton/yr)
2-Methylnaphthalene	2.40E-05	2.40E-09	2.10E-05	1.05E-08
Benzene	2.10E-03	2.10E-07	1.84E-03	9.20E-07
Dichlorobenzene	1.20E-03	1.20E-07	1.05E-03	5.26E-07
Fluoranthene	3.00E-06	3.00E-10	2.63E-06	1.31E-09
Fluorene	2.80E-06	2.80E-10	2.45E-06	1.23E-09
Formaldehyde	7.50E-02	7.50E-06	6.57E-02	3.29E-05
Hexane	1.80E+00	1.80E-04	1.58E+00	7.88E-04
Naphthalene	6.10E-04	6.10E-08	5.34E-04	2.67E-07
Phenanathrene	1.70E-05	1.70E-09	1.49E-05	7.45E-09
Pyrene	5.00E-06	5.00E-10	4.38E-06	2.19E-09
Toluene	3.40E-03	3.40E-07	2.98E-03	1.49E-06
Arsenic	2.00E-04	2.00E-08	1.75E-04	8.76E-08
Cadmium	1.10E-03	1.10E-07	9.64E-04	4.82E-07
Chromium	1.40E-03	1.40E-07	1.23E-03	6.13E-07
Cobalt	8.40E-05	8.40E-09	7.36E-05	3.68E-08
Manganese	3.80E-04	3.80E-08	3.33E-04	1.66E-07
Mercury	2.60E-04	2.60E-08	2.28E-04	1.14E-07
Nickel	2.10E-03	2.10E-07	1.84E-03	9.20E-07
Total		**1.89E-04**		**8.27E-04**

(1) Tables 1.4-3 and Table 1.4-4

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AREA 11000
Biomass Grinding, Handling and Storage Baghouse Emissions

Biomass Grinding, Handling and Storage Baghouse Emissions

Basis:

AP-42 Section 9.9.1, Grain Elevators and Processes, Final Section, April 2003.
Emission factors for grinding operations assumed equivalent to grain cleaning.
Emission factors for grain shipping used as a appropriate estimate for emissions from grinded biomass shipping.

AP-42 Section 9.9.1 states that, recent research on dust emissions from grain handling operations have indicated that the fraction of dust particles equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) averages approximately 25 percent of total PM, and the fraction of dust particles less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) averages about 17 percent of PM_{10}.

The ground biomass grinding, transfer and handling system is a completely closed system designed with high velocity pickup of grains; therefore capture efficiency is assumed 100%.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Straight grain delivery trucks are not typically used in bulk grain transfer operations; however, these trucks are assumed to most similar to the truck type that will be used for biomass delivery.

Criteria:

Crop Residues or Energy Crops Grinding Design Rate	7,352,941	wet lb/day	
Crop Residues or Energy Crops Grinding Capacity	160	wet ton/hr	
Wood Residues Processing Rate	300	wet ton/hr	
Wood Chip Hog Design Rate	3,200,000	wet lb/day	Hog sized for 50% of system processing rate.
Wood Chip Hog Design Rate	150	wet ton/hr	Hog sized for 50% of system processing rate.
Biomass Feed Rate (Crop Residues, Energy Crops and/or Wood Residues)	3,125	dry ton/day	
Receiving Schedule	3,960	hr/yr	**Based on 12 hr/day, 330 day/yr.
Maximum Hours of Operations	8,760	hr/yr	
% Loadout by Straight Truck	100%		

Emission Factor Equation: $PM/PM_{10}/PM_{2.5}$ Emissions (lb/hr) = (cfm) x (gr/dscf) x (60 min/hr) / (gr/lb)

BACT Emission Factor	0.004	gr/dscf	All PM is assumed to be less than 1.0 micrometer in diameter.
Conversion Factor	7,000	gr/lb	
Conversion Factor	60	min/hr	
LAER Emission Factor	0.002	gr/dscf	All PM is assumed to be less than 1.0 micrometer in diameter.
Conversion Factor	7,000	gr/lb	
Conversion Factor	60	min/hr	

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-11235	Floor Sweep System DC	15,000	30	40	4.91	50.93	15.52	Ambient	Ambient
EP-11081	Dirt Load-Out Silo	589	6	65	0.20	50.00	15.24	Ambient	Ambient
EP-11082	Dirt Load-Out Silo Spout	1,400	10	40	0.55	42.78	13.04	Ambient	Ambient
...When BACT is applied at the Biomass Grinding Dust Collectors									
EP-11134	Biomass Grinding DC #1	153,600	96	75	50.27	50.93	15.52	Ambient	Ambient
EP-11135	Biomass Grinding DC #2	153,600	96	75	50.27	50.93	15.52	Ambient	Ambient
EP-11601	Biomass Surge Bin #1 DC	10,000	24	55	3.14	53.05	16.17	Ambient	Ambient
EP-11602	Biomass Surge Bin #2 DC	10,000	24	55	3.14	53.05	16.17	Ambient	Ambient
EP-11603	Biomass Surge Bin #3 DC	10,000	24	55	3.14	53.05	16.17	Ambient	Ambient
EP-12101	EH Metering Bin #1	16,000	30	65	4.91	54.32	16.56	Ambient	Ambient
EP-11711	Boiler 1 Metering Bin DC #1	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11721	Boiler 1 Metering Bin DC #2	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11731	Boiler 1 Metering Bin DC #3	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11712	Boiler 2 Metering Bin DC #1	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11722	Boiler 2 Metering Bin DC #2	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11732	Boiler 2 Metering Bin DC #3	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11713	Boiler 3 Metering Bin DC #1	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11723	Boiler 3 Metering Bin DC #2	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11733	Boiler 3 Metering Bin DC #3	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11714	Boiler 4 Metering Bin DC #1	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11724	Boiler 4 Metering Bin DC #2	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient
EP-11734	Boiler 4 Metering Bin DC #3	4,400	18	65	1.77	41.50	12.65	Ambient	Ambient

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Biomass Grinding, Handling and Storage Baghouse Emissions

Source Details Continued:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
...When LAER is applied at the Biomass Grinding Dust Collectors									
EP-11134	Biomass Grinding DC #1	153,600	96	65	50.27	50.93	15.52	Ambient	Ambient
EP-11135	Biomass Grinding DC #2	153,600	96	65	50.27	50.93	15.52	Ambient	Ambient
EP-11601	Biomass Surge Bin #1 DC	10,000	24	45	3.14	53.05	16.17	Ambient	Ambient
EP-11602	Biomass Surge Bin #2 DC	10,000	24	45	3.14	53.05	16.17	Ambient	Ambient
EP-11603	Biomass Surge Bin #3 DC	10,000	24	45	3.14	53.05	16.17	Ambient	Ambient
EP-12101	EH Metering Bin #1	16,000	30	55	4.91	54.32	16.56	Ambient	Ambient
EP-11711	Boiler 1 Metering Bin DC #1	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11721	Boiler 1 Metering Bin DC #2	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11731	Boiler 1 Metering Bin DC #3	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11712	Boiler 2 Metering Bin DC #1	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11722	Boiler 2 Metering Bin DC #2	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11732	Boiler 2 Metering Bin DC #3	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11713	Boiler 3 Metering Bin DC #1	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11723	Boiler 3 Metering Bin DC #2	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11733	Boiler 3 Metering Bin DC #3	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11714	Boiler 4 Metering Bin DC #1	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11724	Boiler 4 Metering Bin DC #2	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient
EP-11734	Boiler 4 Metering Bin DC #3	4,400	18	60	1.77	41.50	12.65	Ambient	Ambient

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Biomass Grinding, Handling and Storage Baghouse Emissions

PM, PM_{10} & $PM_{2.5}$ Emissions:

ID	Emission Source	Emission Factor Source	System Design Feed Rate	PM		PM_{10}		$PM_{2.5}$		Notes:
			(wet ton/hr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	
EP-11134	Biomass Grinding DC #1	BACT	80	5.27	23.07	5.27	23.07	5.27	23.07	Note 1, 2
EP-11134	Biomass Grinding DC #1	LAER	80	2.63	11.53	2.63	11.53	2.63	11.53	Note 1, 2
EP-11135	Biomass Grinding DC #2	BACT	80	5.27	23.07	5.27	23.07	5.27	23.07	Note 1, 2
EP-11135	Biomass Grinding DC #2	LAER	80	2.63	11.53	2.63	11.53	2.63	11.53	Note 1, 2
EP-11235	Floor Sweep System DC	BACT	6	0.51	1.02	0.51	1.02	0.51	1.02	Note 3
EP-11601	Biomass Surge Bin #1 DC	BACT	40	0.34	1.50	0.34	1.50	0.34	1.50	Note 2
EP-11602	Biomass Surge Bin #2 DC	BACT	40	0.34	1.50	0.34	1.50	0.34	1.50	Note 2
EP-11603	Biomass Surge Bin #3 DC	BACT	40	0.34	1.50	0.34	1.50	0.34	1.50	Note 2
EP-12101	EH Metering Bin #1	BACT	32	0.55	2.40	0.55	2.40	0.55	2.40	Note 2
EP-11711	Boiler 1 Metering Bin DC #1	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11721	Boiler 1 Metering Bin DC #2	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11731	Boiler 1 Metering Bin DC #3	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11712	Boiler 2 Metering Bin DC #1	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11722	Boiler 2 Metering Bin DC #2	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11732	Boiler 2 Metering Bin DC #3	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11713	Boiler 3 Metering Bin DC #1	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11723	Boiler 3 Metering Bin DC #2	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11733	Boiler 3 Metering Bin DC #3	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11714	Boiler 4 Metering Bin DC #1	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11724	Boiler 4 Metering Bin DC #2	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11734	Boiler 4 Metering Bin DC #3	BACT	12	0.15	0.66	0.15	0.66	0.15	0.66	Note 2
EP-11081	Dirt Load-Out Silo	BACT	6.4	0.02	0.09	0.02	0.09	0.02	0.09	Note 2, 4
EP-11082	Dirt Load-Out Silo Spout	BACT	6.4	0.05	0.10	0.05	0.10	0.05	0.10	Note 5
Total with BACT applied to Biomass Grinding					**62.17**		**62.17**		**62.17**	
Total with LAER applied to Biomass Grinding					**39.11**		**39.11**		**39.11**	

(1) The lowest achievable emission rate (LAER) that is guaranteed by the vendor was modeled to establish potential range of stack parameter requirements to ensure compliance with PSD increment and to allow for flexibility in final design criteria. LAER is more stringent than BACT and is generally only required in non-attainment areas. LAER may be applied to the Biomass Grinding Dust Collectors based on a variety of design criteria that are still being considered during the final design, including, but not limited to: costs associated with the control technology, future expansion needs, stack height costs and operation and maintenance.

(2) Equipment assumed to operate 24 hr/day, 365 day/yr.

(3) The feed rates shown are instantaneous (the floor sweep system will be operated intermittently). For the purposes of PTE calculations, the floor sweep system has been assumed to operate not more than 12 hours per day, 330 days per year.

(4) EP-11081 is related to emissions generated within the silo while the silo is being filled from the biomass grinding system.

(5) EP-11082 is for the load-out spout specifically. EP-11082 will be equipped with a fabric filter to control dust emissions generated from dumping material into a truck. EP-11082 will operate intermittent, assumed not more than 12 hours per days, 330 days per year.

Combined Biomass Grinding, Handling and Storage Fugitive Emissions

PM Emissions:

ID	Emission Source	Uncontrolled Emissions		Fugitive Emissions	
		(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EP-11001FUG	Raw Wood Residues Grinding and Handling	0.067	0.065	0.067	0.065
EP-11002FUG	Crop Residues and Energy Crops Grinding and Handling	101.83	336.84	0.073	0.241
EP-11002FUG	Crop Residues and Energy Crops Conveyors and Storage	13.76	45.52	0	0
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.070	0.057	0.070	0.057
Total		**115.73**	**382.48**	**0.21**	**0.36**

PM_{10} Emissions:

ID	Emission Source	Uncontrolled Emissions		Fugitive Emissions	
		(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EP-11001FUG	Wood Residues Grinding and Handling	0.032	0.031	0.032	0.031
EP-11002FUG	Crop Residues and Energy Crops Grinding and Handling	28.83	95.38	0.034	0.114
EP-11002FUG	Crop Residues and Energy Crops Conveyors and Storage	6.45	21.33	0	0
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.033	0.027	0.033	0.027
Total		**35.35**	**116.77**	**0.10**	**0.17**

$PM_{2.5}$ Emissions:

ID	Emission Source	Uncontrolled Emissions		Fugitive Emissions	
		(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EP-11001FUG	Wood Residues Grinding and Handling	0.0048	0.0046	0.0048	0.0046
EP-11002FUG	Crop Residues and Energy Crops Grinding and Handling	4.81	15.89	0.0052	0.017
EP-11002FUG	Crop Residues and Energy Crops Conveyors and Storage	1.10	3.65	0	0
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.0050	0.0041	0.0050	0.0041
Total		**5.92**	**19.56**	**0.015**	**0.026**

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Biomass Grinding, Handling and Storage Baghouse Emissions

Raw Wood Residues Grinding and Handling Fugitive Emissions

Basis: AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.

Raw wood residues will be received exclusively by rail and rail cars will dump the material uncontrolled into the receiving pits. The particulate emissions generated from the dumping of material from the rail cars to the receiving pits was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles.

After the raw wood residues are received, the wood residues are conveyed using an enclosed mechanical conveying system for processing. The wood residues are screened, and the larger chips are then feed into the wood chip hog for further processing prior to storage in the wood residues storage pile. Hog/grinding activities occur within an enclosed system. There is only one emission point associated with the raw wood residues grinding and handling system - the pile stacker discharge point, EP-11052FUG. Emissions from the pile loading at the stacker discharge point are estimated with the storage pile

The processed wood residues will be stored in an open pile. See the storage pile emission calculations for wood pile storage emissions.

Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Wood Residues Onsite Delivery Rate	300	wet ton/hr
Annual Wood Residues Usage	583,333	wet ton/yr
% Loadout by Rail	100%	

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	25	25	25	%	Engineering Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Raw Wood Residues Receiving Operations (Drop Operations)	2.22E-04	1.05E-04	1.59E-05	lb/ton	Equation 13.2.4-1

PM Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM (lb/hr)	Uncontrolled PM (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11001FUG	Wood Residues Receiving via Rail	300.00	583,333	2.22E-04	0.067	0.065	0%	0.067	0.065
Total					**0.067**	**0.065**		**0.067**	**0.065**

PM_{10} Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11001FUG	Wood Residues Receiving via Rail	300.00	583,333	1.05E-04	0.032	0.031	0%	0.032	0.031
Total					**0.032**	**0.031**		**0.032**	**0.031**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled $PM_{2.5}$ (lb/hr)	Uncontrolled $PM_{2.5}$ (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11001FUG	Wood Residues Receiving via Rail	300.00	583,333	1.59E-05	0.005	0.005	0%	0.005	0.005
Total					**0.005**	**0.005**		**0.005**	**0.005**

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Biomass Grinding, Handling and Storage Baghouse Emissions

Crop Residues and Energy Crops Grinding and Handling Fugitive Emissions

Basis: AP-42 Section 9.9.1, Grain Elevators and Processes, Final Section, April 2003.
AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.
AP-42 Section 9.9.1 states that, recent research on dust emissions from grain handling operations have indicated that the fraction of dust particles equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) averages approximately 25 percent of total PM, and the fraction of dust particles less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) averages about 17 percent of PM_{10}.

The ground crop residues and energy crops transfer and handling system is a closed system designed with high velocity pickup of grains; therefore capture efficiency is assumed 100%.

Crop residues will be received exclusively by trucks that will unload (dump) the material uncontrolled into the grinding lines. The particulate emissions generated from the dumping of material from the trucks to the grinding lines was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles. The bound biomass bales will typically not be a source of suspended PM/PM_{10}/$PM_{2.5}$ emissions until grinded; however, for the purposes of the PTE calculations, worst-case fugitive emissions have been estimated using AP-42 Section 13.2.1.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Crop Residues and Energy Crops Onsite Delivery Rate	160	wet ton/hr
Annual Agricultural Residues Usage	1,058,500	wet ton/yr
% Loadout by Straight Truck	100%	

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	15	15	15	%	Engineering Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Headhouse and Grain Handling	0.061	0.034	0.0058	lb/ton	Table 9.9.1-1
Emission Factor for Grain Cleaning w/Cyclone (Controlled Emission Factor from AP-42)	0.075	0.019	0.0032	lb/ton	Table 9.9.1-1
Emission Factor for Grain Cleaning (Uncontrolled Emission Factor Back-calculated Using a 85.0% Control Efficiency for Cyclones)	0.5	0.127	0.021	lb/ton	Table 9.9.1-1
Emission Factor for Crop Residues Receiving Operations (Drop Operations)	4.54E-04	2.15E-04	3.26E-05	lb/ton	Equation 13.2.4-1

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Biomass Grinding, Handling and Storage Baghouse Emissions

PM Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled PM		Capture Efficiency	Fugitive Emissions	
		(wet ton/hr)	(wet ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-11002FU(	Crop Residues Handling	160	1,058,500	0.061	9.76	32.28	100%	0	0
EP-11002FU(	Crop Residues Cleaning	160	1,058,500	0.075	12.00	39.69	100%	0	0
EP-11002FU(	Crop Residues Grinding	160	1,058,500	0.50	80.00	264.63	100%	0	0
Subtotal					**101.76**	**336.60**		**0**	**0**
EP-11002FU(	Crop Residues Receiving via Truck	160	1,058,500	4.54E-04	0.073	0.24	0%	0.073	0.24
Subtotal					**0.073**	**0.24**		**0.073**	**0.24**
Total					**101.83**	**336.84**		**0.073**	**0.24**

PM_{10} Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled PM_{10}		Capture Efficiency	Fugitive Emissions	
		(wet ton/hr)	(wet ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-11002FU(	Crop Residues Handling	160	1,058,500	0.034	5.44	17.99	100%	0	0
EP-11002FU(	Crop Residues Cleaning	160	1,058,500	0.019	3.04	10.06	100%	0	0
EP-11002FU(	Crop Residues Grinding	160	1,058,500	0.13	20.32	67.21	100%	0	0
Subtotal					**28.80**	**95.27**		**0**	**0**
EP-11002FU(	Crop Residues Receiving via Truck	160	1,058,500	2.15E-04	0.034	0.11	0%	0.034	0.11
Subtotal					**0.034**	**0.11**		**0.034**	**0.11**
Total					**28.83**	**95.38**		**0.034**	**0.11**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled $PM_{2.5}$		Capture Efficiency	Fugitive Emissions	
		(wet ton/hr)	(wet ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-11002FU(	Crop Residues Handling	160	1,058,500	0.0058	0.93	3.07	100%	0	0
EP-11002FU(	Crop Residues Cleaning	160	1,058,500	0.0032	0.51	1.69	100%	0	0
EP-11002FU(	Crop Residues Grinding	160	1,058,500	0.021	3.36	11.11	100%	0	0
Subtotal					**4.80**	**15.88**		**0**	**0**
EP-11002FU(	Crop Residues Receiving via Truck	160	1,058,500	3.26E-05	0.005	0.02	0%	0.0052	0.017
Subtotal					**0.005**	**0.02**		**0.0052**	**0.017**
Total					**4.81**	**15.89**		**0.0052**	**0.017**

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Biomass Grinding, Handling and Storage Baghouse Emissions

Crop Residues and Energy Crops Conveyors and Storage Fugitive Emissions

Basis: AP-42 Section 9.9.1, Grain Elevators and Processes, Final Section, April 2003
The biomass transfer and storage system is a completely closed system designed with high velocity pickup of grains; therefore capture efficiency is assumed 100%.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Crop Residues and Energy Crops Onsite Delivery Rate	160	wet ton/hr
Annual Agricultural Residues Usage	1,058,500	wet ton/yr
Module Grinding Loading Schedule	3,960	hr/yr

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Headhouse and Grain Handling	0.061	0.034	0.0058	lb/ton	Table 9.9.1-1
Emission Factor for Storage Bin (Vent)	0.025	0.0063	0.0011	lb/ton	Table 9.9.1-1

PM Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM (lb/hr)	Uncontrolled PM (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11002FUG	Headhouse and Crop Residues/Energy Crops Handling	160	1,058,500	0.061	9.76	32.28	100%	0	0
EP-11002FUG	Storage Bin (Vent)	160	1,058,500	0.025	4.00	13.23	100%	0	0
Total					**13.76**	**45.52**		**0**	**0**

PM_{10} Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11002FUG	Headhouse and Crop Residues/Energy Crops Handling	160	1,058,500	0.034	5.44	17.99	100%	0	0
EP-11002FUG	Storage Bin (Vent)	160	1,058,500	0.0063	1.01	3.33	100%	0	0
Total					**6.45**	**21.33**		**0**	**0**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled $PM_{2.5}$ (lb/hr)	Uncontrolled $PM_{2.5}$ (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11002FUG	Headhouse and Crop Residues/Energy Crops Handling	160	1,058,500	0.0058	0.93	3.07	100%	0	0
EP-11002FUG	Storage Bin (Vent)	160	1,058,500	0.0011	0.18	0.58	100%	0	0
Total					**1.10**	**3.65**		**0**	**0**

AREA 11000
Biomass Grinding, Handling and Storage Baghouse Emissions

Dirt/Fines Load-Out Fugitive Emissions

Basis: AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.
Dirt/fines from biomass cleaning will be shipped offsite exclusively by trucks that are loaded from the elevated Dirt Load-Out Silo (EP-11081). The trucks will be filled using the Dirt Load-Out Spout (EP-11082). The particulate emissions generated from the loading of material from the silo to the trucks was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Dirt/Fines Shipping Rate	33.00	ton/hr
Annual Dirt/Fines Generation	53,676	ton/yr
% Loadout by Truck	100%	

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	5	5	5	%	Engineering Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Dirt/Fines Load-Out Operations (Drop Operations)	2.12E-03	1.00E-03	1.52E-04	lb/ton	Equation 13.2.4-1

PM Emissions:

ID	Emission Source	Throughput (ton/hr)	Throughput (ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM (lb/hr)	Uncontrolled PM (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11003FU(	Dirt/Fines Load-Out from Silo	33.00	53,676	2.12E-03	0.070	0.057	0%	0.070	0.057
Total					**0.070**	**0.057**		**0.070**	**0.057**

PM_{10} Emissions:

ID	Emission Source	Throughput (ton/hr)	Throughput (ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11003FU(	Dirt/Fines Load-Out from Silo	33.00	53,676	1.00E-03	0.033	0.027	0%	0.033	0.027
Total					**0.033**	**0.027**		**0.033**	**0.027**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput (ton/hr)	Throughput (ton/yr)	Emission Factor (lb/ton)	Uncontrolled $PM_{2.5}$ (lb/hr)	Uncontrolled $PM_{2.5}$ (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11003FU(	Dirt/Fines Load-Out from Silo	33.00	53,676	1.52E-04	0.005	0.004	0%	0.005	0.004
Total					**0.005**	**0.004**		**0.005**	**0.004**

AREA 11000
Processed Wood Residues (Hog Fuel) Storage Pile

Processed Wood Residues (Hog Fuel) Storage Pile Fugitive Emissions

Basis: Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, EPA-450/2-92-004, September 1992. Section 2.3.1.3.3, Wind Erosion from Continuously Active Storage Piles, Equation 2-12.

Particle Size Multipliers (k factors) for Section 2.3.1.3.3, Wind Erosion from Continuously Active Storage Piles from AP-42 Section 13.2.5, Industrial Wind Erosion, November 2006.

Due to the source of the wood residue, the silt content is anticipated to be very low. Vendor estimates indicate that "dust" less than 3 millimeter (3,000 micrometer) is generally less than 2 to 3%.

There is only one emission point associated with the raw wood residues grinding and handling system – the pile stacker discharge point, EP-11052[illegible]

The stacking conveyor tips downward to reduce the fall distance to a minimum when first building the pile. When the pile top reaches the tilt switch sensors, the conveyor lifts to keep a consistent fall distance. A flexible chute to enclose the processed wood residues as they fall will be employed to further reduce wind-borne dust.

The percentage of time that the unobstructed wind speed exceeds 5.4 m/s (12 mph) at the mean pile height was obtained using wind speed data from the Dodge City, Kansas meteorological station data provided by the Kansas Department of Health and Environment (KDHE). The anemometer height of the meteorological station was reported as 26 feet. The mean pile height is estimated to be approximately 40 feet. The standard wind sheer component was used to calculate an equivalent unobstructed wind speed at 40 feet of 5.0 m/s. The percentage of time that the unobstructed wind speed exceeds 5.0 m/s at the mean pile height is 50.8%.

Criteria:

Wood Residues Processing Rate	300	wet ton/hr
Annual Wood Residues Usage	583,333	wet ton/yr
Hours per Day of Operation	24	hr/day
Maximum Production Schedule - Permit	365	days/yr

Source Details:

		Total Processed Wood Residues Storage		Wood Yard Pile Dimensions	Mean Wood Yard Pile Height	Pile Size		Wood Residue % Moisture
ID	Emission Source	(wet T)	(wet ton)	(ft)	(ft)	(ft^3)	(acres)	(%)
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	21,773	24,000	375	40	3,000,000	2.5	25%

Emission Factor Equation: **E=k*1.7*(s/1.5)*[(365-P)/235]*(f/15)** Equation 2-12 from Section 2.3.1.3.3

where:
E = particulate emission factor (pounds per day per acre, lb/day/ac)
k = particle size multiplier (dimensionless)
s = silt content of material (percent, %)
P = number of “wet” days with at least 0.254 mm (0.01-in) of precipitation during the averaging period
f = percentage of time that the unobstructed wind speed exceeds 5.4 m/s (12 mph) at the mean pile height

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	1	0.5	0.075		AP-42 13.2.5
Silt Content	s	3	3	3	%	Engineering Estimate
Mean Days > 0.01-in precipitation	P	75	75	75	days	1971-2000 Average Annual Precipitation
Percentage of Unobstructed Wind Speeds > 12 mph	f	50.8	50.8	50.8	%	Dodge City, Kansas Met Station Data
Watering of Pile	CE	60	60	60	%	BACT, Fugitive Dust Control Plan

Emission Factors:

		Uncontrolled Emission Factors			Controlled Emission Factors		
		PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$
ID	Source Description	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	14.210	7.105	1.066	5.684	2.842	0.426

Uncontrolled PM/PM_{10}/$PM_{2.5}$ Emissions:

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	1.50	36.03	6.58	0.75	18.01	3.29	0.11	2.70	0.49
Total		**1.50**		**6.58**	**0.75**		**3.29**	**0.11**		**0.49**

Controlled PM/PM_{10}/$PM_{2.5}$ Emissions:

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	0.60	14.41	2.63	0.30	7.21	1.32	0.05	1.08	0.20
Total		**0.60**		**2.63**	**0.30**		**1.32**	**0.05**		**0.20**

AREA 11000
Processed Wood Residues (Hog Fuel) Storage Pile

Processed Wood Residues Pile Loading Fugitive Emissions

Basis: AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.
Process wood residues will be conveyed and stored at the wood residues storage pile. The particulate emissions generated from the loading of the storage pile was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Wood Residues Processing Rate	300	wet ton/hr
Annual Wood Residues Usage	583,333	wet ton/yr

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	25	25	25	%	Engineering Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Wood Residues (Hog Fuel) Pile Loading Operations (Drop Operations)	2.22E-04	1.05E-04	1.59E-05	lb/ton	Equation 13.2.4-1

PM Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM (lb/hr)	Uncontrolled PM (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11052FU(	Wood Residues (Hog Fuel) Storage Pile Loadi	300	583,333	2.22E-04	0.067	0.065	0%	0.067	0.065
Total					**0.067**	**0.065**		**0.067**	**0.065**

PM_{10} Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11052FU(	Wood Residues (Hog Fuel) Storage Pile Loadi	300	583,333	1.05E-04	0.032	0.031	0%	0.032	0.031
Total					**0.032**	**0.031**		**0.032**	**0.031**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput (wet ton/hr)	Throughput (wet ton/yr)	Emission Factor (lb/ton)	Uncontrolled $PM_{2.5}$ (lb/hr)	Uncontrolled $PM_{2.5}$ (ton/yr)	Capture Efficiency (%)	Fugitive Emissions (lb/hr)	Fugitive Emissions (ton/yr)
EP-11052FU(	Wood Residues (Hog Fuel) Storage Pile Loadi	300	583,333	1.59E-05	0.0048	0.0046	0%	0.0048	0.0046
Total					**0.0048**	**0.0046**		**0.0048**	**0.0046**

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

EP-18185
Enzymatic Hydrolysis Fermentation CO_2 Scrubber

Vendor: Vogelbusch

Basis: Vogelbusch Equipment Datasheet and Scrubber Calculations (EP-18185). A safety margin of 20% was applied.
Percent Acrolein and Formaldehyde assumed equivalent to Acetaldehyde for the purposes of estimating worst case HAP concentrations from this scrubber.
Parts per million by volume dry (ppmvd) calculations were performed using the average molecular weight of the vent gas to calculate total molar flow rate, and using the molecular weight of the hazardous air pollutant (HAP) to calculate its molar flow rate. The total controlled HAP ppmvd is based on the weighted average of the total HAP molecular weight. The ppmvd calculation equation used was:
ppmvd = [(Emission Rate, lb/hr) / (Molecular Weight of Component, lb-lb-mol)] / [(Total Dry Exhaust Rate, lb/hr) / (Average Molecular

VOM Composition:

Uncontrolled VOM Emissions	1,732.08	lb/hr		
Ethanol	1,706.88	lb/hr	% Ethanol	98.55%
Acetaldehyde	2.04	lb/hr	% Acetaldehyde	0.12%
Methanol	1.2	lb/hr	% Methanol	0.07%
Acrolein	2.04	lb/hr	% Acrolein	0.12%
Formaldehyde	2.04	lb/hr	% Formaldehyde	0.12%
Other VOM	17.88	lb/hr	% Other VOM	1.03%

Molecular Weights:

Average of Vent Gas	43	lb/lb-mol
Average VOC/TOC	46.0	lb/lb-mol
Ethanol	46	lb/lb-mol
Acetaldehyde	44	lb/lb-mol
Methanol	32	lb/lb-mol
Acrolein	56	lb/lb-mol
Formaldehyde	30	lb/lb-mol

Criteria:

Biomass Feed Rate	599	dry T/day
Biomass Feed Rate	660	dry ton/day
EH Anhydrous ETOH Production	2,055	gal/hr
EH Anhydrous ETOH Production	18	MMgpy
Hours of Operations	8,760	hr/year

Control Equipment: Wet Scrubber with Packing
Auxiliary Material: Water and Chemical Agents

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-18185	EH Fermentation CO_2 Scrubber	17,200	24	70	3.14	91.25	27.81	70	294

Emission Factors:

Pollutant	Composition of VOM	EF	Unit	Removal Efficiency	Notes
VOC (VOM assumed VOC)	100%	1732.1	lb/hr	99%	BACT % Removal Efficiency
CO_2	--	6	lb/gal	NA	From Rev 0 PFD Strm 18002+overdesign/18 MMgal/y
HAPs					
Acetaldehyde	0.12%	2.0	lb/hr	74.70%	% Removal Efficiency
Methanol	0.07%	1.2	lb/hr	99.70%	% Removal Efficiency
Acrolein	0.12%	2.0	lb/hr	99.00%	% Removal Efficiency
Formaldehyde	0.12%	2.0	lb/hr	99.00%	% Removal Efficiency

EP-18185
Enzymatic Hydrolysis Fermentation CO_2 Scrubber

VOC Emissions:

ID	Source Description	Uncontrolled VOC (lb/hr)	Uncontrolled VOC (ton/yr)	Controlled VOC (lb/hr)	Controlled VOC (ton/yr)	Controlled VOC (ppmv)	Controlled VOC (CE %)
EP-18185	EH CO_2 Fermentation Scrubber	1,732.1	7,587	17.32	75.87	251.6	99.00%
Total			**7,587**		**75.87**		

CO_2 Emissions:

ID	Source Description	Uncaptured CO_2 (lb/hr)	Uncaptured CO_2 (ton/yr)
EP-18185	EH Fermentation CO_2 Scrubber	13,196.6	57,801
Total			**57,801**

HAPs Emissions:

Pollutant	Uncontrolled HAPs (lb/hr)	Uncontrolled HAPs (ton/yr)	Controlled HAPs (lb/hr)	Controlled HAPs (ton/yr)	Controlled HAPs (ppmv)	Controlled HAPs (CE %)
Acetaldehyde	2.04	8.94	0.516	2.26	7.9	74.70%
Methanol	1.20	5.26	0.004	0.02	0.1	99.70%
Acrolein	2.04	8.94	0.020	0.09	0.3	99.00%
Formaldehyde	2.04	8.94	0.020	0.09	0.5	99.00%
Total	**7.32**	**32.06**	**0.56**	**2.46**	**8.40**	**92.34%**

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

EP-18180
Enzymatic Hydrolysis Distillation Vent Scrubber

Vendor: Vogelbusch

Basis: Vogelbusch PFD Rev 1 Stream 18016. A safety margin of 20% was applied.
Percent Acetaldehyde, Methanol, Acrolein, Formaldehyde, and other VOM based on the same percentage as the Starch Plant distillation scrubber.
Parts per million by volume dry (ppmvd) calculations were performed using the average molecular weight of the vent gas to calculate total molar flow rate, and using the molecular weight of the hazardous air pollutant (HAP) to calculate its molar flow rate. The total controlled HAP ppmvd is based on the weighted average of the total HAP molecular weight. The ppmvd calculation equation used was:
ppmvd = [(Emission Rate, lb/hr) / (Molecular Weight of Component, lb-lb-mol)] / [(Total Dry Exhaust Rate, lb/hr) / (Average Molecular

VOM Composition (assumed similar to grain ethanol stream):

Uncontrolled VOM Emissions	40.0 lb/hr		
Ethanol	38.5 lb/hr	% Ethanol	96.27%
Acetaldehyde	0.33 lb/hr	% Acetaldehyde	0.82%
Methanol	0.25 lb/hr	% Methanol	0.64%
Acrolein	0.45 lb/hr	% Acrolein	1.14%
Formaldehyde	0.45 lb/hr	% Formaldehyde	1.14%
Other VOM	0.12 lb/hr	% Other VOM	0.30%

Molecular Weights:

Average of Vent Gas	41 lb/lb-mol
Average VOC/TOC	45.8 lb/lb-mol
Ethanol	46 lb/lb-mol
Acetaldehyde	44 lb/lb-mol
Methanol	32 lb/lb-mol
Acrolein	56 lb/lb-mol
Formaldehyde	30 lb/lb-mol

Criteria:

EH Anhydrous ETOH Production	2,055 gal/hr
EH Anhydrous ETOH Production	18 MMgpy
Hours of Operations	8,760 hr/year

Control Equipment: Wet Scrubber with Packing
Auxiliary Material: Water and Chemical Agents

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-18180	EH Distillation Vent Scrubbe	640	8	80	0.35	30.56	9.31	68	293

Emission Factors:

Pollutant	Composition of VOM	EF	Unit	Removal Efficiency	Notes
VOC (VOM assumed VOC)	100%	40.0	lb/hr	99%	BACT % Removal Efficiency
CO_2	--	318	lb/hr	NA	Vogelbusch PFD Rev 1 Stream 18016
HAPs					
Acetaldehyde	0.82%	0.3	lb/hr	78.38%	% Removal Efficiency
Methanol	0.64%	0.3	lb/hr	99.29%	% Removal Efficiency
Acrolein	1.14%	0.5	lb/hr	99.00%	% Removal Efficiency
Formaldehyde	1.14%	0.5	lb/hr	99.00%	% Removal Efficiency

EP-18180
Enzymatic Hydrolysis Distillation Vent Scrubber

VOC Emissions:

		Uncontrolled VOC		Controlled VOC			
ID	Source Description	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(ppmvd)	(CE %)
EP-18180	Distillation Vent Scrubber	40.0	175	0.40	1.75	93.1	99.00%
Total			**175**		**1.75**		

CO_2 Emissions:

		Uncaptured CO_2	
ID	Source Description	(lb/hr)	(ton/yr)
EP-18180	Distillation Vent Scrubber	318.0	1,393
Total			**1,393**

HAPs Emissions:

	Uncontrolled HAPs		Controlled HAPs			
Pollutant	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(ppmvd)	(CE %)
Acetaldehyde	0.33	1.43	0.071	0.31	17.2	78.38%
Methanol	0.25	1.12	0.002	0.01	0.7	99.29%
Acrolein	0.45	1.99	0.005	0.02	0.9	99.00%
Formaldehyde	0.45	1.99	0.005	0.02	1.7	99.00%
Total	**1.49**	**6.53**	**0.08**	**0.36**	**20.00**	**94.52%**

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

EP-19001
Lignin-Rich Stillage Storage and Loadout

Lignin-Rich Stillage Storage

Basis: Emissions calculated for lignin-rich stillage storage and loadout assumed equivalent to WDGS emission rates. November 2004 stack test at the Diversified Energy Co. (DENCO) ethanol facility located in Morris, Minnesota.

Criteria:

Lignin-Rich Stillage Percent Moisture	66%	by weight
Lignin-Rich Stillage Handling Rate	41,667	wet lb/hr
Lignin-Rich Stillage Handling Rate	20.83	wet ton/hr
Annual Lignin-Rich Stillage Handling Rate	182,500	wet ton/yr
Annual Operations	8,760	hr/yr

Emission Factors:			
Pollutant	EF	Unit	Notes
VOC	0.0083	lb/ton Stillage , Wet	DENCO EF
HAPs			
Acetaldehyde	1.110E-04	lb/ton Stillage , Wet	DENCO EF
Methanol	4.440E-05	lb/ton Stillage , Wet	DENCO EF
Acrolein	1.670E-05	lb/ton Stillage , Wet	DENCO EF
Formaldehyde	2.220E-04	lb/ton Stillage , Wet	DENCO EF

Emissions:	Emissions	
Pollutant	(lb/hr)	(ton/yr)
VOC	0.17	0.76
HAPs		
Acetaldehyde	2.31E-03	1.01E-02
Methanol	9.25E-04	4.05E-03
Acrolein	3.48E-04	1.52E-03
Formaldehyde	4.63E-03	2.03E-02

Total Lignin-Rich Stillage Storage VOC:	**0.76 ton/yr**
Total Lignin-Rich Stillage Storage HAPs:	**0.04 ton/yr**

Abengoa Bioenergy Biomass of Kansas, LLC **Rev. 3**
Biorefinery Facility
Hugoton, Kansas

AREA 20000
Materials and Chemical Handling

Materials and Chemical Handling

Basis: BACT emission factor used to calculate emissions from vents associated with ash, bed media and Trona handling.
Uncontrolled emissions represent potential-to-emit in the absence of controls.
The transfer, handling and storage systems are completely closed systems designed with high velocity pickup of grains; therefore capture efficiency is assumed 100%.

Criteria:

Maximum Hours of Operations	8,760	hr/yr	
Receiving Schedule	3,960	hr/yr	**Based on 12 hr/day, 330 day/yr.

Emission Factor Equation: $PM/PM_{10}/PM_{2.5}$ Emissions (lb/hr) = (cfm) x (gr/dscf) x (60 min/hr) / (gr/lb)

BACT Emission Factor	0.004	gr/dscf	All PM is assumed to be less than 1.0 micrometer in diameter.
Conversion Factor	7,000	gr/lb	
Conversion Factor	60	min/hr	

Source Details:

ID	Emission Source	Stack Flow Rate (cfm)	Stack Diameter (in)	Release Height (ft)	Stack Area (ft^2)	Gas Velocity (ft/s)	Gas Velocity (m/s)	Gas Exit Temperature (deg F)	Gas Exit Temperature (deg K)
EP-20514	Boiler Bottoms Ash Handling DC #1	5,000	18	65	1.77	47.16	14.37	Ambient	Ambient
EP-20524	Boiler Bottoms Ash Handling DC #2	5,000	18	65	1.77	47.16	14.37	Ambient	Ambient
EP-20534	Boiler Bottoms Ash Handling DC #3	5,000	18	65	1.77	47.16	14.37	Ambient	Ambient
EP-20544	Boiler Bottoms Ash Handling DC #4	5,000	18	65	1.77	47.16	14.37	Ambient	Ambient
EP-20510	Boiler Fly Ash Handling DC #1	20,000	36	65	7.07	47.16	14.37	Ambient	Ambient
EP-20520	Boiler Fly Ash Handling DC #2	20,000	36	65	7.07	47.16	14.37	Ambient	Ambient
EP-20530	Boiler Fly Ash Handling DC #3	20,000	36	65	7.07	47.16	14.37	Ambient	Ambient
EP-20540	Boiler Fly Ash Handling DC #4	20,000	36	65	7.07	47.16	14.37	Ambient	Ambient
EP-20511	Bed Media Handling DC #1	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20521	Bed Media Handling DC #2	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20531	Bed Media Handling DC #3	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20541	Bed Media Handling DC #4	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20512	Trona Handling DC #1	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20522	Trona Handling DC #2	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20532	Trona Handling DC #3	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient
EP-20542	Trona Handling DC #4	5,000	18	55	1.77	47.16	14.37	Ambient	Ambient

PM, PM_{10} & $PM_{2.5}$ Emissions:

ID	Emission Source	PM (lb/hr)	PM (ton/yr)	PM_{10} (lb/hr)	PM_{10} (ton/yr)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (ton/yr)	Notes:
EP-20514	Boiler Bottoms Ash Handling DC #1	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20524	Boiler Bottoms Ash Handling DC #2	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20534	Boiler Bottoms Ash Handling DC #3	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20544	Boiler Bottoms Ash Handling DC #4	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20510	Boiler Fly Ash Handling DC #1	0.69	3.00	0.69	3.00	0.69	3.00	Note 1
EP-20520	Boiler Fly Ash Handling DC #2	0.69	3.00	0.69	3.00	0.69	3.00	Note 1
EP-20530	Boiler Fly Ash Handling DC #3	0.69	3.00	0.69	3.00	0.69	3.00	Note 1
EP-20540	Boiler Fly Ash Handling DC #4	0.69	3.00	0.69	3.00	0.69	3.00	Note 1
EP-20511	Bed Media Handling DC #1	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20521	Bed Media Handling DC #2	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20531	Bed Media Handling DC #3	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20541	Bed Media Handling DC #4	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20512	Trona Handling DC #1	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20522	Trona Handling DC #2	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20532	Trona Handling DC #3	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
EP-20542	Trona Handling DC #4	0.17	0.75	0.17	0.75	0.17	0.75	Note 1
Total			**21.02**		**21.02**		**21.02**	

(1) Equipment assumed to operate 24 hr/day, 365 day/yr.

Abengoa Bioenergy Biomass of Kansas, LLC Biorefinery Facility Hugoton, Kansas	Rev. 3

AREA 20000
Ash Pellets Storage Pit

Ash Pellets Storage Pile Fugitive Emissions

Basis: Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, EPA-450/2-92-004, September 1992. Section 2.3.1.3.3, Wind Erosion from Continuously Active Storage Piles, Equation 2-12.

Particle Size Multipliers (k factors) for Section 2.3.1.3.3, Wind Erosion from Continuously Active Storage Piles from AP-42 Section 13.2.5, Industrial Wind Erosion, November 2006.

speed data from the Dodge City, Kansas meteorological station data provided by the Kansas Department of Health and Environment (KDHE). The anemometer height of the meteorological station was reported as 26 feet. The mean pile height is estimated to be approximately 3 feet (1 meter) above grade as the wind speed at ground surface cannot be approximated with the logarithmic model used to obtain wind speed verses height. The standard wind sheer component was used to calculate an equivalent unobstructed wind speed at 3 feet of 3.35 m/s. The percentage of time that the unobstructed wind speed exceeds 3.35 m/s at the mean pile height is 24.5%.

The silt content of the ash pellets was assumed to be the maximum quality control guarantee of allowable material not bound up in the 2 to 4 mm pellets.

Criteria:

Ash Production Rate	23,292	lb/hr
Annual Ash Production	102,018	ton/yr
Hours per Day of Operation	24	hr/day
Maximum Production Schedule - Permit	365	days/yr

Source Details:

ID	Emission Source	Boiler Ash Pit Storage (wet ton)	Boiler Ash Pit Length and Width (ft)	Mean Boiler Ash Pile Height Above Grade (ft)	Pile Size (ft^3)	Pile Size (acres)	Ash % Moisture (%)
EP-20551FUG	Ash Pellets Storage Pit	3,600	150	3	120,000	0.3	5%

Emission Factor Equation: **E=k*1.7*(s/1.5)*[(365-P)/235]*(f/15)** Equation 2-12 from Section 2.3.1.3.3

where:
E = particulate emission factor (pounds per day per acre, lb/day/ac)
k = particle size multiplier (dimensionless)
s = silt content of material (percent, %)
P = number of “wet” days with at least 0.254 mm (0.01-in) of precipitation during the avg. pe
f = % of time that the unobstructed wind speed exceeds 5.4 m/s (12 mph) at the mean pile h

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	1	0.5	0.075		AP-42 13.2.5
Silt Content	s	5	5	5	%	Engineering Estimate
Mean Days > 0.01-in precipitation	P	75	75	75	days	1971-2000 Average Annual Precipitation
Unobstructed Wind Speeds > 12 mph	f	24.5	24.5	24.5	%	Dodge City, Kansas Met Station Data
Watering of Pile	CE	60	60	60	%	BACT, Fugitive Dust Control Plan

Emission Factors:

		Uncontrolled Emission Factors			Controlled Emission Factors		
		PM_{30}	PM_{10}	$PM_{2.5}$	PM_{30}	PM_{10}	$PM_{2.5}$
ID	Source Description	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac	lb/day/ac
EP-20551FUG	Ash Pellets Storage Pit	11.422	5.711	0.857	4.569	2.284	0.343

Uncontrolled PM/PM_{10}/$PM_{2.5}$ Emissions:

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-20551FUG	Ash Pellets Storage Pit	0.13	3.15	0.57	0.07	1.57	0.29	0.01	0.24	0.04
Total		**0.13**		**0.57**	**0.07**		**0.29**	**0.01**		**0.04**

Controlled PM/PM_{10}/$PM_{2.5}$ Emissions:

		PM_{30}			PM_{10}			$PM_{2.5}$		
ID	Source Description	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)	(lb/hr)	(lb/day)	(ton/yr)
EP-20551FUG	Ash Pellets Storage Pit	0.05	1.26	0.23	0.03	0.63	0.11	0.00	0.09	0.02
Total		**0.05**		**0.23**	**0.03**		**0.11**	**0.00**		**0.02**

Ash Pellets Storage Pit Loading and Pellet Loadout Fugitive Emissions

Basis: AP-42 Section 13.2.1, Aggregate Handling and Storage Piles, November 2006.
An alternative ash pellets handling scenarios includes storing excess ash pellets at the ash pellet storage pit. Ash pellets trucked and dumped at the ash pellet storage pit to be loaded later onto trucks using a front end loader for off-site transport. The particulate emissions generated from the loading of the storage pile and the loading of trucks was assumed equivalent to the particulate emissions generated by the drop operation for aggregate handling and storage piles.
Uncontrolled emissions represent potential-to-emit in the absence of controls.

Criteria:

Ash Production Rate	23,292	lb/hr
Ash Pellets Shipping Rate	66	ton/hr
Annual Ash Production	102,018	ton/yr
% Loadout by Truck	100%	

Emission Factor Equation: **E=k(0.0032)*[((U/5)^1.3)/((M/2)^1.4)]** Equation 13.2.4-1

where:
E = particulate emission factor (pounds per ton, lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (miles per hour, mph)
M = material moisture content

		PM_{30}	PM_{10}	$PM_{2.5}$	Unit	Notes
Particle Size Multipliers	k	0.74	0.35	0.053		AP-42 13.2.4
Mean Wind Speed	U	12.30	12.30	12.30	mph	Dodge City, Kansas Met Station Data
Material Moisture Content	M	5	5	5	%	Vendor Estimate

Emission Factors:	PM	PM_{10}	$PM_{2.5}$	Unit	Notes
Emission Factor for Ash Pellet Storage Pit Loading and Pellet Load-Out Operations (Drop Operations)	2.12E-03	1.00E-03	1.52E-04	lb/ton	Equation 13.2.4-1

PM Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled PM		Capture Efficiency	Fugitive Emissions	
		(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-20552FU(	Ash Pellets Storage Pit Loading	66	102,018	2.12E-03	0.14	0.11	0%	0.14	0.11
EP-20552FU(	Ash Pellets Load-Out from Pit	66	102,018	2.12E-03	0.14	0.11	0%	0.14	0.11
Total					**0.28**	**0.22**		**0.28**	**0.22**

PM_{10} Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled PM_{10}		Capture Efficiency	Fugitive Emissions	
		(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-20552FU(	Ash Pellets Storage Pit Loading	66	102,018	1.00E-03	0.07	0.05	0%	0.07	0.05
EP-20552FU(	Ash Pellets Load-Out from Pit	66	102,018	1.00E-03	0.07	0.05	0%	0.07	0.05
Total					**0.13**	**0.10**		**0.13**	**0.10**

$PM_{2.5}$ Emissions:

ID	Emission Source	Throughput		Emission Factor	Uncontrolled $PM_{2.5}$		Capture Efficiency	Fugitive Emissions	
		(ton/hr)	(ton/yr)	(lb/ton)	(lb/hr)	(ton/yr)	(%)	(lb/hr)	(ton/yr)
EP-20552FU(	Ash Pellets Storage Pit Loading	66	102,018	1.52E-04	0.010	0.008	0%	0.010	0.008
EP-20552FU(	Ash Pellets Load-Out from Pit	66	102,018	1.52E-04	0.010	0.008	0%	0.010	0.008
Total					**0.020**	**0.015**		**0.020**	**0.015**

Appendix B

Wetland Assesment Report:
Proposed Abengoa Ethanol
Plant Hugoton, Kansas

WETLAND ASSESSMENT REPORT
PROPOSED ABENGOA ETHANOL PLANT
HUGOTON, KANSAS

JUNE 27, 2008

KLEINFELDER
Bright People. Right Solutions.

A Report Prepared for:

Abengoa Bioenergy Hybrid of Kansas
1400 Elbridge Payne Road
Chesterfield, Missouri 63017

WETLAND ASSESSMENT REPORT
PROPOSED ABENGOA ETHANOL PLANT
HUGOTON, KANSAS

Kleinfelder Project No. 88404

Prepared by:

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June 27, 2008

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1.0 INTRODUCTION AND SUMMARY

This report was prepared to provide information related to potential jurisdictional wetlands and streams. Jurisdictional streams and wetlands are regulated by the U.S. Army Corps of Engineers (USACE) and are referred to as "Waters of the U.S." (WUS). See Section 3. The U.S. Department of Energy is providing federal grant money for this project and documentation per the National Environmental Policy Act (NEPA) is required. The results of this wetland survey and assessment will be incorporated into an Environmental Impact Statement (EIS) that is being prepared for the proposed project.

This wetland assessment report was prepared for Abengoa Bioenergy Hybrid of Kansas (ABHK). The survey area was located just west of the City of Hugoton, Kansas. Kleinfelder was contracted to conduct a wetland assessment for the northwest quarter of Section 17, T. 33 S., R. 37 W. in Stevens County, Kansas. See Figure 1 – General Site Location. The survey area was approximately 160 acres in size. See Figure 2 – Vicinity and Survey Location.

Correspondence with the Stevens County Natural Resource Conservation Service (NRCS) indicated a need for a wetland assessment on the northwest portion of the east property tract due to the presence of an internal drainage area. The Kansas State Historic Preservation Officer also indicated a need for a Phase I Cultural Resources Assessment on a portion of the east property tract due to the presence of a playa (separate report that will also be included as part of the NEPA analysis).

This report is based on knowledge of wetlands in the region, a review of relevant background literature (see Section 2), and a focused field survey of the 160 acre site (see Section 4). This report includes discussion of wetland-related plant communities, soil types observed on site, wetland indicators, jurisdictional wetland boundaries, and permitting implications.

Prior to conducting the field survey, Kleinfelder reviewed site maps, NRCS soil surveys, aerial photographs, U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps, and U.S. Geological Service (USGS) topographical maps. See Figures 3 – Internal Drainage Areas, Figure 4 – NRCS Hydric and USFWS NWI, Figure 5 – NRCS Soil Map Units, Figure 6 – Surface Hydrology Map, and Section 2.

The field work consisted of two days (May 28 and 29, 2008) of focused field surveys in and around a playa or internal drainage area. The on-site survey consisted of collecting soils, hydrology, and plant information. The information was recorded on data forms, photographs were taken, and a GPS unit was used to record spatial data. See Appendix B – Site Photographs and Appendix C – Wetland Data Forms. A laser level was used to collect field topographical data. See Figure 8 – Elevation Contour Map.

No streams or wetlands that would be considered jurisdictional or Waters of the U.S. (WUS) were found during the survey. There were two low quality isolated farmed wetlands totaling 0.43 acres delineated during the survey and assessment. See Figure 7 – Wetland Map and Section 5. Recommendations and feasibility considerations for the potential restoration of the playa are included in Section 6 and Appendix D – Hydrological Analysis.

2.0 SETTING AND REVIEW OF PUBLISHED INFORMATION

European settlement of the area began in the 1870s when cattlemen began moving into the area. Stevens County was organized August 1886 and Hugoton was made the county seat. A railroad was constructed across the county in 1912.

The proposed construction site is adjacent to the City of Hugoton, a historic railroad line, grain storage and a few mill facilities, industrial park, airport, golf course, roads, and row crop agriculture. The site is highly disturbed and has been used for decades for row crop agriculture. Center pivot irrigation systems are extensively used in the area and a few areas are flood irrigated. Internal drainage areas or playas are present throughout the area. Wheat, milo, and corn are the most common crops. Cattle and hogs are also raised in the area. Most of the hogs are raised in confinements and most of the cattle are raised in large open lots.

The proposed project is in the Arkansas-White-Red Rivers Region 11, the 12,000 square mile Upper Cimarron sub-region 1104; and, the 1,720 square mile Cimarron-Liberal 8-digit cataloging unit 11040006. Stevens County is in the Central Great Plains Winter Wheat and Range Region; and, the Major Land Resource Area (MLRA) – 77A Southern High Plains, Northern Part (USDA Handbook 296). The playa is in the Limy Upland Kansas Range Site.

USFW NWI maps indicated that there was one area mapped as Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated (PUBFx) within the subject property boundaries and one area mapped as PUBFx that was adjacent to the northeast corner (see Figure 4). The PUBFx mapped location within the subject property is 1.5 acres in size. Leveling activities have occurred since the NWI maps were published.

The 2006 NRCS Soil Survey of Stevens County, Kansas indicated that the following soil map units (SMU) were present within the 160 acre survey area (see Figure 5):

- 5205 – Canina loam, 0-1% slope
- 5210 – Belfon loam, 0-1% slope
- 1611 – Vorhees fine sandy loam, 1-3% slope

All of the above soils are classified as well drained, have moderate permeability, low to neglible runoff, and a water table that is 6 or more feet below the surface. None of the SMUs are flooded per information in the soil survey. Review of the NRCS Stevens County List of Hydric Soils indicated that none of the SMUs are on the hydric list.

The current or 2006 Soil Survey for Stevens County mapped the center of the playa as the Canina loam, 0 – 1 % slope (5205). The Canina Series consists of very deep, well drained soils that formed in loamy, calcareous eolian loess deposits of Holocene age. These soils are nearly level to very gently sloping plains with slopes of 0 to 3 percent. Permeability of Canina soils is moderate. Canina soils are used extensively as cropland with some minor areas used as improved pasture or rangeland. A typical profile for this soil map unit (SMU) is as follows:

A	0 – 6"	10YR 5/2	loam
B	6 – 17"	10YR 5/4	silty clay loam
B	17 – 27"	10YR 5/4	clay loam
B	27 – 43"	7.5YR 6/6	sandy clay loam
B	43 – 57"	7.5YR 5/4	clay loam
B	57 – 80"	7.5YR 5/6	clay loam

The 1958 Soil Survey of Stevens County mapped the playa area as the Ulysses silt loam (Ub), 1-3% slopes. The SMU polygon for the Ulysses silt loam more closely matched the contours of the playa than the 2006 survey; and, the 1958 soil survey was completed before excavating and leveling activities were conducted within and around the playa. A typical profile for the Ub SMU is as follows:

A	0 – 6"	10YR 4/2	silt loam
B	6 – 13"	10YR 4.5/2	silt loam or silty clay loam
B	13 – 23"	10YR 6/3	silt loam
C	23 – 43"	10YR 7/3	silt loam with 5% $CaCO_3$ concretions

USGS 7.5 minute Hugoton and Feterita topographical quadrangle (topo) maps (1974/75) review did not note any indications of springs, marsh, and/or streams. One area was shown as open water (the bottom of the playa). Per review of the USGS topo the location does not appear to have any significant nexus with any other wetlands, lakes, streams, and/or other areas considered WUS; and, subsequently would be considered "isolated" and non-jurisdictional.

Site Disturbance

The site is highly disturbed and has been used for decades for row crop agriculture. There are no large naturally forested or native prairie areas present onsite or in the immediate vicinity of the site. All of the areas visited during this survey had been disturbed by agricultural activities, and/or roads/railroads. No wetland or adjacent habitats were observed that would be considered high quality natural areas. The wetland areas delineated were highly disturbed.

Disturbance was documented using field collected soils data and observations, landowner interview, aerial photographs, soil surveys, topo maps, and USFWS NWI maps. Copies of aerial photographs from 2006, 2005, 2004, 2002, 1997, 1992, 1991, and 1983 were reviewed; and, the 2006 Stevens County Soil Survey, 1974/1975 USGS 7.5 minute topographical maps, and 1958 Stevens County Soil Survey were used to document disturbances and historical activities. Following are observations from review of copies of historical aerials and maps.

1958 Soil Survey (1953 B&W aerial, 1' = 1,667'): The railroad is present to the south and a road is present to the north. Some ponding is evident in the 1958 Soil Survey map sheet. The subject site and adjacent areas appear to be used for hayland and row-crops. The soil survey map sheet shows an open diamond symbol in the bottom of the playa which the legend indicates is a "small depression that is crossable with tillage instruments". About 2 acres at the bottom of the playa appear to temporarily pond.

1974 topo (1" = 2,000'): The 1974 USGS topographical map shows a square shaped open water area in the bottom of the playa. Approximately 40 acres have been fenced in the west central portion of the northwest quarter of Section 17. The Hugoton airport is present one-half mile to the south.

1983 aerial (B&W, 1' = 1,000'): The excavated pond is present and the adjacent fields in the northwest quarter of Section 17 appear to be flood irrigated. Some leveling and benching of the southwest quarter of Section 17 has occurred (based on contours from the 1974 USGS topographical map the bench was likely made in the early 1970s).

1988 aerial (blue ammonium print, 1" = 400'): No significant changes from 1983 noted.

USFWS NWI Map: An open water area of 1.5 acres is mapped as "PUBHx". PUBHx is palustrine, unconsolidated bottom, permanently flooded, excavated.

1991/1992 aerials (B&W, 1" = 750'): No significant changes from 1983.

1997 aerial (B&W, 1" = 750'): Center pivot irrigation is present to the north in Section 8, a gas well has been installed near the southwest corner of Section 17; and, development is occurring to the southwest in the southeast quarter of Section 18 along the railroad tracks.

2002 aerial (B&W, 1" = 750'): Excavated and bermed pond in the bottom of the playa is still present and adjacent fields appear to be flood irrigated.

2004/2005 aerials (color, 1" = 350'): Center pivot irrigation system has been installed in the northwest quarter of Section 17. Four sided containment berm for irrigation return water pond has been removed.

2006 Soil Survey (B&W aerials from 1991 to 1999, 1" = 2,000'): Bottom of playa is mapped as a "borrow pit" (square with an x) on the NRCS soil survey map sheet.

2006 aerial (color, 1" = 170'): An east-west trending berm has been constructed in bottom of playa for center pivot wheel tracks. Field corners in the northwest quarter of Section 17 appear to be flood irrigated. Shallow ponding is present in the "W-1" farmed wetland and stressed vegetation is observed in the "W-2" farmed wetland location.

Landowner interview: Section 17 was purchased by Abengoa from Mr. Fred Walkenmeyer. The former landowner was interviewed on May 29, 2008 concerning historical activities in Section 17. Mr. Walkenmeyer is retired and had farmed in the Hugoton area for several decades. Mr. Walkenmeyer indicated that the subject site has always been used for agriculture during his adult lifetime. Based on his observations, the playa had never overflowed onto other fields, roads, or railroad tracks.

About 35 years ago, the bottom of the playa was excavated approximately 5 feet below grade to produce an irrigation return water pond; and, the excavated soil was used for the four sided levee. At this time, there were some leveling activities also completed in other parts of the section. Four years ago, the irrigation return water pond levee was bulldozed into the excavated pit; and, approximately four feet of fill were placed in the bottom of the playa. The field leveling activities including removing about 2 to 4 feet from the highest points in the crop fields and placing fill from 2 to 4 feet deep in the lowest parts of the crop fields in Section 17. Two years ago, the berm for the center pivot wheel tracks was built up with about 3 feet of soil.

Plant species observed during the survey in surrounding habitats includes the following: bindweed, annual brome, barnyard grass, curly dock, ragweed, cocklebur, loco weed, reed canary grass, smartweed, switch grass, wheatgrass, blue grama, willow, Russian olive, and Virginia creeper. Animal species observed on-site, adjacent areas, and other playas observed south and southwest of the subject site include numerous pheasants, morning dove, kill deer, red-wing blackbird, pigeon, cottontail rabbit, jack rabbit, badger, coyote, and mule deer.

3.0 REGULATORY FRAMEWORK

The following section provides an overview of the regulatory framework involved with impacts to WUS that are associated with the proposed project. Wetlands and riparian communities are considered to have special ecological status and are considered a declining resource by several regulatory agencies, including the USACE. Wetlands serve significant biological functions by providing nesting, breeding, foraging, and spawning habitat for a wide variety of resident and migratory animal species. Wetlands and streams also provide for the movement of water and sediments, groundwater recharge, water purification, storage of storm water runoff, and recreation.

The USACE retains jurisdiction over WUS, which include territorial seas, tidal waters, and non-tidal waters such as lakes, streams, rivers, and wetlands. The federal government has prescribed methodologies for delineating WUS pursuant to the Clean Water Act (CWA) of 1977. Determination of WUS is based on definitions and descriptions at 33 CFR 328. According to Section 404 of the CWA, work in navigable waters and the placement of fill or dredge material into WUS, including streams and wetlands, requires authorization by the USACE. The type of authorization (e.g., individual permit, nationwide permit, regional permit, or letter of permission) depends on the location, volume, and purpose of the fill or dredge.

The USACE has established definitions and regulations for the identification and delineation of "wetlands", which are published in the 1987 USACE *Wetlands Delineation Manual* (Environmental Laboratory, 1987). This 1987 manual is the current federal delineation manual used in the CWA Section 404 regulatory program for the identification and delineation of wetlands. The 1987 manual has been clarified and updated through a series of guidance documents and memoranda from the USACE. The USACE defines wetlands as:

"Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The USACE clearly states, "except in certain situations defined in the 1987 manual, evidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland determination." For a wetland to exist, it must have the following three characteristics:

(1) prevalent hydrophytic vegetation (plants that are adapted to grow, compete, reproduce and persist in anaerobic soil conditions);

(2) hydric soils (those that possess characteristics associated with reducing soil conditions); and,

(3) a source of hydrology (frequently inundated or saturated during the biological growing season).

Streams and drainages that support wetland vegetation, exhibit ponding or scouring, show obvious signs of channeling, or have discernible banks and high water marks are also regulated. Field indicators of ordinary high water include clear and natural lines on opposite sides of the banks, shelving, scouring, sedimentary deposits, changes in the character of the soil, drift lines, exposed roots, shelving, destruction of terrestrial vegetation, and the presence of litter and debris. The width of WUS is defined as that portion which falls within the limits of ordinary high water (OHWM). Typically, the width of WUS corresponds to the two-year flood event.

4.0 FIELD SURVEY METHODS

The wetland determination and delineation method employed for this project site involved the routine, on-site delineation method set forth by the USACE (Environmental Laboratory, 1987). A walkover survey was conducted by Mr. Tom Plattner and Mr. Brent Peterson of Kleinfelder on May 28 and 29, 2008 to evaluate the overall site physiognomy, to determine the primary biological and hydrological characteristics, and to identify appropriate areas to establish wetland delineation sampling plots. Established wetland sampling plots consisted of hand-dug soil pits for hydric soils analysis, visual hydrophytic plant assessment, and visual observation of wetland hydrology indicators. Appropriate jurisdictional wetland boundaries were derived from wetland sampling plot analysis and recorded on Data Sheets.

Data sheets were completed for each sample location describing hydrology, plant species, soil features, topography and other data relevant to each location. Wetland type and setting, stream specific parameters, evidence of disturbance, water source and estimated persistence, apparent conditions, adjacent habitats, wetland / aquatic life observed, habitat diversity, cultural, and biological features were documented for each sample location.

Each location was recorded on a GPS unit. At each sample point, data forms were completed with relevant information to that distinct area. Photographs were taken as to represent the specific location. Wetland Data Forms are included in Appendix C. Photographs taken during field activities are included in Appendix B.

In addition, the team visited the NRCS office to obtain information regarding wetland information, and/or other information useful in evaluating the area of investigation. There were no Wetland Reserve Program (WRP) areas identified; and, there were no preliminary or certified wetland determinations completed by the NRCS within the study area.

Potential wetland locations were identified by using the following references (see Section 2):

- USGS Topographical Map – following contour lines to identify drainageways, "blueline" streams, marshes, open water, and depressions;
- NWI Maps – identified wetland locations and types. Prepared by USFWS using color-infrared (CIR) photographs. Use the Cowardian system of wetland classification instead of the 1987 USACE Wetland Manual; and,
- NRCS Soil Survey Maps – used information in the county soil surveys to identify hydric soil map units (SMU) and characteristics identified with hydric soils.

Field collected data was conducted in accordance with the Wetlands Delineation Manual (1987) and consisted of the following:

- Sample plots were used to determine wetland or non-wetland status. Visual observations were used to identify vegetation, soil, and hydrological characteristics within the vicinity of the data points. Completed wetland delineation forms for each data point included in Appendix C;
- Plant community types in proximity to potential wetland boundaries were identified. The biologists selected a representative observation point for each plant community, visually selected the dominant species from each stratum of the community, and recorded the indicator status of the dominant species. A determination was then made as to whether the vegetation was hydrophytic;
- Soil pits were placed at sample plots for the potential wetlands being investigated. The biologist then recorded indicators of hydric status from the samples and determined if the soils were hydric. Also noted were other hydrological indicators such as soil saturation within the upper 12 inches of the soil, standing water existing within the soil pits, and the depth to saturated soil. A wetland delineation form for each soil pit was completed; and,

- NRCS Soil Survey data (formerly the Soil Conservation Service) were reviewed to assist in determining whether the areas evaluated exhibited the hydrological and soil parameters for wetlands.

Hydric Soils

Hydric soil determinations in the field used the 2006 NRCS *Field Indicators of Hydric Soils in the U.S., A Guide for Identifying and Delineating Hydric Soils,* Version 6.0.

Hydric soils are saturated or ponded for a sufficient duration during the growing season to develop anaerobic or reducing conditions that favor the growth and regeneration of hydrophytic vegetation. Indicators of wetland soils include observations of ponding or saturation, dark (low chroma) soil colors, bright mottles (concentrations of oxidized minerals such as iron), or gleying, which indicates reducing conditions by a blue-gray color. Additional supporting information includes documentation of a soil as hydric, or reference to wet conditions, in the NRCS soil survey. Often, localized hydric soil conditions are not documented due to their small size, erroneous mapping, or recent development of hydric conditions, and must be visually inspected to confirm hydric conditions.

Potential hydric soils on-site were identified by using the following methodology:

- A soil pit was dug to approximately 18 inches at the location of a suspected wetland area to check the level of the local seasonal water table;
- The soil was examined for texture, chroma, mottling, and other wetland characteristics; and,
- NRCS listings of hydric soils for the County were examined and compared to on-site SMU.

Wetland Hydrology

Assessment of wetland hydrology is frequently supported based on soil surveys, obvious topographic patterns of drainage, and impoundment. In addition to wetland hydrology, streams as defined by OHWM are investigated.

Wetland hydrology on-site was determined by using the following methodology:

- A soil pit was dug to approximately 18 inches at the location of a suspected wetland area to check the depth of saturation and level of the local seasonal water table;
- Visual observation was noted on surface water movement and quantity;
- Visual observation was compared to soil survey information;
- Ordinary High Water Marker (OHWM) was noted; and,
- Terrestrial vegetation was observed for signs of surface water movement or inundation.

Hydrophytic Vegetation

Hydrophytic vegetation dominates areas where the frequency and duration of inundation or soil saturation exerts a controlling influence on the plant species present. Plant species are assigned wetland indicator status according to the probability of species occurring in wetlands (Reed, 1988). More than fifty percent of the dominant species must be hydrophytic to meet the wetland vegetation criterion.

Hydrophytic vegetation was determined by the following methodology:

- Visual observation and classification;
- Plant species verified by keying the plant characteristics; and,

- Plant species were compared to the National List of Plant Species that Occur in Wetlands: 1988 National Summary provided by the USFWS of the Department of the Interior for indicator categories.

Data Forms contain the wetland Plant Indicator Status Categories of OBL, FACW, FAC, FACU, and UPL. Plants with the Indicator Status of OBL, FACW, and FAC are considered wetland plants; and, FACU and UPL are considered upland plants. Following are the plant indicator status categories with the estimated probability of occurring in a wetland:

- OBL – Obligate Wetland Plant, >99%
- FACW – Facultative Wetland Plant, 67-99%
- FAC – Facultative Plant, 33-67%
- FACU – Facultative Upland Plant, 1-33%
- UPL – Obligate Upland Plant, < 1%

It should be noted that while the Wetlands Delineation Manual provides guidance and standards for the determination of WUS and wetlands, interpretation of field condition can be complicated. It is the purview of the regulatory agencies to accept or amend delineation opinions as submitted to them.

5.0 SURVEY RESULTS AND PERMITTING REQUIREMENTS

The USACE requires that discharged dredged or fill material into WUS be minimized or avoided to the maximum extent practicable. The USACE also requires consideration of feasible alternatives to avoid or minimize potential impacts to WUS. USACE guidelines require that a permit applicant justify project-related impacts to WUS, including wetlands, and provide mitigation for unavoidable impacts. In order of preference, these include avoidance, minimization, and compensation. Three types of compensatory mitigation exist, including wetland enhancement, wetland restoration, and wetland creation.

The wetland areas under consideration are farmed in most years and the area was developed for row-crop agricultural use prior to 1985. Due to the limited rainfall in southwest Kansas, the distance to the nearest stream/river, and the size of the current watershed, it is highly unlikely that the playa could overflow and discharge any water to a "navigable" waterway or jurisdictional water-body. It is likely that the farmed wetlands noted during the survey will be considered isolated and non-jurisdictional by the USACE; and, no Section 404 Permit per the CWA would be required for any dredge or fill activities within the mapped areas.

While the USACE has the final determinations as to the status of the streams, the preliminary determination is that there are no jurisdictional wetlands or streams present on the proposed ethanol plant site. There is a total of 0.43 acres of low quality, non-jurisdictional wetlands that are farmed and isolated.

Permit Considerations

The location does not appear to have any significant nexus with any other wetlands, lakes, streams, and/or other areas considered WUS, and subsequently would be considered "isolated" and non-jurisdictional. A CWA Section 404 Permit is not needed for dredge or fill in areas considered isolated or non-jurisdictional. Playa/wetland restoration activities would not require a CWA Section 404 Permit.

The subject site is in the USACE Kansas City District. The Kansas State Regulatory office for the USACE has regulatory authority for the area in question. Following is the state office address and telephone number:

Kansas State Regulatory Office
U.S. Army Corps of Engineers
2710 NE Shady Creek Access Road
El Dorado, Kansas 67042
(316) 322-8247

It is recommended that this survey be presented to the USACE for comment and/or concurrence with the survey findings.

6.0 POTENTIAL PLAYA RESTORATION

ABHK has decided not to develop the eastern 425 acre tract, which includes the 160 acre wetland survey area. This land will be used for buffer space, acquisition of water rights, biomass production, experimental agricultural plots, and/or wetland restoration along the eastern portion adjacent to the City of Hugoton. This land will not be rezoned from agricultural use.

ABHK will evaluate possible enhancement of the farmed wetland areas. Benefits of enhancement could include increased wildlife and bird nesting habitat, increased aquatic habitat, water quality improvement, groundwater recharge, landscaping/aesthetics, and research/educational opportunities. The wetland restoration would be compatible with the "buffer zone" concept for the east land tract.

Wetland restoration is contingent upon adequate water supply; and, non-contact process waste water may be used. See Appendix D for more hydrology information and analysis. Native grasses and forbs such as prairie cordgrass, switch grass, big bluestem, little bluestem, green needlegrass, sideoats grama, blue grama, western wheatgrass, sand dropseed, tall dropseed, heath aster, slimflower scurfpea, purple prairie clover, and prairie sunflower will be considered for use in playa restoration and as a vegetated buffer in adjacent upland areas. Reduced spring mowing will be considered in buffer strips to enhance bird and wildlife habitat and nesting while maintaining the ability to produce biomass.

It is not anticipated that wetland restoration/enhancement would attract birds to such an extent that it would create a bird air-strike hazard (BASH) for aircraft using the Hugoton airport. Objections from the airport could prevent wetland restoration/enhancement. Coordination with the airport would be required. Wetland enhancement will be further considered and discussed in the NEPA document.

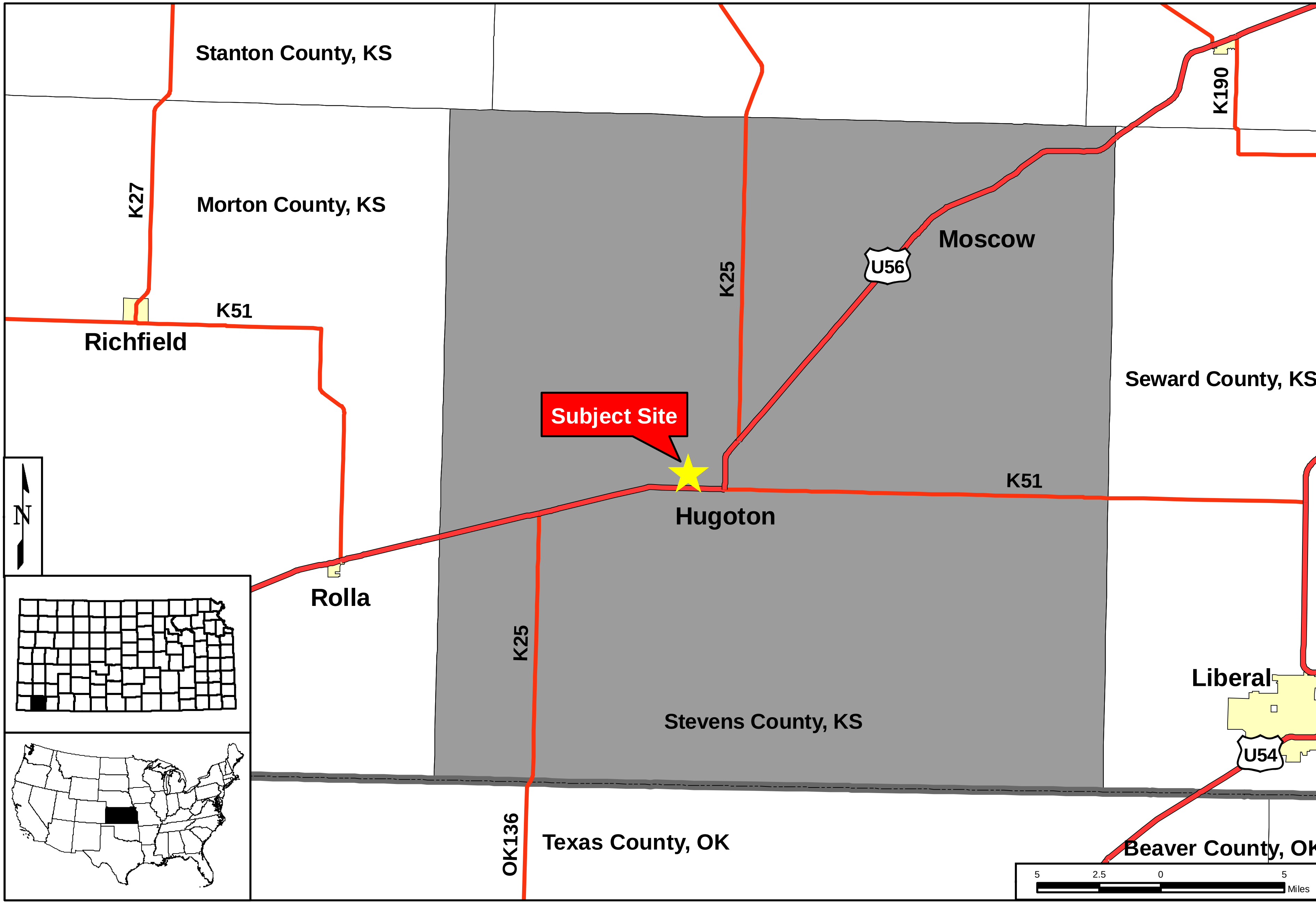
Cultural and T & E Species

Wetland/playa restoration would be unlikely to adversely affect listed species and cultural resources. The Phase I Archaeological Survey is being conducted concurrently with the wetland survey. The portion of the playa that would be restored is highly disturbed and any cultural or archaeological items (if present) would be difficult to put into proper context or time period. Results of the cultural survey and SHPO comments will also be part of the NEPA analysis and document.

Published information on state-listed Threatened and Endangered (T & E) Species for Stevens County has been reviewed. The USFWS Critical Habitat mapper was used to search for Critical Habitat or known locations of T & E Species as well as federally managed lands. No known T & E locations, Critical Habitat, or federally managed lands were noted within or adjacent to the project site. The USGS topographical maps, plat maps, and NRCS Soil Survey did not indicate the presence of federal or state lands managed within or adjacent to the project site. The project site is 10 or more miles from the Cimarron National Grassland to the west and Cimarron River to the northwest. Environmental Review by the Kansas Department of Wildlife and Parks (KDWP) was requested. KDWP has responded that the project will have no effect on T & E or Critical Habitat. Regulatory correspondence will be included in the NEPA document.

APPENDIX A

FIGURES



GENERAL SITE LOCATION

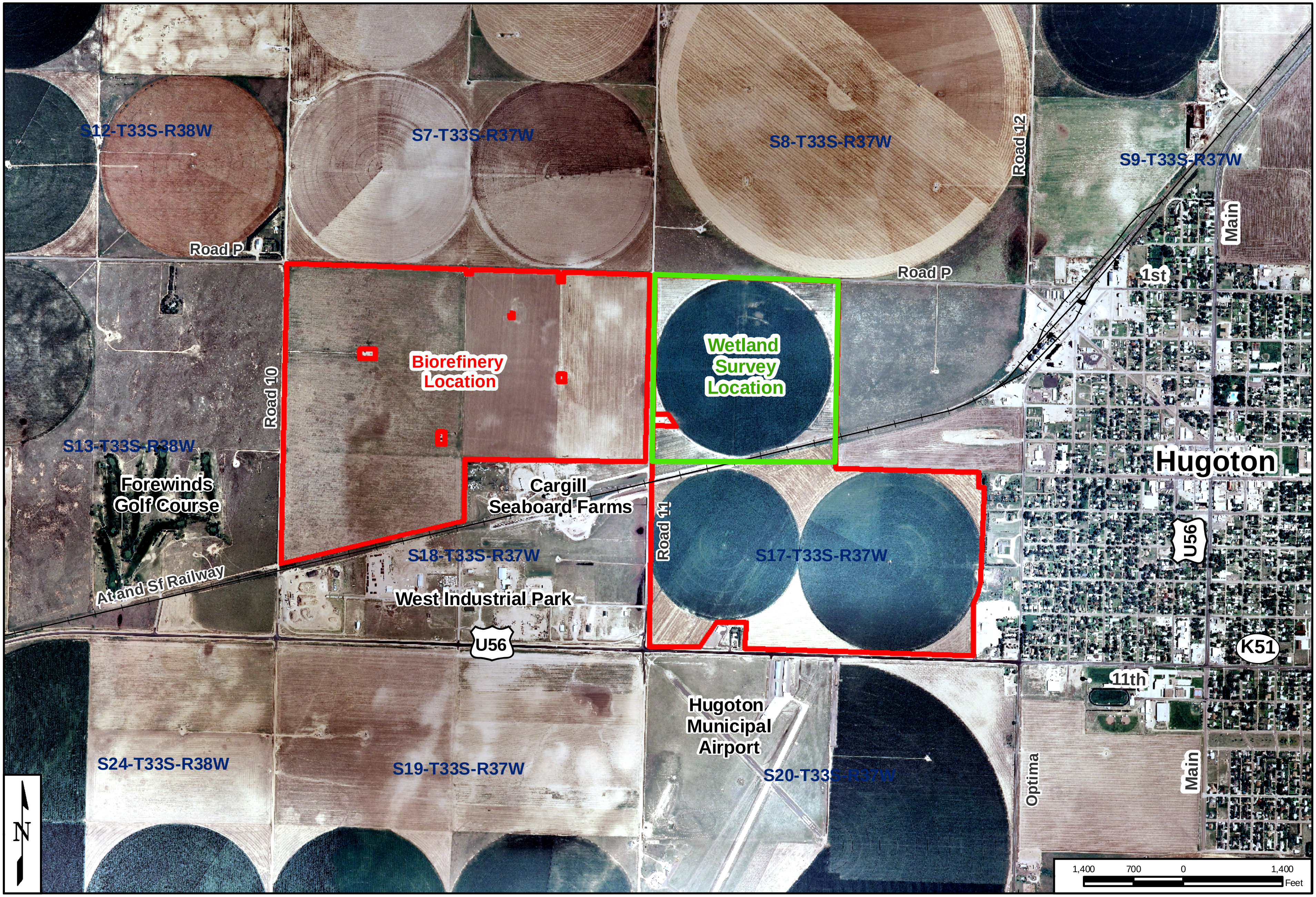
PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

KLEINFELDER
Bright People. Right Solutions.
7802 Barton
Lenexa, Kansas 66214
913.962.0909

PROJECT NO: 88404

FILE NAME: U:\LMessinger\Abengoa\Wetland\Report Figures\Figure 1.pdf

DRAWN: 6/12/08	REVISED: NA
DRAWN BY: LGM	
CHECKED BY: TP	
FIGURE 1	



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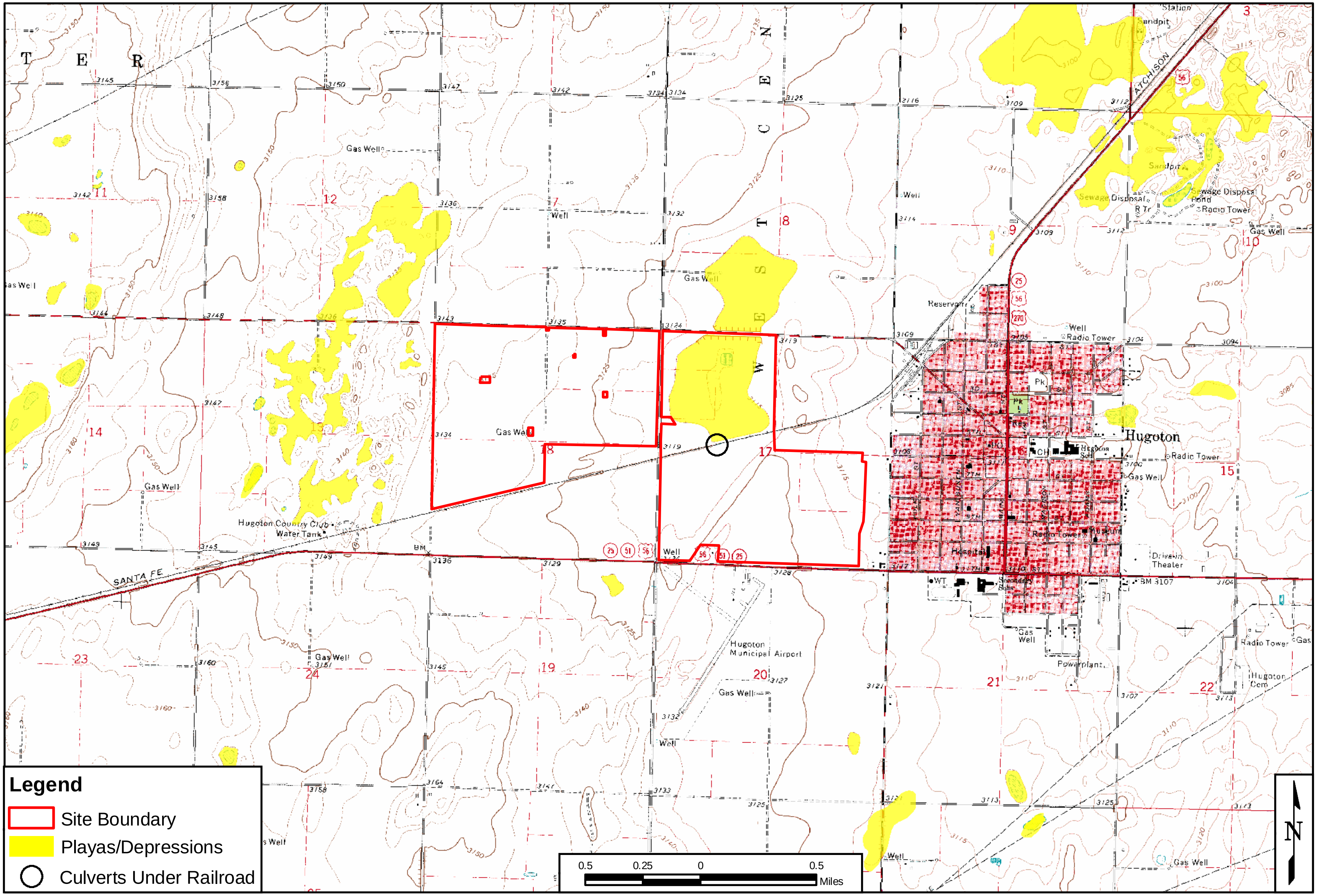
VICINITY AND SURVEY LOCATION

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

DRAWN: 6/12/08	REVISED: NA
DRAWN BY: LGM	
CHECKED BY: TP	
FIGURE	2

PROJECT NO: 88404

FILE NAME: U:\LMessinger\Abengoa\Wetland\Report Figures\Figure 2.pdf



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INTERNAL DRAINAGE AREAS

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

DRAWN: 6/12/08	REVISED: NA
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FIGURE	3

PROJECT NO: 88404

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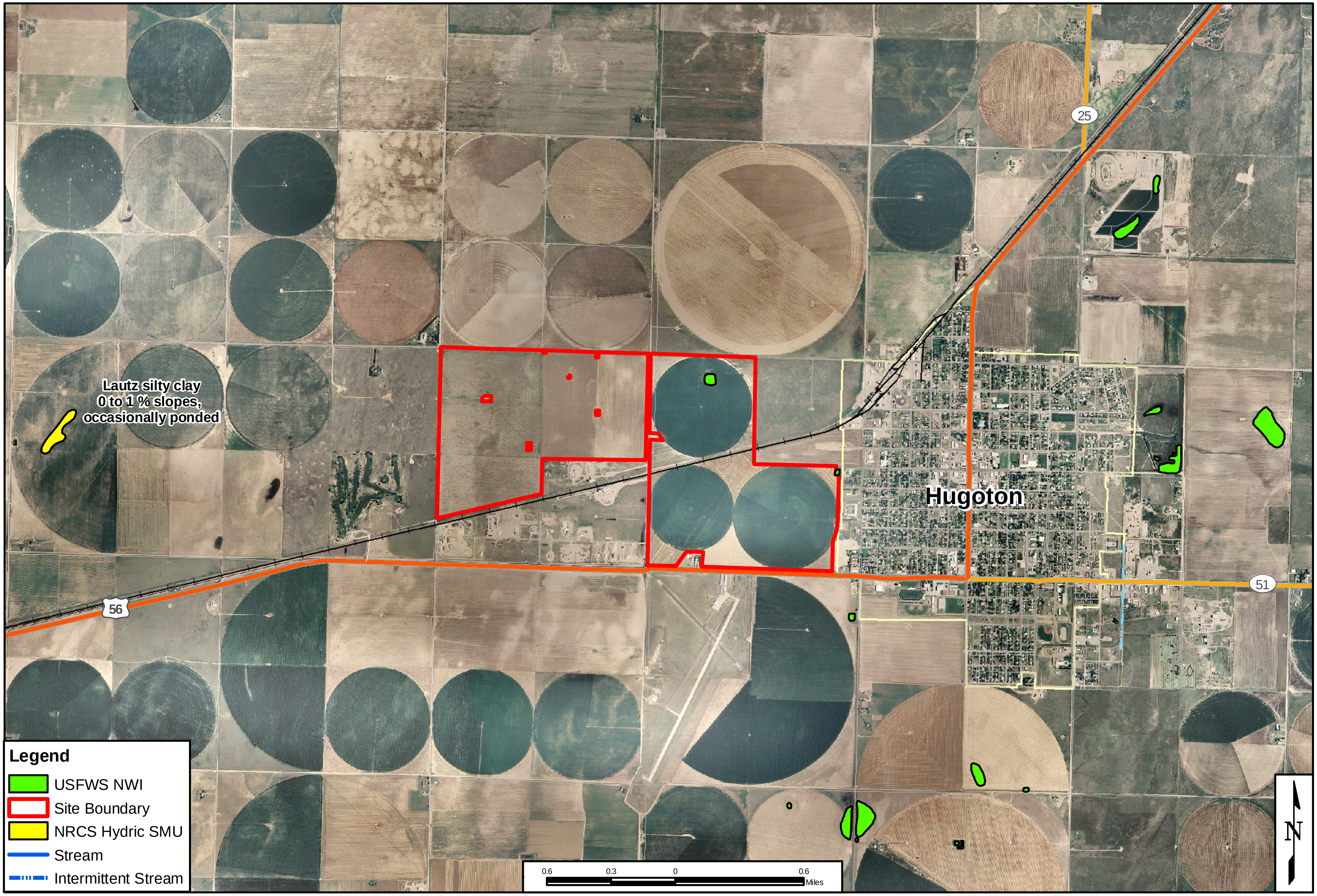

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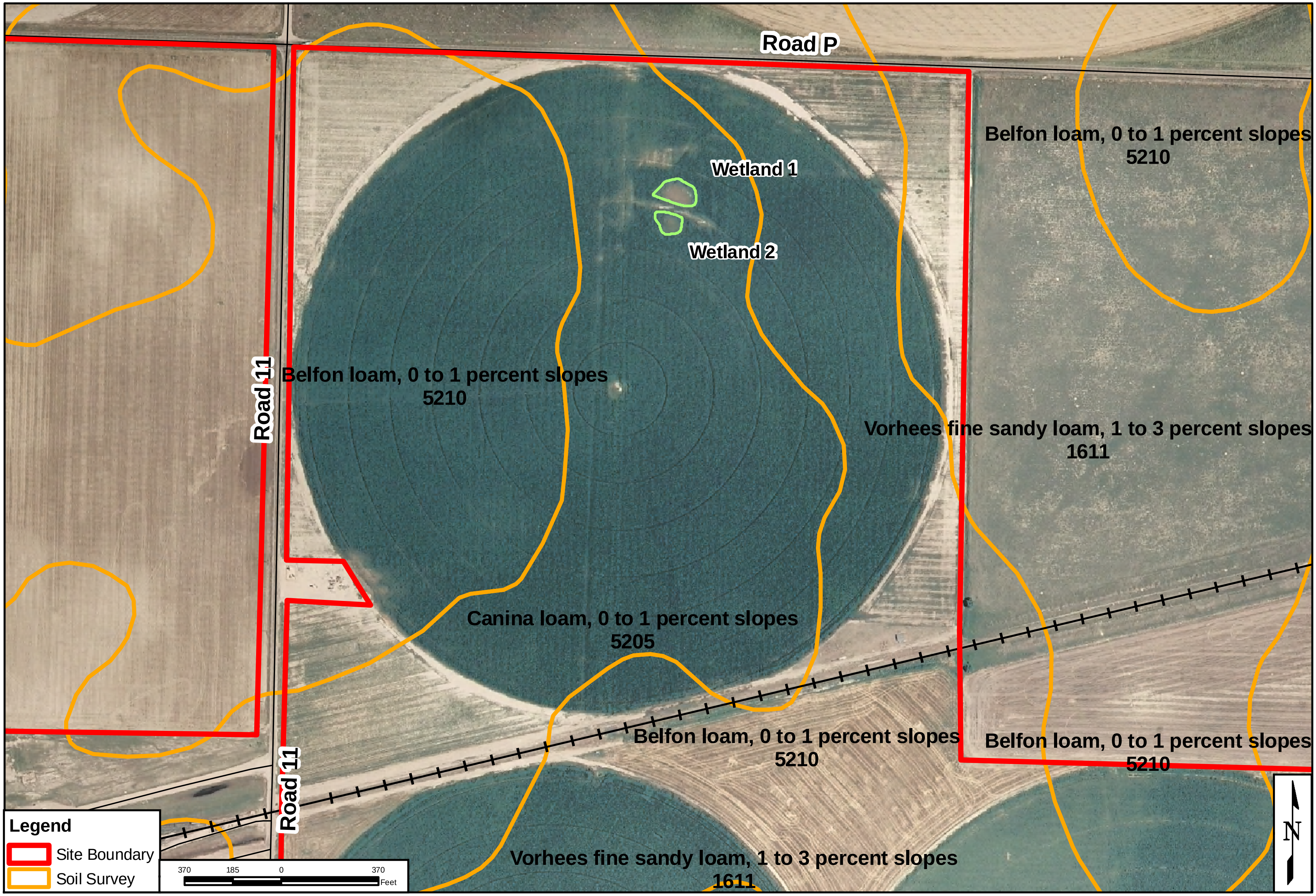
NRCS HYDRIC AND USFWS NWI

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

DRAWN: 6/12/08	REVISED: NA
DRAWN BY: LGM	
CHECKED BY: TP	
FIGURE	4

PROJECT NO: 88404

FILE NAME: U:\LMessinger\Abengoa\Wetland\Report Figures\Figure 4.pdf



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NRCS SOIL MAP UNITS

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

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FIGURE 5

PROJECT NO: 88404
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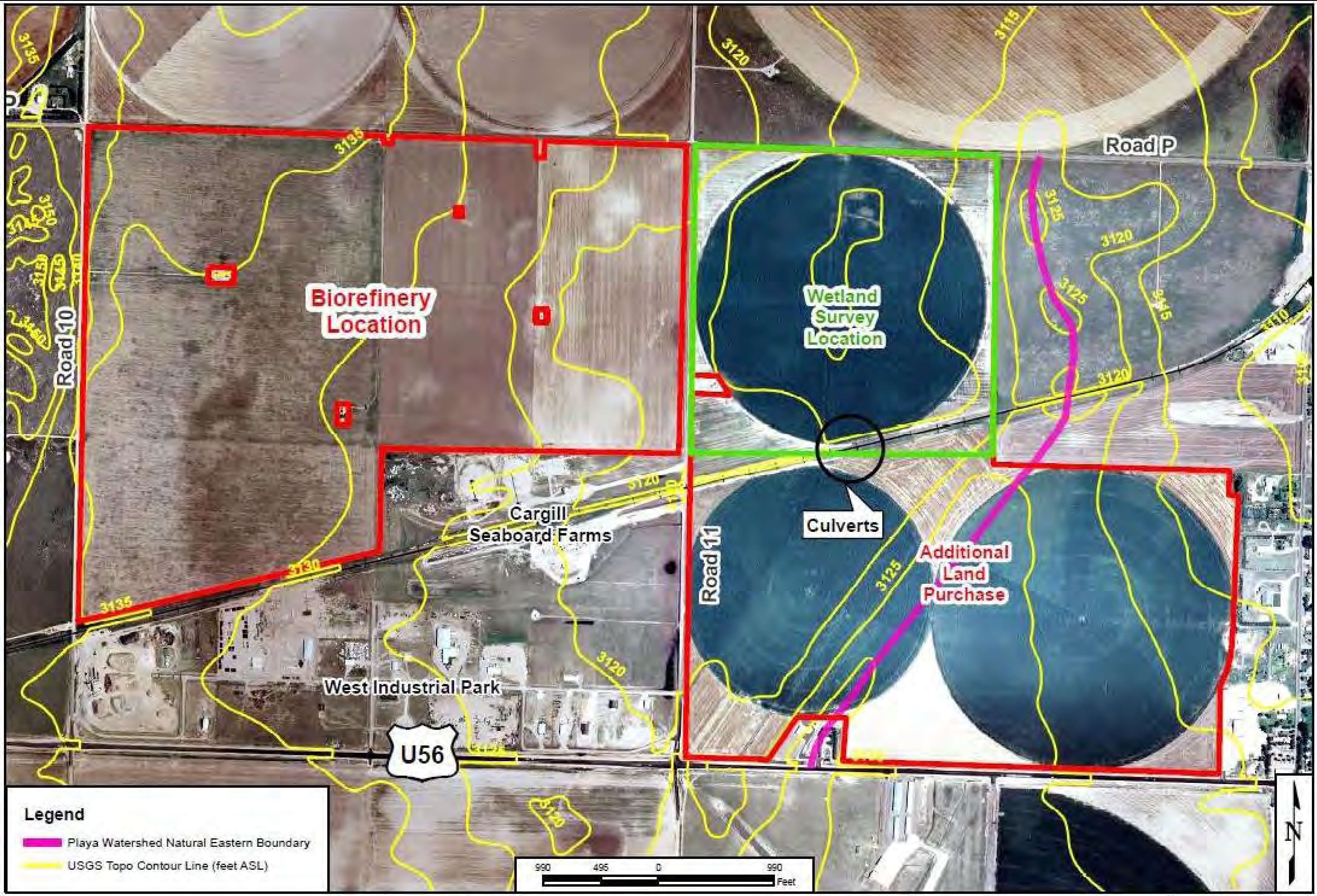

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SURFACE HYDROLOGY MAP

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

PROJECT NO: 88404 | FILE NAME: U:\LMessinger\Abengoa\Wetland\Report Figures\Figure 5.pdf

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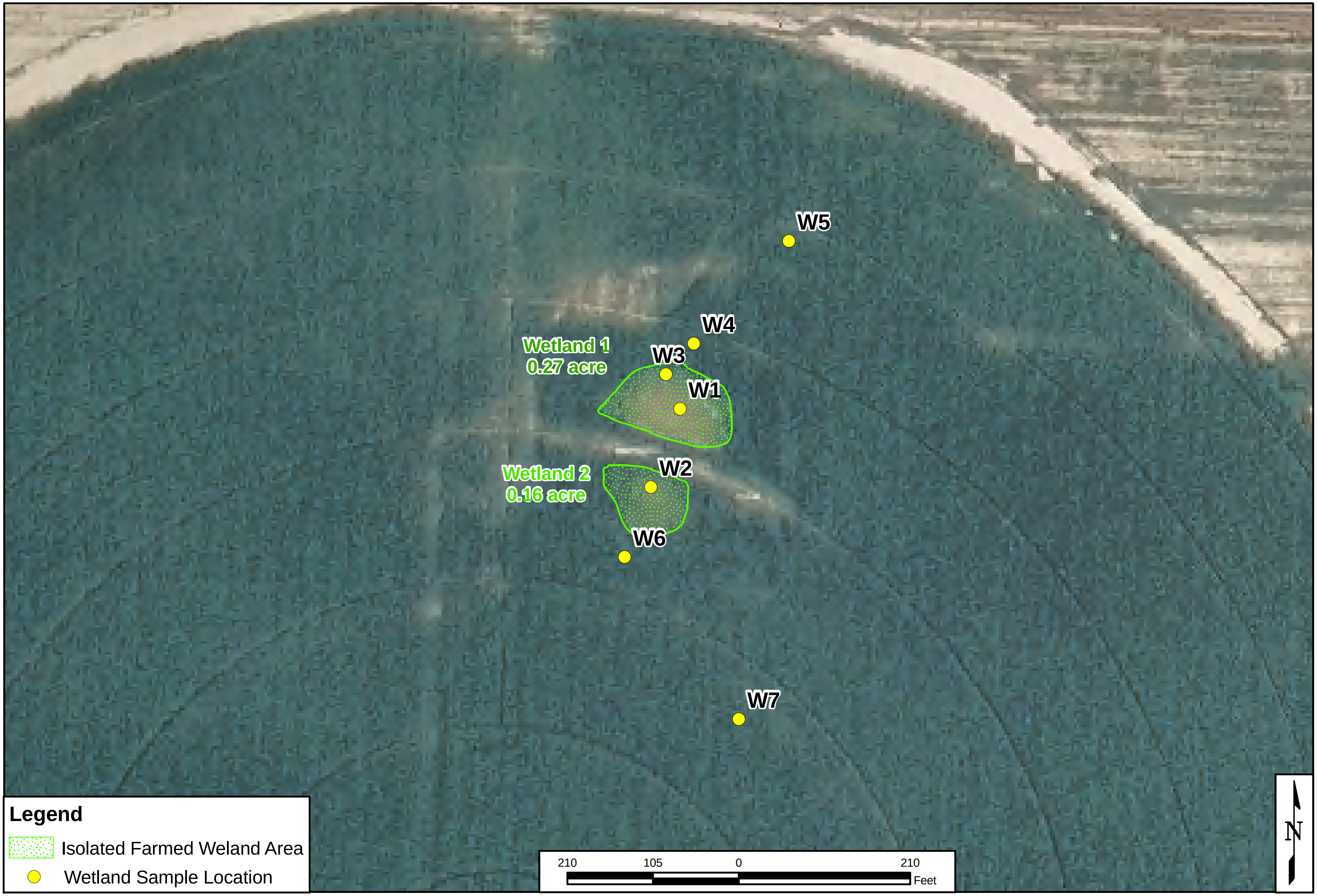
FIGURE 6



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WETLAND MAP

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

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REVISED: NA
DRAWN BY: LGM
CHECKED BY: TP
FIGURE 7

PROJECT NO: 88404
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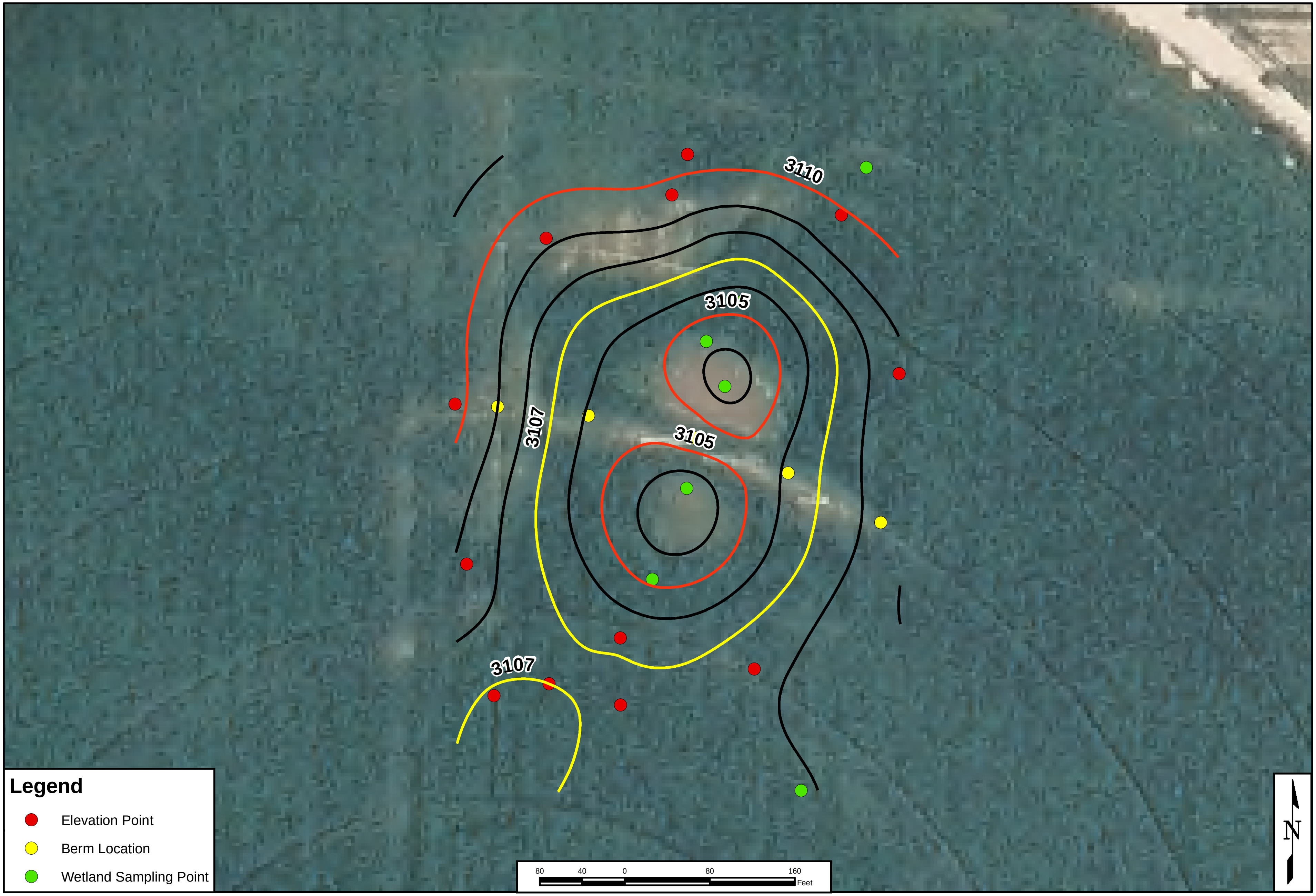

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ELEVATION CONTOUR MAP (feet ASL)

Contour Interval = 1 foot

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

DRAWN: 6/25/08	REVISED: NA
DRAWN BY: LGM	
CHECKED BY: TP	
FIGURE	8

PROJECT NO: 88404

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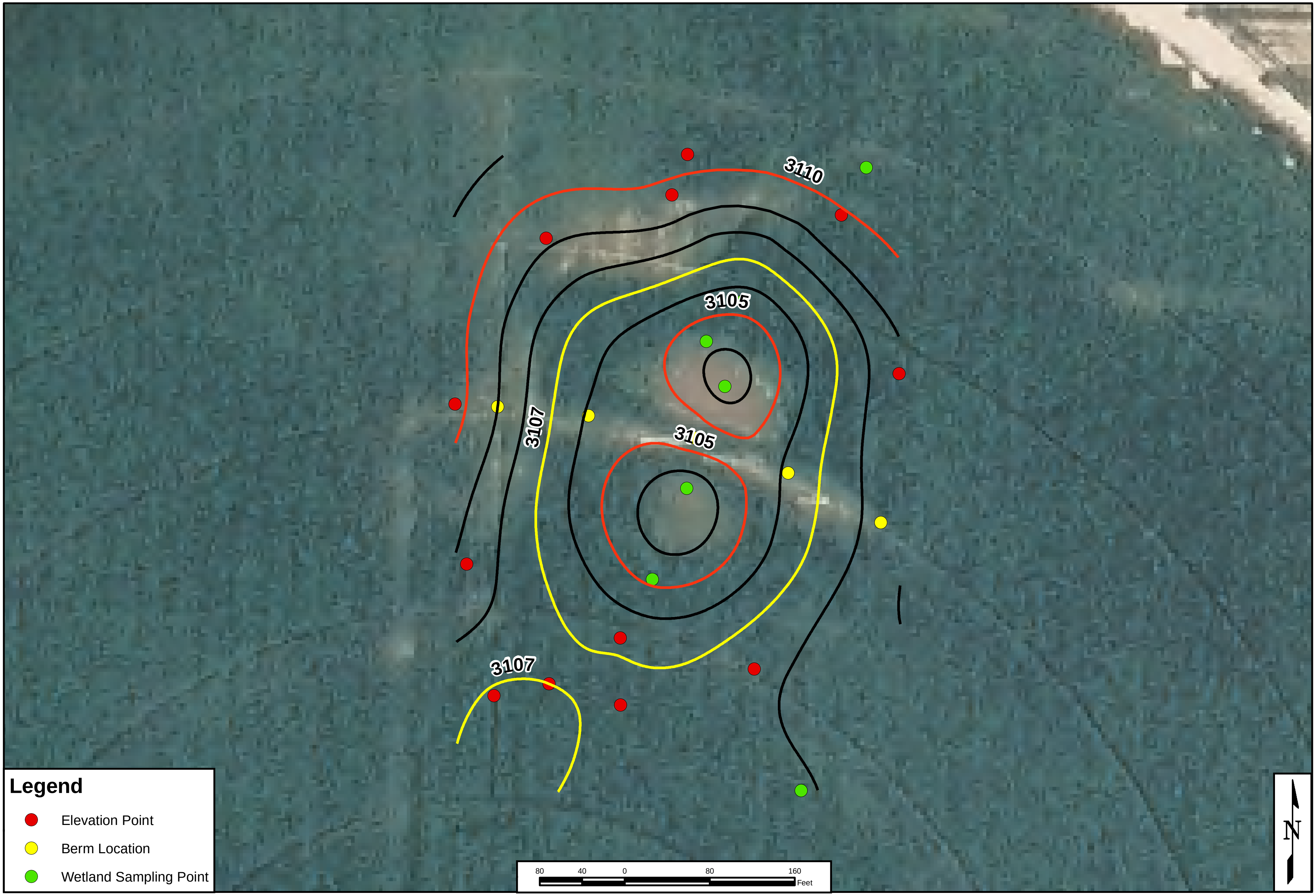

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ELEVATION CONTOUR MAP (feet ASL)

Contour Interval = 1 foot

PROPOSED ABENGOA ETHANOL PLANT
Hugoton, Stevens County Kansas

PROJECT NO: 88404

FILE NAME: U:\LMessinger\Abengoa\Wetland\Report Figures\Figure 8.pdf

DRAWN: 6/25/08

REVISED: NA

DRAWN BY: LGM

CHECKED BY: TP

FIGURE 8

APPENDIX B

SITE PHOTOGRAPHS

1. Looking southwest at playa from data point W-5

2. Looking north from data point W-7


3. Looking west at north half of farmed wetland

4. Looking west from data point W-1

5. Looking east from data point W-1

6. Looking north from data point W-1

7. Looking south from data point W-1

8. Looking north from data point W-2

9. Looking north from data point W-6 at farmed wetland “W-2”

10. Looking south from data point W-2

11. Looking west from data point W-2

12. Ground surface at data point W-2

13. Ground surface near data point W-6

14. Soil sample W-1

15. Soil sample W-2

16. Soil sample W-3

17. Looking north from data point W-3

18. Soil sample W-5

19. Soil sample W-6

20. Soil sample W-7

21. Water well in southwest corner of Section 17

22. Section of a center pivot irrigation system

23. Section of pipe used to flood irrigate field corners

24. Looking south at culverts under railroad tracks along south-central border of the NW 1/4 of Section 17

25. Looking north at culverts under railroad tracks along south-central border of the NW 1/4 of Section 17

26. Example of grassland / forbland habitat along railroad tracks and field borders

27. Looking north from southwest corner of SW 1/4 of Section 17

28. Looking south at abandoned flood irrigation return water pond; east and adjacent to Abengoa property

29. Looking east at man-made pond shown as “PUBHx” on USFWS NWI maps; east and adjacent to Abengoa property

30. Example of irrigation return water pond; off-site to the west

31. Off-site playa approximately two miles northwest

32. Playa approximately 7 to 8 miles south of proposed site; farmed some years

33. Off-site playa in sandhill area approximately 8 to 9 miles southwest of site; used by cattle

34. Cimarron River at US 56

35. Cimarron River channel

36. Cimarron River channel

37. Looking north at typical field borders near SW corner of NW 1/4 of Section 17

APPENDIX C

WETLAND DATA FORMS

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 28, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☒Yes ☐No	Plot ID:	W-1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Bare soil - less than 5% vegetation cover. Tilled and planted this spring to corn that did not sprout. Ponding, herbicide use, and tillage prevent establishment of vegetation. Wetland vegetation would be present if tillage and direct herbicide application stopped.

HYDROLOGY

- ☐ Recorded Data (Describe in Remarks):
  - ☐ Stream, Lake, or Tide Gauge
  - ☒ Aerial Photographs
  - ☐ Other
- ☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☒ Other (Explain in Remarks)

Remarks: Lowest elevation in field. Ponding observed in 2004 and 2005 aerial photographs.

SOILS

Map Unit Name
(Series and Phase): Canina loam

Drainage Class:
Field Observations
Confirm Mapped Type? ☐ Yes ☐ No

Taxonomy (Subgroup):

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 2		7.5YR 3/2			dry sandy loam
2 - 10		10YR 3/2			moist loam
10 - 18		7.5YR 3/2 &	7.5YR 2.5/1	few small soft	very moist loam &
		10YR 5/6		concretions & organic streaking	silty sand

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☒ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☒ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☒ Other (Explain in Remarks)

Remarks: Disturbed and mixed soil. Soil has been disturbed by the following : 55+ years of tillage for crop production; approximately 35 years ago a flood irrigation return water pond was constucted by excavating about 5 feet of soil; and, construction of a berm for the center pivot irrigation and approximately 4 feet of filling 3 years ago.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No (Check)
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No

(Check)
Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks 0.27 acre of isolated non-jurisdictional farmed wetland. Note: Data point W-3 is also in this wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 28, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☒Yes ☐No	Plot ID:	W-2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Echinochloa crusgalli		FACW	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 1/1

Remarks: 95% vegetation cover. Tilled and planted this spring to corn.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☒ Other (Explain in Remarks)

Remarks: Ponding observed in 2004 and 2005 aerial photographs.

SOILS

Map Unit Name
(Series and Phase): Canina loam

Drainage Class:
Field Observations
Confirm Mapped Type? ☐ Yes ☐ No

Taxonomy (Subgroup):

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 2		10YR 4/2			dry sandy loam
2 - 12		10YR 3/3			very moist clay loam
12 - 18		10YR 2/2	10YR 3/1 clay & 10YR 6/6 sand	few coarse	very moist mixed sandy & clayey loam

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☒ Other (Explain in Remarks)

Remarks: Disturbed and mixed soil. Soil has been disturbed by the following : 55+ years of tillage for crop production; approximately 35 years ago a flood irrigation return water pond was constucted by excavating about 5 feet of soil; and, construction of a berm for the center pivot irrigation and approximately 4 feet of filling 3 years ago.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒ Yes ☐ No (Check)
Wetland Hydrology Present? ☒ Yes ☐ No
Hydric Soils Present? ☒ Yes ☐ No

(Check)
Is this Sampling Point Within a Wetland? ☒ Yes ☐ No

Remarks 0.16 acre of isolated non-jurisdictional farmed wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 29, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☒Yes ☐No	Plot ID:	W-3

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Echinochloa crusgalli		FACW	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 1/1

Remarks: 95% vegetation cover. Tilled and planted this spring to corn.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☒ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☒ Other (Explain in Remarks)

Remarks: Ponding observed in 2004 and 2005 aerial photographs.

SOILS

Map Unit Name
(Series and Phase): Canina loam

Taxonomy (Subgroup): ______

Drainage Class: ______
Field Observations
Confirm Mapped Type? ☐Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 4		10YR 3/2			dry sandy loam
4 - 8		10YR 3/3 &			moist loam
		7.5 YR 6/4			
8 - 18		10YR 3/2 &			very moist loam
		2.5Y 2.5/1			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☒ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☒ Other (Explain in Remarks)

Remarks: Polychromatic matrix. Disturbed and mixed soil. Soil has been disturbed by the following : 55+ years of tillage for crop production; approximately 35 years ago a flood irrigation return water pond was constucted by excavating about 5 feet of soil; and, construction of a berm for the center pivot irrigation and approximately 4 feet of filling 3 years ago.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☒Yes ☐No (Check)
Wetland Hydrology Present? ☒Yes ☐No
Hydric Soils Present? ☒Yes ☐No

(Check)
Is this Sampling Point Within a Wetland? ☒Yes ☐No

Remarks Second data point in isolated non-jurisdictional farmed Wetland "W-1".

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 29, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	W-4

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: 4-8 inch tall corn planted in rows. Coverage of vegetation other than corn less than 5%.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Upland

SOILS

Map Unit Name (Series and Phase):	Canina loam	Drainage Class:	
		Field Observations	
Taxonomy (Subgroup):		Confirm Mapped Type?	☐ Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 10		10YR 3/3			moist loam
10 - 18		10YR 3/2 &			moist loam
		5YR 6/4			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed and mixed soil. Soil has been disturbed by the following : 55+ years of tillage for crop production; approximately 35 years ago a flood irrigation return water pond was constucted by excavating about 5 feet of soil; and, construction of a berm for the center pivot irrigation and approximately 4 feet of filling 3 years ago.

WETLAND DETERMINATION

	(Check)		(Check)
Hydrophytic Vegetation Present?	☐ Yes ☒ No		
Wetland Hydrology Present?	☐ Yes ☒ No		
Hydric Soils Present?	☐ Yes ☒ No	Is this Sampling Point Within a Wetland?	☐ Yes ☒ No

Remarks

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DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 29, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	W-5

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: 4-8 inch tall corn planted in rows. Coverage of vegetation other than corn less than 5%.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Upland

SOILS

Map Unit Name
(Series and Phase): Canina loam

Drainage Class:

Field Observations

Taxonomy (Subgroup):

Confirm Mapped Type? ☐ Yes ☐ No

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 8		10YR 4/2			moist loam
8 -18		10YR 2/2 &			moist clay loam
		7.5YR 4/4			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed soil. Some vertical and horizontal sand lens.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No (Check)
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No

(Check)
Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Remarks

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 29, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	W-6

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: 4-8 inch tall corn planted in rows. Coverage of vegetation other than corn less than 5%.

HYDROLOGY

☐ Recorded Data (Describe in Remarks):
- ☐ Stream, Lake, or Tide Gauge
- ☐ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ______ (in.)

Depth to Free Water in Pit: ______ (in.)

Depth to Saturated Soil: ______ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Upland

SOILS

Map Unit Name
(Series and Phase): Canina loam

Drainage Class:
Field Observations
Confirm Mapped Type? ☐Yes ☐ No

Taxonomy (Subgroup):

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 9		7.5YR 3/2			moist loam
9 - 18		7.5YR 3/1			moist clay

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed soil. Soil has been disturbed by the following : 55+ years of tillage for crop production; approximately 35 years ago a flood irrigation return water pond was constucted by excavating about 5 feet of soil; and, construction of a berm for the center pivot irrigation and approximately 4 feet of filling 3 years ago.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐Yes ☒No (Check)
Wetland Hydrology Present? ☐Yes ☒No
Hydric Soils Present? ☒Yes ☐No

(Check)
Is this Sampling Point Within a Wetland? ☐Yes ☒No

Remarks

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DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site:	Hugoton	Date:	May 29, 2008
Applicant/Owner:	Abengoa	County:	Stevens
Investigator:	Kleinfelder (Tom Plattner)	State:	Kansas
Do Normal Circumstances exist on the site?	☐Yes ☒No	Community ID:	
Is the site significantly disturbed (Atypical Situation)?	☒Yes ☐No	Transect ID:	
Is the area a potential Problem Area?	☐Yes ☒No	Plot ID:	W-7

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC
(excluding FAC-).

Remarks: 4-8 inch tall corn planted in rows. Coverage of vegetation other than corn less than 5%.

HYDROLOGY

- ☐ Recorded Data (Describe in Remarks):
  - ☐ Stream, Lake, or Tide Gauge
  - ☐ Aerial Photographs
  - ☐ Other
- ☐ No Recorded Data Available

Field Observations:

Depth of Surface Water: ____________(in.)

Depth to Free Water in Pit: ____________(in.)

Depth to Saturated Soil: ____________(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: Upland

SOILS

Map Unit Name
(Series and Phase): Canina loam

Drainage Class:

Field Observations
Confirm Mapped Type? ☐ Yes ☐ No

Taxonomy (Subgroup):

Profile Descriptions:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc,
0 - 9		10YR 4/2			moist clay loam
9 -18		10YR 4/2 &			moist loam
		10YR 4/3			

Hydric Soil Indicators:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: Disturbed soil.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? ☐ Yes ☒ No (Check)
Wetland Hydrology Present? ☐ Yes ☒ No
Hydric Soils Present? ☐ Yes ☒ No

(Check)
Is this Sampling Point Within a Wetland? ☐ Yes ☒ No

Remarks

APPENDIX D

HYDROLOGICAL ANALYSIS

TABLE OF CONTENTS

Chapter

Page

APPENDIX D

Playa Wetland Restoration
Hydrology and Feasibility Analysis

1.0 INTRODUCTION AND LIMITATIONS

1.1 Introduction

The purpose of the following analysis is to determine if wetland restoration within the playa in the NW/4 of Section 17 is feasible. The analysis looks at the proposed wetland restoration from the following perspectives:

- wetland hydrology,
- loss of sellable non-contact wastewater in the summer, and,
- reduction of winter water storage capacity for the ethanol plant.

The analysis needs to answer two primary questions: 1) What is the minimum amount of water in the summer that would be needed to provide for a functioning playa wetland; and, 2) What is the maximum amount of water that could be discharged into the playa in the winter without causing undesirable flooding?

1.2 Assumptions and Analysis Limitations

Playas naturally vary in the amount of water present throughout the year and from year to year based on droughts and periods of increased rainfall. Some variation mimics natural conditions and is considered beneficial. There is little to no demand for irrigation water during the winter months. Little to no irrigation in the summer months would be detrimental to the ecological functioning of the playa wetlands.

With the exception of about 1 to 2 acres in the center of the playa (lowest elevations), the playa currently produces good stands of non-water tolerant row-crops such as corn, sorghum, and wheat. The current center pivot irrigation system will remain and could be used for wetland enhancement. The majority of the quarter section would be converted from annual row-crops to biomass production using perennial crops such as, but not limited to, switch grass.

Runoff and storage volumes were largely based on USGS topographic maps. The USGS 7.5 minute topographical map is 30+ years old, is at 1 inch = 2,000 feet scale, and has 5 feet contour intervals. Also, field conditions have been modified since the publication of the USGS topographical map. While the natural topography of the field has been changed for past flood irrigation and row crop production, the current topography appears to resemble the natural topography in that most, if not all, of the original watershed within Section 17 still drains to the playa.

Infiltration rates and evaporation rates are based on generalized soil map units from the county soil survey and other readily available published references. No computer modeling was used and no detailed hydrological modeling was involved in the calculations.

2.0 SETTING

2.1 Natural Setting

The wetland survey location is situated in an area that is predominantly void of surface drainage channels or streams. A review of USGS 7.5-minute quadrangles for the area does not identify a defined drainage within the proposed site, and the nearest surface drainage feature is not apparent for approximately 3 miles to the east (0.75 miles east of Hugoton); this feature appears as an intermittent drainage (USGS Hugoton Kansas Quadrangle). The nearest identifiable named water course is the Cimarron River, located approximately 11 miles northwest of Hugoton. Surface runoff, to the extent it occurs in the study area, flows into interdunal depressions or playa lakes where it evaporates or percolates downward through the soil.

The Cimarron River passes through the northwestern corner of Stevens County with a main stem gradient of approximately 11 feet per mile (KGS 2005 – Aquifer report). The Cimarron River is described as an intermittent stream in Stevens County and generally flows only after intensive rainfall (NRCS 2005). The Cimarron River and its tributaries drain about 10 percent of the area within Stevens County. The remaining area has no exterior drainage. Water flows into interdunal depressions, or playa lakes, where it evaporates or percolates downward through the soil. Stream dissection in the county is in the stage known as topographic youth (NRCS 2006 – Stevens County Survey).

The average annual precipitation for the study area is 18 inches, of which 15 inches falls as rain from April through October. Two years in ten will have less than 15 inches and more than 21.5 inches of precipitation. The average number of days with 0.10 inch or more of precipitation is 31 and the average snowfall is 10 inches. The heaviest 1-day rainfall during the period of record was 4.5 inches at Hugoton on May 25, 1976. Thunderstorms occur on about 52 days each year, and most occur between May and August (NRCS 2006 – Stevens County Survey).

The mean annual lake evaporation is approximately 60 inches with the mean May – October evaporation being approximately 70 percent of the total (Midwest Plan Service, 1987).

The NRCS Soil Survey of Stevens County, Kansas identified the survey location within soil map unit (SMU) 5205 – Canina loam, 0 to 1 percent slopes. The drainage class is "well drained," the slowest permeability is "moderate" (about 0.57 inch per hour), the flooding hazard is "none," the depth to seasonal zone saturation is "more than 6 feet", and the surface runoff class is "negligible." Other SMUs within the playa watershed within Section 17 include SMU 5210 – Belfon loam, 0 to 1 percent slopes and SMU 1611 – Vorhees find sandy loam, 1 to 3 percent slopes. Both of these soils are also well drained, have moderate permeability, low to negligible runoff, and a water table that is 6 or more feet below the surface. None of the SMUs are flooded. Review of the NRCS Stevens County List of Hydric Soils indicated that none of the SMUs are on the hydric list.

The site lies near the center of the 16-digit hydrologic unit code (HUC) 11040006020060, which encompasses 46.2 square miles. Based on contour analysis using the USGS topographic maps with 5 feet interval contour lines, the potential natural maximum watershed for the subject playa is approximately 5 square miles (3,200 acres).

2.2 Existing Conditions

Based on the USGS topographic map, Figure 6 shows the playa watershed natural eastern boundary. However, field observations indicate that a berm along the east side of the northwest quarter section of Section 17 affectively makes it the playa watershed eastern boundary. Road P and Road 11 (both paved) along the north and west sides of the site, respectively, affectively create berms and isolate the site from offsite drainage (see photograph 37 which represents typical field borders such as roads and railroads that interrupt natural drainage patterns). No culverts were observed along these roads in the vicinity of the site. The railroad track along the southern edge of the survey location is also elevated; however, a series of culverts immediately south of the center pivot hub was observed (see photographs 24 and 25). No other culverts, storm water sewers, or other structures to handle runoff were observed within or around the perimeter of the site.

Based on the current configuration of roads, road drainage ditches, railroad tracks, culverts, and flood irrigation berms, the functional playa watershed for typical precipitation events is the quarter section in which it occurs, approximately 154 acres (excludes 6 acres in southeast corner, south of railroad tracks). Moderately heavy thunderstorms could increase the runoff or functional watershed to include the land south of the railroad tracks for a total area of about 275 acres. Flooding conditions would be needed to increase the playa watershed beyond the approximately 275 acres in the northwest and southwest quarters of Section 17. Water would have to pond and flood over low points in roads adjacent to the north, west, and/or south of Section 17.

The playa soils have been disturbed by leveling for flood irrigation purposes, excavation for flood irrigation water collection, and filling to accommodate to center pivot irrigation wheel traversing. A berm has been created that divides Wetlands 1 and 2 to allow the center pivot tower to traverse through the wetland. Ponding was observed during the wetland survey.

According to the owner, the berm was needed to keep the wheel electric motor above water. This indicates that the adjacent row crops need irrigation at times when there is standing water in the bottom of the playa. Therefore, the existing topography appears to create sufficient runoff and the soil conditions appear to create sufficient storage or ponding to maintain water in the playa well beyond the time in which the adjacent land dries out. By extrapolation, we can conclude that the existing conditions resemble natural conditions, but the degree of resemblance is unknown. Based on these observations, restoration of playa appears feasible without large scale changes in surface topography.

3.0 WATER ANALYSIS

The following discussion is based on limited information and scoping-level assumptions. The numbers generated and used throughout this discussion are not intended for design, but should provide sufficient information to preliminarily evaluate playa restoration as it pertains to water storage capacity and availability issues.

3.1 Storage Capacity

Kleinfelder used a laser level in combination with basic GPS and GIS tools to obtain and analyze topographic information. As shown in Figure 7, the surface area of Wetland 1 is 0.27 acres and the surface area of Wetland 2 is 0.16 acre. Elevation data collected during the survey indicated the identified wetlands were approximately 1 foot deep. Assuming the wetland storage capacity is half the surface area times the depth ($V = ½ Ah$), results in a storage capacity of 0.14 and 0.08 acre-feet for Wetlands 1 and 2, respectively.

Wetlands 1 and 2 are at the bottom of a larger depression. Figure 8 shows contour lines developed from limited elevation data collected during the wetland survey. The contour map revealed a low area at the southwest portion of the upper perimeter of the larger depression. The low area resembles the USGS topographic map 3,110 ft. elevation contour shown on Figure 6. Therefore, the elevation at the southwest corner of the upper perimeter of the larger depression was assumed to be the controlling elevation (3,107 ft.) for storage capacity within the larger depression. Using the contour map created from the field survey data and GIS, the storage volume within the 3,107 ft. contour was estimated to be 2.8 acre-feet.

The area within the 3,110 ft. contour line shown in Figure 6 is approximately 12 acres. The storage capacity between the 3,110 ft. contour and the 3,107 ft. contour is approximately 20.4 acre-feet. According to the USGS topographic map, the entire northwest quarter of Section 17 is within a depression. Figure 3 highlights the approximately 96 acres within the 3,115 ft. contour line. The storage capacity between the 3,115 ft. and 3,110 ft. contours is approximately 294 acre-feet. Summing each storage capacity unit, results in a total storage capacity of approximately 317 acre-feet within the 3,115 ft. contour.

Table 1 below summarizes the storage capacity within the depression. The accuracy of the numbers in the table should be considered accurate only to the degree implied by the methods used to calculate them. The "gallons" column was determined by directly converting from acre-feet.

Table 1. Storage Capacity

	Water Volume	
Elevation	**Gallons**	**Acre-Feet**
Wetland 1 + 2	71,682	0.22
3107 Contour	912,321	2.8
3110 Contour	7,559,228	23.2
3115 Contour	103,352,895	317

3.2 Available Water

Available water consists of non-contact wastewater from the plant, precipitation directly into the playa, and runoff into the playa. The center pivot irrigation system would allow irrigation of a 0.5 mile radius circle (126 acres) or to apply water to smaller areas near the center of the playa. Irrigation water could be applied at different rates within the playa to create variable hydrological regimes and habitats.

Abengoa Plant

The plant will reportedly generate non-contact wastewater at a rate of 100 gallons per minute, 24 hours per day, 365 days per year. The non-contact wastewater is suitable for land application. Table 2 summarizes this available water in other units.

Table 2. 100 Gallons Per Minute Equivalents

	Day	**Week**	**Month**	**Year**
Gallons	144,00	1,008,000	4,320,000	52,560,000
Acre-feet	0.44	3.1	13.3	161

The plant has several options for utilization of this water, including:

- Irrigation water for the three center pivots on the east tract
- Selling to the golf course or other nearby land owners
- Playa wetland restoration

Beneficial reuse of the non-contact wastewater will require sufficient storage capacity to accumulate enough water to effectively pump and apply the water. Assuming 0.5 mile diameter center pivots (126 acres), all non-contact wastewater would provide about 15 inches of water for one center pivot, or about 5 inches of water for each of the three center pivots on the east tract.

Neglecting evaporation and infiltration, it would take about one-week's supply of non-contact wastewater to fill the playa to the 3,107 ft. contour, which has a surface area of about 1.8 acres. Assuming 68 inches (5.7 feet) of evapotranspiration per year, and a vertical infiltration rate of 0.05 inches per day (18 inches per year or 1.5 feet per year) for the most restrictive subsurface layer, results in a loss of 86 inches (7.2 feet) per year. At the 3,107 ft. contour (1.8 surface acres), it would take about 13 acre-feet or one-month's supply of non-contact wastewater to offset these yearly losses (not including any direct precipitation and runoff).

Precipitation and Runoff

The average yearly precipitation is about 18 inches. Therefore, precipitation directly onto the permanent pool basically offsets infiltration losses, leaving 68 inches of evapotranspiration loss per year.

Runoff was estimated for two scenarios. The 154-acre watershed applies to the northwest quarter of Section 17 in which the playa is located. The 275-acre watershed includes runoff from Section 17 south of the railroad tracks. Runoff from land outside Section 17 was considered to only occur during flooding and was not reviewed.

The runoff was estimated using the Natural Resources Conservation Service runoff volume method from *Soil and Water Conservation Engineering, Fourth Edition*. The NRCS method was derived from years of storm flow records for agricultural watersheds throughout the United States. The derived equation is:

$$Q = (I - 0.2S)^2 / (I + 0.8S)$$

Where Q = direct surface runoff depth in mm

I = storm rainfall in mm

S = maximum potential difference between rainfall and runoff in mm, starting at the time the storm begins.

For convenience in evaluating antecedent rainfall, soil conditions, land use, and conservation practices, USDS-SCS (1972) defines:

$S = (25{,}400/N) - 254$
Where N is an arbitrary curve number varying from 0 to 100

Various storm rainfalls (I) were determined from the National Oceanic & Atmospheric Administration's (NOAA) National Weather Service (NWS) Technical Paper No. 40. A curve number of 75 was selected to represent future land use of biomass production. The design storm and antecedent rainfall conditions greatly affect runoff estimates. Dry soil conditions would be anticipated during the summer and wet soil conditions would be expected during the winter and early spring. Results for different rainfalls and antecedent conditions are attached.

154-acre Watershed: Under average soil moisture conditions (Condition II), a 1.2-inch rain (1-year, 1-hour design storm) would result in about 1 acre-feet of runoff. A 2-inch rain would generate about 5 acre-feet or runoff. Under dry conditions (Condition I), the same storms would generate about 0.06 and 0.7 acre-feet of runoff, respectively. Under wet conditions (Condition III), these storms would generate about 3.7 and 10.6 acre-feet, respectively. Rains around 1-inch and below would likely only result in runoff from the 154-acre field. Under dry conditions, little recharge of the playa would be expected. Under wet conditions, enough runoff to fill the playa above the 3,107 ft. contour could be generated. Rains above 2 inches would likely generate runoff from the land south of the railroad tracks.

275-acre Watershed: Under average soil moisture conditions, a 2-inch rain would generate about 8.7 acre-feet of runoff and a 2.9-inch rain (25-year, 1-hour design storm) would produce about 20 acre-feet of runoff. Therefore, with 3 acre-feet of water in the playa, a 3-inch rain under average soils moisture conditions may fill the playa to the 3,110 ft. contour. Under dry conditions, the same storms would only generate about 1.2 and 6.3 acre-feet of runoff, respectively. Under wet conditions (Condition III), these storms would generate about 19 and 35 acre-feet, respectively. At what point flooding would occur and result in additional runoff from neighboring properties is unknown. For this reason, runoff from rainfalls above 3 inches was not reviewed. However, even constant application of non-contact wastewater to the playa (161 acre-feet yearly supply) in conjunction with a significant rain event (35 acre-feet of runoff) would not likely cause flooding beyond the field in which the playa is located (317 acre-feet of storage capacity).

3.3 Operating Analysis

The application of non-contact wastewater to the playa, biomass fields, nearby crop fields, or the golf course will be an ongoing task of managing the health of the playa, potentially meeting biomass production research objectives, and economics. A simple method to maintain the health of the playa would be to install a staff gauge with a minimum pool marker. A possible exception could be to allow the playa to dry out during summer or drought when natural playas would likely do so. A maximum pool elevation could also be marked on the staff gauge that would mark the water elevation in which no additional non-contact wastewater should be applied, with sufficient freeboard to protect the adjacent biomass field from flooding conditions. To evaluate application of non-contact wastewater to the playa through the center pivot irrigation system, two extremes (winter and summer) and average conditions were reviewed.

Under average conditions, we'll assume the playa has about 3 acre-feet of water (3,107 ft. contour). Without rainfall or non-contact wastewater, the playa would likely not dry out for 3 to 6 months. Without rainfall and with constant application of non-contact wastewater for a month, the playa would contain about 15.7 acre-feet of water (3 acre-feet initial + 13.3 acre-feet of non-contact wastewater – 0.6 acre-feet loss to evapotranspiration and infiltration). Under these conditions (dry), a 3-inch storm would add about 6.5 acre-feet of water, for a total of 22.2 acre-feet. Under these conditions, the playa would still be within the 3,110 ft. contour. Similarly, if the playa contains about 3 acre-feet of water and a significant rainfall occurs (3 inch or less), a month's worth of non-contact wastewater could still be applied and the playa would only encompass about 12 acres (3,110 ft. contour).

During winter, the only way to get rid of non-contact wastewater may be through the three center pivots. However, with 317 acre-feet of storage capacity within the field, the plant could apply all non-contact wastewater to the field and not flood beyond the field. Ideally, the water level in the playa would be relatively low entering winter and could hold about 1.5 month's worth of non-contact wastewater within the 3,110 ft. contour. The plant would also have the option of applying water through the other two center pivots.

The non-contact wastewater will be in high demand during the summer. As described previously, the yearly loss to evapotranspiration and infiltration was estimated to be 7.2 feet per year, or 0.6 feet per month. During summer, we'll assume a loss of 1 foot per month, Therefore, without any rain or water application, the number of months the playa would contain water through the summer would be roughly equivalent to the number of feet (in depth) the playa contained. Near the bottom of the depression, a playa with a surface area of 2 acres containing about 3 acre-feet of water would lose about 2 acre-feet in a month. At a generation rate of 0.44 acre-feet per day, the plant would need to apply about 4.5 day's worth of non-contact water per month to maintain the playa at this level.

4.0 CONCLUSIONS

The actual amount of non-contact wastewater available from the plant and the actual storage capacities may be significantly different than those discussed in this report. However, based on the information available, the following preliminary conclusions are provided.

Besides possibly flooding part of the field in which the playa exists, there appears to be no real concern that applying non-contact wastewater to the playa will result in flooding beyond the field in which it lies, under typical conditions. However, if existing conditions do not resemble the topographic map which indicates five feet of elevation relief between the railroad culverts and the 12-acre playa bottom, there may be less storage capacity in the quarter section than indicated in this report.

Application of non-contact wastewater to the playa would be an ongoing management task. Under normal conditions, it appears that in addition to maintaining the playa, the non-contact wastewater could also be used for other beneficial uses. In other words, restoration of the playa would not likely require all of the non-contact wastewater generated by the plant.

Restoration of the playa appears feasible with regard to hydrology. The preliminary feasibility analysis indicates the following:

- Approximately 6 acres of wetland and moist soil habitat could be restored that would include on average approximately 1 acre of semi-permanent shallow open water, 2 acres of emergent herbaceous wetlands, and approximately 3 acres of moist grassland/forbland or prairie.
- During the summer, approximately one week's supply of non-contact wastewater would need to be applied to the center (approximately 9 – 24 acres) portions of the playa per month using the center pivot to enhance or restore approximately 6 acres of playa wetland and moist soil habitat.
- During winter, about 1.5 month's equivalent of non-contact wastewater could be stored within approximately the bottom 12-acres of the playa.
- Even with significant rainfall and constant application of all the non-contact wastewater to the entire center pivot area (126 acres), it would not be likely to cause any flooding beyond the northwest quarter of Section 17.

NRCS Runoff Method

Site Data

Location:	Hugoton, Kansas			
Acreage:	154 acres			Source:
Design Storms:	1-year, 1-hour	1.2 inches.	30.48 mm	2
	2-year, 1-hour	1.4 inches.	35.56 mm	2
	5-year, 1-hour	2.2 inches.	55.88 mm	2
	10-year, 1-hour	2.3 inches.	58.42 mm	2
	25-year, 1-hour	2.9 inches.	73.66 mm	2
	50-year, 1-hour	3.1 inches.	78.74 mm	2
	100-year, 1-hour	3.5 inches.	88.9 mm	2
	1-day record	4.52 inches.	114.808 mm	3
	1-year, 24-hour	2.0 inches.	50.8 mm	2
	2-year, 24-hour	2.5 inches.	63.5 mm	2
	5-year, 24-hour	3.3 inches.	83.82 mm	2
	10-year, 24-hour	4.0 inches.	101.6 mm	2
	25-year, 24-hour	4.7 inches.	119.38 mm	2
	50-year, 24-hour	5.4 inches.	137.16 mm	2
	100-year, 24-hour	5.8 inches.	147.32 mm	1

NRCS Runoff Method	1
Hydrologic Soil Group B	3

Percent	Acreage	Land Use	Treatment	Hydrologic Condition	CN[1]	NA
0	0	row crops	straight row	poor	81	0
100	154	small grain	straight row	good	75	11550
0	0	pasture			0	0
0	0	roads			0	0
100	154					11550

	Antecedent Rainfall Conditions		
	II (avg.)	I (dry)	III (wet)
weighted curve number	75	59.25	85.50
S = (25,400/CN) - 254 =	84.67	174.69	43.08

$$Q = \frac{(I - 0.2*S)^2}{I + 0.8*S}$$

Condition II

Q (mm)	Q (in)		Volume ac-in	Volume ac-ft
1.87	0.07	1-year, 1-hour	11.33	0.94
3.36	0.13	2-year, 1-hour	20.37	1.70
12.27	0.48	5-year, 1-hour	74.40	6.20
13.64	0.54	10-year, 1-hour	82.72	6.89
22.76	0.90	25-year, 1-hour	137.99	11.50
26.08	1.03	50-year, 1-hour	158.12	13.18
33.07	1.30	100-year, 1-hour	200.48	16.71
52.48	2.07	1-day record	318.18	26.51
9.68	0.38	1-year, 24-hour	58.67	4.89
16.52	0.65	2-year, 24-hour	100.18	8.35
29.52	1.16	5-year, 24-hour	178.98	14.91
42.33	1.67	10-year, 24-hour	256.67	21.39
56.09	2.21	25-year, 24-hour	340.08	28.34
70.55	2.78	50-year, 24-hour	427.72	35.64
79.05	3.11	100-year, 24-hour	479.30	39.94

Condition I

Q (mm)	Q (in)		ac-in	ac-ft
0.12	0.00	1-year, 1-hour	0.71	0.06
0.00	0.00	2-year, 1-hour	0.01	0.00
2.24	0.09	5-year, 1-hour	13.59	1.13
2.78	0.11	10-year, 1-hour	16.87	1.41
7.03	0.28	25-year, 1-hour	42.60	3.55
8.78	0.35	50-year, 1-hour	53.24	4.44
12.73	0.50	100-year, 1-hour	77.21	6.43
25.06	0.99	1-day record	151.93	12.66
1.32	0.05	1-year, 24-hour	8.01	0.67
4.01	0.16	2-year, 24-hour	24.33	2.03
10.69	0.42	5-year, 24-hour	64.80	5.40
18.41	0.72	10-year, 24-hour	111.63	9.30
27.52	1.08	25-year, 24-hour	166.83	13.90
37.73	1.49	50-year, 24-hour	228.79	19.07
43.99	1.73	100-year, 24-hour	266.74	22.23

Condition III

Q (mm)	Q (in)		ac-in	ac-ft
7.36	0.29	1-year, 1-hour	44.63	3.72
10.37	0.41	2-year, 1-hour	62.87	5.24
24.73	0.97	5-year, 1-hour	149.93	12.49
26.71	1.05	10-year, 1-hour	161.92	13.49
39.13	1.54	25-year, 1-hour	237.25	19.77
43.44	1.71	50-year, 1-hour	263.38	21.95
52.25	2.06	100-year, 1-hour	316.79	26.40
75.55	2.97	1-day record	458.04	38.17
20.87	0.82	1-year, 24-hour	126.55	10.55
30.75	1.21	2-year, 24-hour	186.44	15.54
47.82	1.88	5-year, 24-hour	289.91	24.16
63.55	2.50	10-year, 24-hour	385.28	32.11
79.75	3.14	25-year, 24-hour	483.52	40.29
96.28	3.79	50-year, 24-hour	583.75	48.65
105.84	4.17	100-year, 24-hour	641.69	53.47

Sources and Key

[1]Soil and Water Conservation Engineering, Fourth Edition
[2]NOAA's NWS Technical Paper No. 40
[3]USDA Soil Survey of Stevens County, KS
[4] NRCS TR-55
Input Data
Output Data

NRCS Runoff Method

Site Data

Location:	Hugoton, Kansas			
Acreage:	275 acres			Source:
Design Storms:	1-year, 1-hour	1.2 inches.	30.48 mm	2
	2-year, 1-hour	1.4 inches.	35.56 mm	2
	5-year, 1-hour	2.2 inches.	55.88 mm	2
	10-year, 1-hour	2.3 inches.	58.42 mm	2
	25-year, 1-hour	2.9 inches.	73.66 mm	2
	50-year, 1-hour	3.1 inches.	78.74 mm	2
	100-year, 1-hour	3.5 inches.	88.9 mm	2
	1-day record	4.52 inches.	114.808 mm	3
	1-year, 24-hour	2.0 inches.	50.8 mm	2
	2-year, 24-hour	2.5 inches.	63.5 mm	2
	5-year, 24-hour	3.3 inches.	83.82 mm	2
	10-year, 24-hour	4.0 inches.	101.6 mm	2
	25-year, 24-hour	4.7 inches.	119.38 mm	2
	50-year, 24-hour	5.4 inches.	137.16 mm	2
	100-year, 24-hour	5.8 inches.	147.32 mm	1

NRCS Runoff Method — 1
Hydrologic Soil Group B — 3

Percent	Acreage	Land Use	Treatment	Hydrologic Condition	CN[1]	NA
0	0	row crops	straight row	poor	81	0
100	275	small grain	straight row	good	75	20625
0	0	pasture			0	0
0	0	roads			0	0
100	275					20625

	Antecedent Rainfall Conditions		
	II (avg.)	I (dry)	III (wet)
weighted curve number	75	59.25	85.50
S = (25,400/CN) - 254 =	84.67	174.69	43.08

$$Q = \frac{(I - 0.2*S)^2}{I + 0.8*S}$$

Condition II

Q (mm)	Q (in)		Volume ac-in	Volume ac-ft
1.87	0.07	1-year, 1-hour	20.23	1.69
3.36	0.13	2-year, 1-hour	36.37	3.03
12.27	0.48	5-year, 1-hour	132.85	11.07
13.64	0.54	10-year, 1-hour	147.71	12.31
22.76	0.90	25-year, 1-hour	246.40	20.53
26.08	1.03	50-year, 1-hour	282.37	23.53
33.07	1.30	100-year, 1-hour	358.00	29.83
52.48	2.07	1-day record	568.17	47.35
9.68	0.38	1-year, 24-hour	104.76	8.73
16.52	0.65	2-year, 24-hour	178.90	14.91
29.52	1.16	5-year, 24-hour	319.60	26.63
42.33	1.67	10-year, 24-hour	458.33	38.19
56.09	2.21	25-year, 24-hour	607.28	50.61
70.55	2.78	50-year, 24-hour	763.79	63.65
79.05	3.11	100-year, 24-hour	855.89	71.32

Condition I

Q (mm)	Q (in)		ac-in	ac-ft
0.12	0.00	1-year, 1-hour	1.26	0.11
0.00	0.00	2-year, 1-hour	0.02	0.00
2.24	0.09	5-year, 1-hour	24.27	2.02
2.78	0.11	10-year, 1-hour	30.12	2.51
7.03	0.28	25-year, 1-hour	76.06	6.34
8.78	0.35	50-year, 1-hour	95.07	7.92
12.73	0.50	100-year, 1-hour	137.88	11.49
25.06	0.99	1-day record	271.31	22.61
1.32	0.05	1-year, 24-hour	14.29	1.19
4.01	0.16	2-year, 24-hour	43.45	3.62
10.69	0.42	5-year, 24-hour	115.71	9.64
18.41	0.72	10-year, 24-hour	199.34	16.61
27.52	1.08	25-year, 24-hour	297.91	24.83
37.73	1.49	50-year, 24-hour	408.55	34.05
43.99	1.73	100-year, 24-hour	476.32	39.69

Condition III

Q (mm)	Q (in)		ac-in	ac-ft
7.36	0.29	1-year, 1-hour	79.70	6.64
10.37	0.41	2-year, 1-hour	112.26	9.35
24.73	0.97	5-year, 1-hour	267.73	22.31
26.71	1.05	10-year, 1-hour	289.14	24.10
39.13	1.54	25-year, 1-hour	423.66	35.30
43.44	1.71	50-year, 1-hour	470.32	39.19
52.25	2.06	100-year, 1-hour	565.70	47.14
75.55	2.97	1-day record	817.94	68.16
20.87	0.82	1-year, 24-hour	225.98	18.83
30.75	1.21	2-year, 24-hour	332.93	27.74
47.82	1.88	5-year, 24-hour	517.70	43.14
63.55	2.50	10-year, 24-hour	688.00	57.33
79.75	3.14	25-year, 24-hour	863.44	71.95
96.28	3.79	50-year, 24-hour	1042.41	86.87
105.84	4.17	100-year, 24-hour	1145.87	95.49

Sources and Key

[1]Soil and Water Conservation Engineering, Fourth Edition
[2]NOAA's NWS Technical Paper No. 40
[3]USDA Soil Survey of Stevens County, KS
[4] NRCS TR-55
Input Data
Output Data

Appendix C

Water Resources Study

GLB Services

Water Resources at Hugoton, Kansas

By Gary L. Baker, Consultant

Abengoa Bioenergy is planning to develop a bioethanol plant in the immediate area of Hugoton, Kansas. GLB Services has been retained to provide a study of the available water resources in the area. This report should be considered a preliminary document and will cover the following:

- A review of groundwater sources existing in the area being considered.
- Identification of any local groundwater quality issues
- Best estimates of sustainability of local groundwater availability in the future
- A market survey or other reliable indication of the value of groundwater rights

Groundwater Sources in the Area

The proposed site for the bioethanol plant is located in the North ½ and 80 acres in the SW ¼ of Section 18-33-37W, in Stevens County, Kansas. The 400 acre tract all lies to the North of the Cimarron Valley railroad. Abengoa has entered into option agreements to purchase water wells and water rights in the following three townships: Township 33, Range 37W, Township 33, Range 38W and Township 34, Range 38W. The three townships are marked in the enclosed KGS open-file report 2007-1, and will encompass a total of approximately 69,120 acres. The state of Kansas has appropriated a total of 66,915 acre-feet to various landowners in the area. Attached to this report are 3 spreadsheets showing the water right file numbers and acre-feet appropriated to each well. The option agreements will secure 7,231 acre-feet of the 66,915 acre-feet appropriated, approximately 10.8%. State of Kansas, "consumptive use rules" will only allow about 60% of the 7,231 acre-feet to be converted from irrigation to industrial use, or about 4,300 acre-feet. Consumptive use in Stevens County is considered to be 14.8 inches, or 1.23 acre-feet for corn. Abengoa estimates that the plant will require between 3,000 and 4,000 acre-feet per year, with a discharge of about 200 acre feet.

Depth water in the area ranges from 150 to 200 feet. Average saturated thickness will exceed 400 feet in the area West and South of Hugoton. The state of Kansas protects current water right holders by its adoption of rules and regulations no longer allowing new permits beyond 15 acre feet. Since 2003, these rules prohibit the Chief Engineer of the Division of Water Resources from allowing changes to water rights that will increase consumptive use. All non-domestic wells are metered and water use is closely monitored, with stiff fines in place for over-pumping of water rights.

The Kansas Geological Survey study indicates that this area has a 100 to 200 year of sustainable water supply remaining. Abengoa will develop a plant in Stevens County, knowing that further development of groundwater resources will not occur which will stabilize water use in this area.

Local Groundwater Quality Issues

Groundwater quality in Stevens County is very good. I have enclosed the latest water quality report produced by the City of Hugoton. I don't know of any issues in Stevens County concerning water quality. It is suggested here that any groundwater rights purchased in the area should have each well tested for nitrates and any other contaminant that would not be conducive to an ethanol plants operation.

Sustainability of Groundwater Availability in the Area

Abengoa personnel have indicated a need for 2500 gallons per minute 24 hours per day and 365 days per year. This amounts to 150,000 gallons per hour, 3,600,000 gallons per day, 1,314,000,000 gallons or 4,032 acre feet per year. This would amount to about 6% of the water appropriated in the 3 townships. It was also suggested that this amount of flow be sustained for 50 years or more. I have attached a new map published by the Kansas Geological Survey this year that indicates 100 to 200 years of sustainability. Feed grain (corn and grain sorghum) prices have doubled in the past year. This should not affect water use because the rules previously mentioned will not allow irrigators to add new lands to existing rights. Replacement wells can be drilled and existing irrigation water rights can be converted to industrial or municipal use. The amount that can be converted is calculated by multiplying the number of acres that were irrigated during the perfection period (the first 10 years after the application was approved) by 1.23 in Stevens County. Example, if you irrigated 160 acres in Stevens County, you may convert 196.8 acre feet to industrial use, even if you now have 320 acre feet (2 feet per acre). If you irrigated 160 acres in Stevens County and your water right only calls for 200 acre feet, you would still be able to convert 196.8 acre feet.

Wells in this area are known to pump a consistent quantity throughout the growing season. The wells that are included in the option agreements will divert water at rates from 1000 to close to 3000 gallons per minute. All wells should be tested for rate and quality.

Depletion Concerns

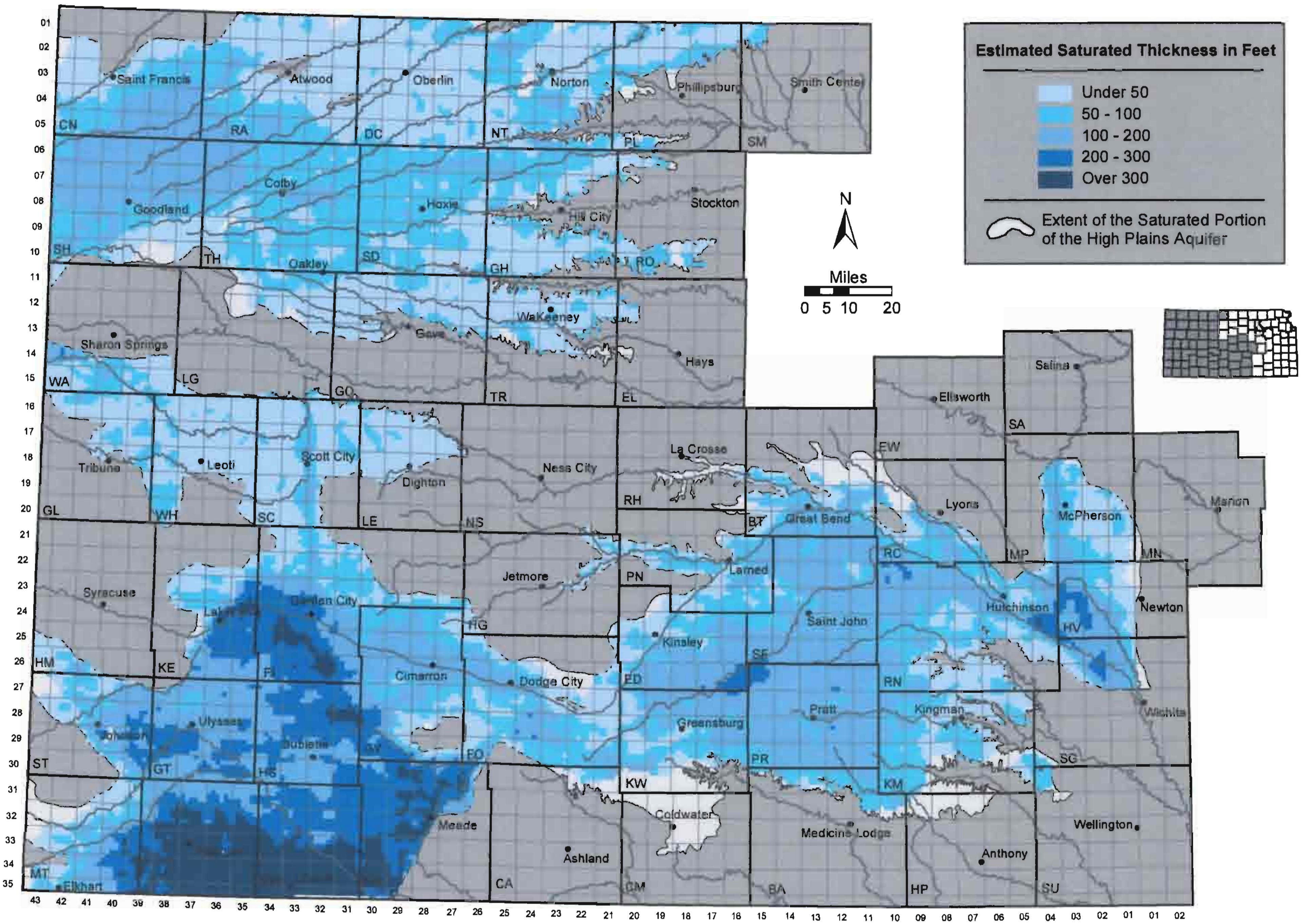
Groundwater depletion is a concern at any location in Western Kansas. However, when we look at the southern ½ of Stevens County and Seward County, we find the deepest, or largest thickness of the Ogallala aquifer. I have enclosed a map produced by the Groundwater Management District No. 3, that shows the footage decline in SW Kansas since 1940 to 1988. This map indicates that virtually no depletion occurred from pre-development to 1988 in the area surrounding Hugoton and South to the State line. I have enclosed a map produced by the Kansas Geological Survey in 1992 that shows the saturated thickness as of 1992. The latest studies by the Survey indicate that the declines in this area were 6% from 1989-1992 and 3% from 2002-2005. The time period between 2002 and the present marks a terrible drought that extends to this day. This area between the southern half of Stevens County and the Southern half of Seward County was basically the only area in SW Kansas that was developed for irrigation with rules and regulations that governed that development. When these rules were developed the rest of Southwest Kansas was already over-appropriated, thus we have problems with decline in those areas.

Value of Groundwater in Proposed Area

Water right sales in SW Kansas vary a great deal. Options have been made on rights in Stevens County at $2000 per acre-foot that can be converted. This amounts to about $1230 per acre-foot before conversion, assuming that the right calls for 2 acre-feet per acre. I have reports of water rights in SW Kansas selling for $2800.00 per acre-foot that can be converted as of April, 2008. Most likely, this is caused by the tremendous increase in the price of farm commodities. Water in storage amounts to 15% of the saturated thickness, or 15 feet of actual water per 100 feet. Water needs to be priced based on the amount of water in storage and the amount of appropriation.

P.O. Box 247 • Hugoton, KS 67951
Phone: 620-544-8064 • e-mail glbh2o@pld.com

Average 2004 - 2006 Saturated Thickness for the High Plains Aquifer in Kansas



Kansas Geological Survey Open-File Report 2007-1

Estimated Usable Lifetime for the High Plains Aquifer in Kansas
(Based on ground water trends from 1996 to 2006 and the minimum saturated thickness required to support well yields at 400 gpm under a scenario of 90 days of pumping with wells on 1/4 section)

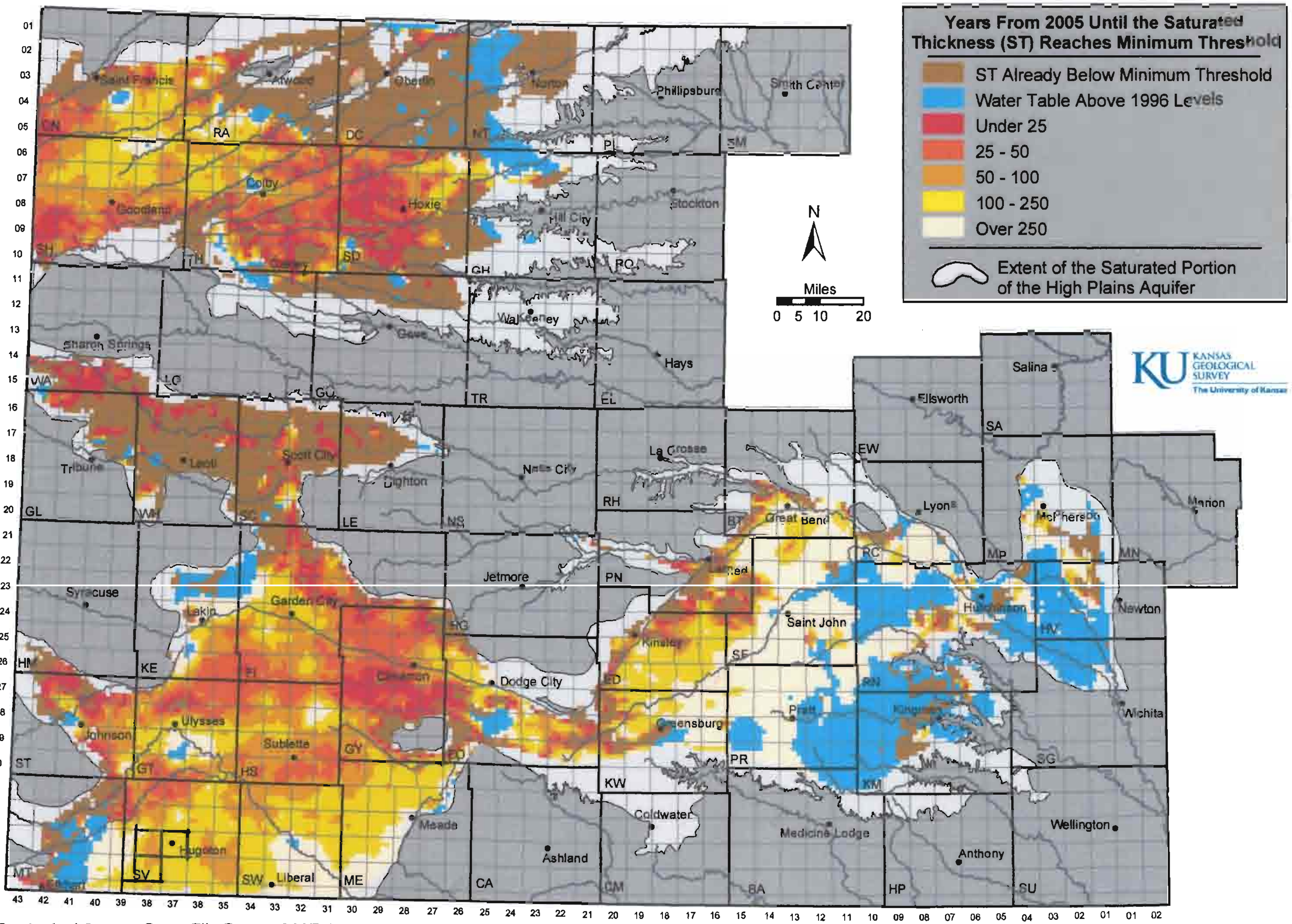
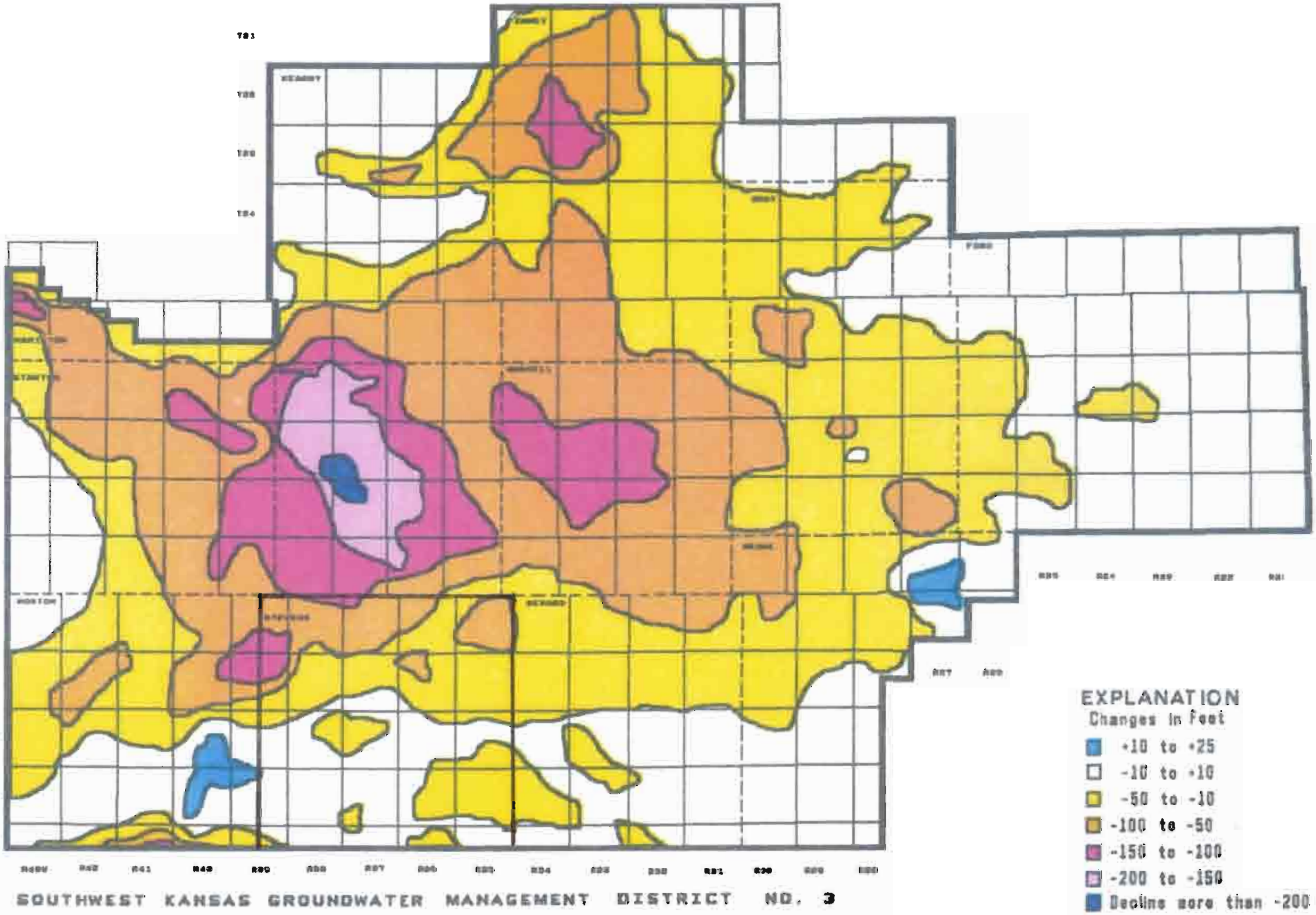
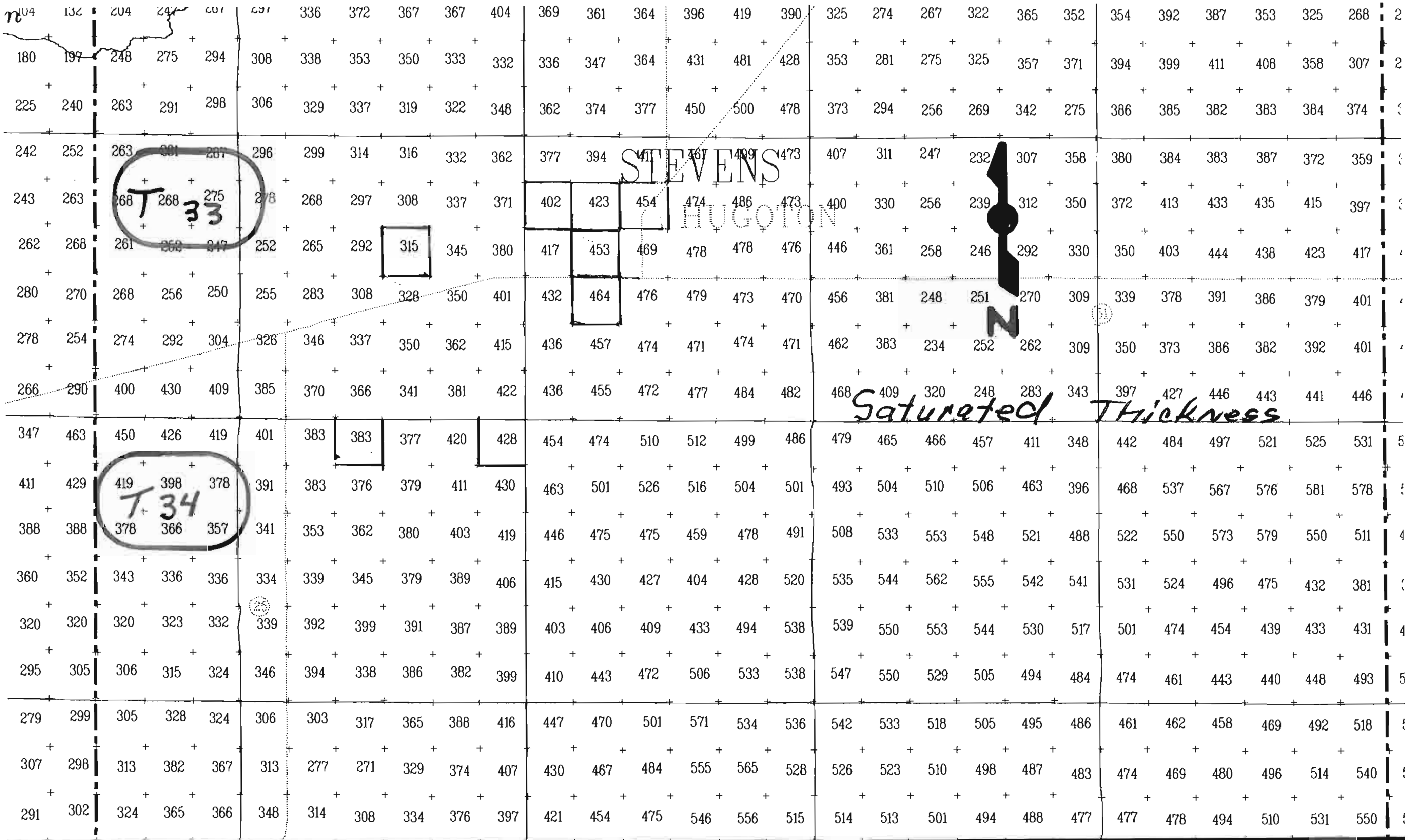


Figure 3:

WATER LEVEL CHANGE 1940 - 1988

HIGH PLAINS AQUIFER





R39W R38W R37W R36W R35W

KGS 1992 Map - 33D

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL
ALKALINITY, TOTAL	2/20/2007	179	156 - 179	MG/L	300
CALCIUM	2/20/2007	68	63 - 68	MG/L	200
CHLORIDE	2/20/2007	39	12 - 39	MG/L	250
CONDUCTIVITY @ 25 C UMHOS/CM	2/20/2007	810	640 - 810	UMHO/CM	1500
CORROSIVITY	2/20/2007	0.11	0.042 - 0.11	LANG	0
HARDNESS, TOTAL (AS CAC03)	2/20/2007	310	240 - 310	MG/L	400
IRON	2/20/2007	1.1	0.012 - 1.1	MG/L	0.3
MAGNESIUM	2/20/2007	35	19 - 35	MG/L	150
MANGANESE	2/20/2007	0.03	0.0012 - 0.03	MG/L	0.05
NICKEL	2/20/2007	0.0056	0.0019 - 0.0056	MG/L	0.1
PH	2/20/2007	7.7	7.5 - 7.7	PH	8.5
POTASSIUM	2/20/2007	4.2	3.1 - 4.2	MG/L	100
SILICA	2/20/2007	28	27 - 28	MG/L	50
SODIUM	2/20/2007	45	37 - 45	MG/L	100
SULFATE	2/20/2007	170	130 - 170	MG/L	250
TDS	2/20/2007	500	400 - 500	MG/L	500
ZINC	2/20/2007	0.019	0.011 - 0.019	MG/L	5

City of Hugoton
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The City of Hugoton

Water Quality Report

Additional questions about this report can be directed to:

The City of Hugoton
Water Department
631 S. Main St.
PO Box 788
Hugoton, Kansas 67951
(620) 544-8531

Copias en espanol disponible ala oficiana de cuidad de Hugoton.

Landlords, businesses and schools are encouraged to share this report with non-billed users at their locations. To obtain additional copies free of charge, call us at (620)544-8531. More information about contaminants and potential health effects can be obtained by calling the USEPA Safe Drinking Water Hotline, 1-800-426-4791.

This pamphlet lists water quality information for the City of Hugoton for calendar year 2007. It includes limited details on the source and quality parameters and how our water compares to Environmental Protection Agency (EPA) and state standards. It's important that customers be aware of the efforts that are made continually to improve their water system. To learn more, please attend any of the regularly scheduled meetings that are held on the first Monday of the month after the 4th day of the month at 5:15 p.m. at the City Office, 631 S. Main. For more nformation, please contact Alan Thomas, Head Operator, at 620/544-8531.

The water source for the City of Hugoton is from six water wells. The water is treated to remove contaminants. A disinfectant is also added to protect the water supply against microbial contaminants. An assessment of our source water has been completed. For the results of the assessment, please contact us or download the results at www.kdheks.gov/nps/swap/SWreports.html.

A message from EPA

To ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. The city treats water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before treatment may include:

- **Microbial contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- **Inorganic contaminants**, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- **Pesticides and herbicides**, which may come from a variety of sources such as agriculture and residential uses.
- **Radioactive contaminants**, which are naturally occurring.
- **Organic chemical contaminants**, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Total Coliform Rule (TCR): Coliform bacteria are usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio. During 2007, the utility collected four samples per month.

Water Quality Data

The table on the reverse side lists all the drinking water contaminants that we detected during the 2007 calendar year. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in the accompanying tables is from testing done January 1 - December 31, 2007. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. The bottom line is that the water that is provided to you is safe.

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Contaminant Level (MCL): the highest level of contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs allow for a margin of safety.

Action Level (AL): the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT): a required process intended to reduce the level of contaminants in water

MRDL: Maximum Residual Disinfectant Level

N/A: not applicable; ND: non detect at testing limit

pCi/l: picocuries per liter (a measure of radiation)

ppb: parts per billion or micrograms per liter (µg/l)

ppm: parts per million or milligrams per liter (mg/l)

NTU: Nephelometric Turbidity Unit: measure of turbidity

Testing Results for the City of Hugoton

The City of Hugoton had no violations of drinking water standards in 2007.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	2/20/2007	2.5	1.5 - 2.5	ppb	10.000		Erosion of natural deposits
BARIUM	2/20/2007	0.031	0.02 - 0.031	ppm	2	2	Discharge from metal refineries
CHROMIUM	2/20/2007	8.4	4.2 - 8.4	ppb	100	100	Discharge from steel and pulp mills
FLUORIDE	2/20/2007	0.5	0.38 - 0.5	ppm	4.0	4	Natural deposits; water additive which promotes strong teeth
NITRATE	2/20/2007	3.4	2.3 - 3.4	ppm	10	10	Runoff from fertilizer use
SELENIUM	2/20/2007	15	4.2 - 15	ppb	50	50	Erosion of natural deposits

Disinfection Byproducts	Monitoring Period	Highest RAA	Range	Unit	MCL	MCLG	Typical Source
TTHM	2005 - 2007	4	4	ppb	80.000	0.000	By-product of drinking water chlorination

Lead and Copper	Monitoring Period	90th Percentile	Range	Unit	AL	Sites Over AL	Typical Source
COPPER, FREE	2005 - 2007	0.12	0.027 - 0.15	ppm	1.3	0	Corrosion of household plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Your water system is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
GROSS ALPHA, INCL. RADON & U	4/10/2006	14	4 - 14	pCi/l	15	0	Erosion of natural deposits

-- continued on reverse panel

Report 1

FILE	STAT	SUBSECTION	S	T	R	AF	NAME
4479800	APRD	4100N 4700W	2	33	37	135	WING, MATT & JEANA
3254900	CERT	2639N 4541W	3	33	37	1	KNOX, FLOYD & KNOX,
4176900	CERT	5196N 2427W	7	33	37	248	LEONARD, JOYCE A; ETAL
1167700	CERT	2600N 2680W	7	33	37	1080	BANE TRUST, GORDON
4182600	CERT	3562N 5229W	8	33	37	1038	SCHNITTKER TRUSTS, THO
1265400	CERT	3280N 5165W	9	33	37	1216	MOSER, DENNIS A &
SV00100	VEST	0154N 1220W	9	33	37	1207.59	LEGENDS LLC
1119000	CERT	0100N 5180W	9	33	37	491	CITY OF HUGOTON
4365300	APRD	2150N 2375W	9	33	37	207.4	LEGENDS LLC
4574800	APRD	2985N 4900W	14	33	37	312	BURROWS, SIDNEY D & SHEI
3723400	CERT	0552N 5138W	16	33	37	125	CITY OF HUGOTON
0072800	CERT	0100N 5180W	17	33	37	888	WALKEMEYER, FRED; ETAL
1052000	CERT	1210N 5240W	20	33	37	1060	BARBER, CECIL R & KATHRY
1119000	CERT	3225N 0330W	21	33	37	113.27	CITY OF HUGOTON
SV00700	VEST	2165N 4950W	21	33	37	570	HEGER, DARIN & KIRK HEGE
1258600	CERT	0488N 0151W	22	33	37	425	COX, JEFF J
1519500	CERT	2780N 5098W	23	33	37	552	COX, JERRY H & JEFFREY J
4433300	APRD	3068N 5185W	24	33	37	640	MID-AMERICA CATTLE CO,
1251400	CERT	3016N 3788W	25	33	37	214	OLINGER TRUST, CHARLES
1251400	APRD	3360N 3804W	25	33	37	230	OLINGER TRUST, CHARLES
1780000	CERT	2750N 0150W	26	33	37	440	CARPENTER FAMILY TRUST,
1197000	CERT	3290N 3965W	26	33	37	463	CARPENTER FAMILY TRUST,
1564100	CERT	0210N 5060W	26	33	37	376	CARPENTER FAMILY TRUST,
1143800	CERT	1590N 3630W	28	33	37	481	KNIER LIV TR,DONALD DEE
1143800	CERT	SW NW NW	28	33	37	432	KNIER LIVING TRUST, DONA
3999300	CERT	2670N4430W	29	33	37	820	LEE, KELLY DIANE & TAMMIE
2799300	CERT	3028N 1361W	30	33	37	750	PELAJO PROPERTIES
3997400	CERT	3963N 4006W	31	33	37	583	HEGER, ROB LEON
4151100	CERT	0505N 2540W	32	33	37	520	PELAJO PROPERTIES
1054600	CERT	3950N 4115W	32	33	37	1228	BEE ENTERPRISES, INC
4042200	CERT	4990N 5200W	34	33	37	764	HEGER, CHRISTOPHER T &
4221100	CERT	1300N 5220W	34	33	37	181	HEGER, RODERICK J
4208100	CERT	2650N 1395W	35	33	37	320	ATS ENTERPRISES LLC
4156100	APRD	2615N 4720W	35	33	37	890	HEGER, DARIN K
1443700	CERT	4400N 4900W	36	33	37	573	STEGMAN, ANTHONY J
						19574.2	

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FILE	STAT	SUBSECTION	S	T	R	AF	NAME
1322000	CERT	2600N 2710W	1	34	38	704	KRAMER PROPERTIES
1261900	CERT	2720N 1210W	2	34	38	360	SHIRLEY, LEROY; ETAL
1101100	CERT	SW NE SW	2	34	38	800	MOSER, DON ETTA
1185900	CERT	2720N 2580W	3	34	38	698	WHITE LIVING TRUST, RALP
3443300	CERT	0087N 4948W	3	34	38	1	BENTLEY LIFE ESTATE,
4233800	APRD	5200N 2666W	4	34	38	900	GREWELL LIFE ESTATE,
2290800	CERT	0160N 0080W	4	34	38	1000	MORRIS, GREGORY WILSON
4293500	CPI	1650N 5050W	7	34	38	160	DOUBLE H & G FARMS LLC
4232800	CPI	0150N 1755W	7	34	38	1102	DOUBLE H & G FARMS LLC
4232700	CPI	1314N 3900W	8	34	38	500	COULTER, REX & ROGLEND
4187900	CERT	2055N 0127W	9	34	38	72.6	MCBRIDE, BOBBY & EVELYN
4196800	CERT	0110N 0100W	9	34	38	260	MCBRIDE, BOBBY & EVELYN
2622200	CERT	3398N 5199W	10	34	38	507	THOMPSON, ALMETA G; ETA
4231900	CERT	1980N 3500W	10	34	38	391	COULTER, REX A & ROLEND
1094100	CERT	2650N 2630W	11	34	38	1192	RECTOR, DEBORAH
2329900	CERT	2754N 1796W	12	34	38	550	MCBRIDE, TONY J & TODD L
3728500	CERT	3960N 3960W	13	34	38	230	MURRAY, KAY ANITA YOUNG
2285800	CERT	1320N 3960W	13	34	38	720	MID-AMERICA CATTLE CO
24942D2	CERT	2435N 2045W	14	34	38	92	BRECHEISEN, PEGGY H
24942D1	CERT	2435N 2045W	14	34	38	843	MID AMERICA CATTLE CO
4146300	CERT	2825N 5200W	14	34	38	500	GREWELL, DONALD PAUL &
4146300	CERT	0365N 0210W	15	34	38	500	GREWELL, DONALD P &
4221000	APRD	3530N 0100W	16	34	38	260	LIVINGSTON, JAMES E &
4233600	CERT	0020N 2830W	16	34	38	1193	GREWELL, DONALD P &
2189600	CERT	2710N 2840W	18	34	38	490	LIGHT, WILLIAM C; ETAL
4342200	CPI	0300N 2940W	18	34	38	287	LIGHT, WILLIAM C; ETAL
4223100	CPI	2970N 2505W	20	34	38	498.6	BRECHEISEN, CHARLES P
4134400	CERT	2690N 2630W	21	34	38	1000	GREWELL, PHYLLIS KAY &
3238100	CERT	4200N 3900W	22	34	38	160	BURROWS, LARRY F & WILE
2300100	CERT	0685N 3597W	23	34	38	0.307	KANSAS UNIV ENDOWMENT
4284400	CPI	3000N 2800W	24	34	38	980	RECTOR, WILLIAM D &
2661000	CERT	0135N 4915W	25	34	38	404	FINDLEY, ELINOR R
2582800	CERT	3035N 2640W	26	34	38	560	BURROWS, RUBY; ETAL
2301700	CERT	1400N 1360W	26	34	38	490	BURROWS, LARRY F & WILE
4151300	APRD	2950N 4850W	28	34	38	1253	MORRIS, GREGORY W &
4419300	APRD	0067N 0245W	29	34	38	400	MORRIS LIFE ESTATE,
4178900	CERT	2500N 2514W	29	34	38	308	MORRIS, GREGORY W
1342800	CERT	0320N 0300W	31	34	38	272	BRECHEISEN, CHARLES P
3989600	CPI	0300N 2590W	32	34	38	520	BRECHEISEN, CHARLES P
2292700	CERT	2730N 5235W	33	34	38	885	MORRIS LIFE ESTATE,
3893300	CERT	1315N 1110W	33	34	38	260	BRECHEISEN, GAYLEN ALFR
2294500	CERT	2310N 2755W	34	34	38	520	MORRIS, GREG W; ETAL
4229800	CERT	2600N 0110W	34	34	38	256	BERNARD, LETA ROSE
4235000	APRD	2925N 1400W	35	34	38	1491	WHEELER, LEWIS & LEE; ET
4244900	APRD	5050N 5000W	35	34	38	80	WHEELER, LEWIS & LEE; ET
						24650.5	

Report 1

FILE	STAT	SUBSECTION	S	T	R	AF	NAME
2006700	CERT	2700N 0800W	2	33	38	500	DOUBLE H & G FARMS LLC
0026100	CERT	N N NE	6	33	38	580	SLEMP LIVING TRUST, JOHN
0043500	CERT	2125N 2590W	6	33	38	640	SHAFER, ROBERT J
3861600	CERT	3940N 3960W	7	33	38	1327	HEGER TRUSTS, MARLIN P &
1124300	CERT	1650N 1250W	8	33	38	440	REYNOLDS TRUSTS, KAREN
0724100	CERT	2800N 1500W	10	33	38	512	GASKILL, NADYNE
0653400	CERT	3950N 5200W	10	33	38	640	GREENWOOD, MILDRED
4181400	PEND	0100N 2740W	11	33	38	239	EMERY, FRANK E & SANDRA
2283900	CERT	2600N 2500W	11	33	38	520	SIMMONS TRUSTS, ROSS A
4038000	CERT	5125N 3192W	12	33	38	763	EMERY, SANDRA A & FRANK
2694100	CERT	1300N 3930W	12	33	38	282	SCHMIDT, GERALD L
2790900	CERT	2547N 0597W	13	33	38	414	CITY OF HUGOTON
3315900	CERT	4387N 0070W	14	33	38	741	HULL, RICHARD D & VICKIE S
1088900	CERT	3060N 1120W	15	33	38	1090	DAVIS, STEVEN R
1749800	CERT	0100N 5180W	15	33	38	400	MCBRIDE, TONY J & TODD L
0096800	CERT	0480N 3500W	16	33	38	1280	HIGH PLAINS TRUST
1536600	CERT	2200N 2600W	16	33	38	6	HIGH PLAINS TRUST
0623000	CERT	NW NW NE	17	33	38	423	POWELL, JEAN A; ETAL
3903600	CERT	0600N 5240W	18	33	38	186	HEGER, ROBB L
1363000	CERT	0475N 0120W	18	33	38	640	SLEMP LIVING TRUST, JOHN
0603200	CERT	1485N 0045W	20	33	38	890	SLEMP LIVING TRUSTS, LAR
1440300	CERT	1350N 4050W	20	33	38	457	LIGHT FAMILY FARMS
0096800	CERT	4450N 5200W	21	33	38	960	FARRAR REV TRUST, KEITH
1114800	CERT	0525N 1300W	22	33	38	942	COULTER, GILBERT H &
2628200	CERT	2700N 2700W	23	33	38	700	MORGAN REV TRUST, RAY A
4100400	CPI	4820N 4705W	24	33	38	544	PELAJO PROPERTIES
4099200	CERT	1980N 0140W	24	33	38	462	PELAJO PROPERTIES
4097900	CERT	4180N 5180W	25	33	38	361	PELAJO PROPERTIES
2799300	CERT	0635N 1361W	25	33	38	645	PELAJO PROPERTIES
1333000	CERT	1160N 3330W	27	33	38	420	HOLCOMB REVOCABLE TRU
4220700	CPI	0305N 0305W	29	33	38	320	REYNOLDS, JACK & PATRIN
1476800	CERT	CE CE NW	30	33	38	199	LIGHT FAMILY FARMS
4234400	APRD	2575N 2750W	33	33	38	960	MORGAN TRUST, THELMA K
24941D2	CERT	0895N 2550W	34	33	38	18	JOHNSON, NINA
3228200	CERT	3994N 1285W	34	33	38	272	REYNOLDS, ARTHUR WAYN
2665900	CERT	2700N 3150W	34	33	38	326	BRECHEISEN, CHARLES P;
24941D1	CERT	0895N 2550W	34	33	38	270	REYNOLDS, WAYNE & EVAL
2628300	CERT	5240N 2600W	35	33	38	960	MORGAN TRUST, THELMA K;
2799400	CERT	2687N 5210W	36	33	38	771	PELAJO PROPERTIES
2799400	CERT	2510N 2510W	36	33	38	591	PELAJO PROPERTIES
						22691	

Appendix D

Agency Consultations

D. AGENCY CONSULTATIONS

This appendix includes correspondence representing consultations undertaken with the Kansas Department of Wildlife and Parks, U.S. Fish and Wildlife Service, Kansas State Historical Society, and the U.S. Department of Agriculture Farm Service Agency between December 2007 and November 2008. Although separate from the public scoping process, information obtained from these consultations was used to inform the scope of this Abengoa Bioenergy Project EIS.

Public comments received in response to public scoping conducted from August 25 through October 9, 2008 and April 29 through May 29, 2009, and the Department's consideration of these comments are discussed in Chapter 1, Section 1.4.3 of this EIS.

KLEINFELDER

January 29, 2008

Environmental Services Section
Kansas Department of Wildlife and Parks
512 SE 25th Avenue
Pratt, Kansas 67124

RE: Request for Environmental Review
Proposed Abengoa Ethanol Plant
Hugoton, Stevens County, Kansas

Dear KDWP:

Abengoa Bioenergy of Kansas is proposing to build a bio-refinery just west of the City of Hugoton, Kansas (See attached Figure 1). The proposed site totals approximately 810 acres (See attached Figure 2). The sections/township/range are included on Figure 2. Also attached for your use are copies of U.S. Geological Survey (USGS) 7.5 minute topographical maps and aerial photographs. The ethanol plant will be in section 18 (see "Biorefinery Location"); and, support facilities such as parking and biomass storage will be in section 17 (see "Additional Land Purchase"). Site lay-out or construction plans are not available at this time. Some of the Additional Land Purchase may be used for experimental agricultural plots or green space, but our environmental analysis assumes that all lands within the project boundaries will be used for the biorefinery and/or support facilities.

The Kansas Department of Wildlife and Parks (KDWP) is being contacted at this time to determine if any type of Threatened and Endangered (T & E) Species surveys will be needed for the project. A Wetland Survey and Cultural Resources Survey are planned for the northwest quarter of Section 17. The Cultural Resources Survey is per request from the Kansas State Historic Preservation Office due to the possible presence of a historical playa pond/lake. The need for the Wetland Survey is based on review of the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Maps and USGS topographical map review; and, requests from Don Jantzen with the Natural Resource Conservation Service (NRCS) in Hugoton. The topographical map shows a shallow internal drainage area of approximately 75 acres and the NWI map shows an approximately 1.5 acre area classified as PUBFx.

On-site jurisdictional wetland delineation will be conducted following the guidelines provided in the U.S. Army Corps of Engineer's (USACE) 1987 *Wetland Delineation Manual*, NRCS 2006 *Field Indicators of Hydric Soils in the United States*, and Section 404 of the Clean Water Act. The Cultural Survey will be conducted per the National Historic Preservation Act Section 106 Phase I Cultural Resources Investigation guidelines by a state of Kansas-approved and federally-qualified archaeologist.

The U.S. Department of Energy (DOE) is providing federal grant money and appropriate environmental documentation per the National Environmental Policy Act (NEPA) will be completed before any construction activities are undertaken. Kleinfelder is preparing the NEPA environmental documentation and construction permits for the project. Requirement for air permits is acknowledged and is being handled as a separate task. We are requesting a determination for any KDWP required on-site T & E Species surveys. Our preliminary determination is that there is no need for any on-site surveys for any species of concern. We are requesting your concurrence or to be informed of the types of surveys that would be required.

Scoping letters will be sent out by DOE at a future date and KDWP will of course be provided with copies of the NEPA documents for review and comment when they are available. The primary purpose of our correspondence and request at this time is to determine the need for any on-site T & E Species surveys that are needed; and, to complete the surveys now to avoid possible project delays and to allow the incorporation of the survey results into the NEPA documents. Following is information and preliminary analysis that may be of assistance for KDWP's Environmental Review.

PRELIMINARY ASSESSMENT

The proposed construction site is adjacent to the City of Hugoton, a historic railroad line, grainery, light industrial park, airport, asphalt plant, golf course, roads, and row crop agriculture. The site is highly disturbed and has been used for several decades for row crop agriculture. The site was readily accessible and general site recon did not note any natural habitats or streams. There are no naturally forested, large native prairie, and/or natural wetland areas present on-site or adjacent to the site based on site recon and review of available information. There are no streams, springs, caves, or rock outcrops on-site or adjacent to the site based on site recon and review of available information.

The proposed project is in the Arkansas-White-Red Rivers Region 11, the 12,000 square mile Upper Cimarron sub-region 1104; and, the 1,720 square mile Cimarron-Liberal cataloging unit 11040006. Stevens County is a part of the southern High Plains section of the Great Plains physiographic province. Stevens County is in the Central Great Plains Winter Wheat and Range Region; and, the Major Land Resource Area (MLRA) – 77A Southern High Plains, Northern Part.

The 2006 NRCS Soil Survey of Stevens County, Kansas indicated that the following soil map units (SMU) were present on-site:

- 5205 – Canina loam, 0-1% slope
- 5210 – Belfon loam, 0-1% slope
- 1611 - Vorhees fine sandy loam, 1-3% slope

All of the above SMUs are well drained, have moderate permeability, low to neglible runoff, and a water table that is 6 or more feet below the surface. None of the SMUs are flooded per NRCS Soil Survey information.

USGS 7.5 minute Hugoton and Feterita topographical quadrangle maps review did not note any indications of springs, marsh, and/or streams. One area was shown as open water. The open water area is a former borrow pit. The site is not in the 100-year floodplain.

The USFWS Critical Habitat mapper was used to search for Critical Habitat or known locations of T & E Species as well as federally managed lands. No know T & E locations, Critical Habitat, or federally managed lands were noted within or adjacent to the proposed construction site. The USGS topographical and NRCS Soil Survey did not indicate the presence of any federal or state lands managed lands within or adjacent to the site. The proposed ethanol plant is five or more miles from the Cimarron National Grassland to the west and Cimarron River to the northwest.

Review of the KDWP internet site indicated the potential historic presence of 11 T & E Species and 7 Species In Need of Conservation Concern (SINC) in Stevens County. The range maps and habitat descriptions were reviewed for all 18 species listed for Stevens County. Habitats for the 18 species of concern included streams, rivers, lakes, relatively large natural wetlands and marshes, sand bars, relatively large areas of native prairie, riparian forest, rocky areas or outcrops, and canyons. Most of the species are intolerant of frequent human disturbance.

The only KDWP listed species with designated Critical Habitat in Stevens County was the Arkansas River Shiner, which is the Cimarron River when it is flowing. The Bald Eagle was noted for historic range, but prefers large water bodies with nearby large trees with lateral branches. Large waterbodies are absent within or adjacent to the site. The Eastern Spotted Skunk, Flathead Chub, Least Tern, Longnose Snake, Peregrine Falcon, Piping Plover, Snowy Plover, and Texas Blind Snake were listed only as "probable historic range". The SINC list included Black Tern, Chihuahuan Raven, Ferruginous Hawk, Golden Eagle, Long Billed Curlew, Plains Minnow, and Yellow-throated Warbler which were listed as "known current range" for Stevens County, but were present in habitats that did not occur within or adjacent to the proposed project site. Most of the SINC species were only part year residents and no nesting in Stevens County was noted.

As stated above, our analysis does not indicate the need for any on-site surveys for species of concern. Please review and let us know if you concur. Thank you for your time and help. If you have any questions please contact me at (913) 962-0909.

Respectfully submitted,
KLEINFELDER

Tom Plattner
Natural Resources Professional
Kleinfelder
7802 Barton
Lenexa, Kansas 66214

Attachments (11):
- Figure 1
- Figure 2
- Stevens Co. T & E List
- USFWS Critical Habitat (2)
- Topographical Maps (3)
- Aerial Photographs (3)

KANSAS
DEPARTMENT OF WILDLIFE AND PARKS

Kathleen Sebelius, Governor
J. Michael Hayden, Secretary

www.kdwp.state.ks.us

February 28, 2008

Mr. Tom Plattner
Natural Resources Professional
Kleinfelder
7802 Barton
Lenexa, Kansas 66214

Ref: D5.0105
Stevens
Track: 20080060

Dear Mr. Plattner:

We have reviewed the information provided involving the construction of the Abengoa Ethanol Plant in Sections 17,18, Township 33 South, Range 37 West, Stevens County. The project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered species and species in need of conservation, and public recreation areas for which this agency has some administrative authority.

Due to the predominance of cropland on the proposed site, we have very few wildlife resource concerns with this proposed site. We concur that no T & E species surveys are needed. We do note, based on soil survey data alone, that there may be a highly modified playa lake present in the far western half the SW/4 of section 17. Lofton Clay Loam is indicative of ephemeral playa lakes in this region and this area should be evaluated for modified hydrology or possible future restoration as a result of this project.

Otherwise, we have no objections to the proposed project as designed and simply recommend implementing standard erosion control BMPs, temporary weed-free seeding/mulching to protect water quality during construction, minimize any instream/wetland construction activities and we suggest the use of native grasses and forbs to permanently revegetate all areas disturbed by construction.

Results of our review indicate there will be no significant impacts to crucial wildlife habitats; therefore, no special mitigation measures are recommended. The project will not impact any public recreational areas, nor could we document any potential impacts to currently listed threatened or endangered species or species in need of conservation. No Department of Wildlife and Parks permits or special authorizations will be needed if construction is started within one year, and no design changes are made in the project plans. Since the Department's recreational land obligations and the State's species listings periodically change, if construction has not started within one year of this date, or if design changes are made in the project plans, the project sponsor must contact this office to verify continued applicability of this assessment report. For our purposes, we consider construction started when advertisements for bids are distributed.

Thank you for the opportunity to provide these comments and recommendations. If you have any questions or concerns, please contact me at (620)-672-0798 or ericj@wp.state.ks.us.

Sincerely,

Eric R. Johnson, Ecologist
Environmental Services Section

PRATT OPERATIONS OFFICE
512 SE 25th Ave., Pratt, KS 67124-8174
(620) 672-5911 • Fax: (620) 672-6020

January 29, 2008

U.S. Fish and Wildlife Service
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

RE: Request for Environmental Review
Proposed Abengoa Ethanol Plant
Hugoton, Stevens County, Kansas

Dear USFWS:

Abengoa Bioenergy of Kansas is proposing to build a bio-refinery just west of the City of Hugoton, Kansas (See attached Figure 1). The proposed site totals approximately 810 acres (See attached Figure 2). The sections/township/range are included on Figure 2. Also attached for your use are copies of U.S. Geological Survey (USGS) 7.5 minute topographical maps and aerial photographs. The ethanol plant will be in section 18 (see "Biorefinery Location"); and, support facilities such as parking and biomass storage will be in section 17 (see "Additional Land Purchase"). Site lay-out or construction plans are not available at this time. Some of the Additional Land Purchase may be used for experimental agricultural plots or green space, but our environmental analysis assumes that all lands within the project boundaries will be used for the biorefinery and/or support facilities.

We are contacting the U.S. Fish and Wildlife Service (USFWS) to determine if any Threatened and Endangered (T & E) Species surveys will be needed for the project. The Kansas Department of Wildlife and Parks (KDWP) is also being contacted to determine if any type of T & E Species surveys will be needed for the project. A Wetland Survey and Cultural Resources Survey are planned for the northwest quarter of Section 17. The Cultural Resources Survey is per request from the Kansas State Historic Preservation Office due to the possible presence of a historical playa pond/lake. The need for the Wetland Survey is based on review of the USFWS National Wetland Inventory (NWI) Maps and USGS topographical map review; and, requests from Don Jantzen with the Natural Resource Conservation Service (NRCS) in Hugoton. The topographical map shows a shallow internal drainage area of approximately 75 acres and the NWI map shows an approximately 1.5 acre area classified as PUBFx.

On-site jurisdictional wetland delineation will be conducted following the guidelines provided in the U.S. Army Corps of Engineer's (USACE) 1987 *Wetland Delineation Manual*, NRCS 2006 *Field Indicators of Hydric Soils in the United States*, and Section 404 of the Clean Water Act. The Cultural Survey will be conducted per the National Historic Preservation Act Section 106 Phase I Cultural Resources Investigation guidelines by a state of Kansas-approved and federally-qualified archaeologist.

The U.S. Department of Energy (DOE) is providing federal grant money and appropriate environmental documentation per the National Environmental Policy Act (NEPA) will be completed before any construction activities are undertaken. Kleinfelder is preparing the NEPA environmental documentation and construction permits for the project. Requirement for air permits is acknowledged and is being handled as a separate task. We are requesting a determination for any USFWS required on-site T & E Species surveys. Our preliminary determination is that there is no need for any on-site surveys for any species of concern. We are requesting your concurrence or to be informed of the types of surveys that would be required.

Scoping letters will be sent out by DOE at a future date and USFWS will of course be provided with copies of the NEPA documents for review and comment when they are available. The primary purpose of our correspondence and request at this time is to determine the need for any on-site T & E Species surveys that are needed; and, to complete the surveys now to avoid possible project delays and to allow the incorporation of the survey results into the NEPA documents. Following is information and preliminary analysis that may be of assistance for USFWS's review.

PRELIMINARY ASSESSMENT

The proposed construction site is adjacent to the City of Hugoton, a historic railroad line, grainery, light industrial park, airport, asphalt plant, golf course, roads, and row crop agriculture. The site is highly disturbed and has been used for several decades for row crop agriculture. The site was readily accessible and general site recon did not note any natural habitats or streams. There are no naturally forested, large native prairie, and/or natural wetland areas present on-site or adjacent to the site based on site recon and review of available information. There are no streams, springs, caves, or rock outcrops on-site or adjacent to the site based on site recon and review of available information.

The proposed project is in the Arkansas-White-Red Rivers Region 11, the 12,000 square mile Upper Cimarron sub-region 1104; and, the 1,720 square mile Cimarron-Liberal cataloging unit 11040006. Stevens County is a part of the southern High Plains section of the Great Plains physiographic province. Stevens County is in the Central Great Plains Winter Wheat and Range Region; and, the Major Land Resource Area (MLRA) – 77A Southern High Plains, Northern Part.

The 2006 NRCS Soil Survey of Stevens County, Kansas indicated that the following soil map units (SMU) were present on-site:

- 5205 – Canina loam, 0-1% slope
- 5210 – Belfon loam, 0-1% slope
- 1611 - Vorhees fine sandy loam, 1-3% slope

All of the above SMUs are well drained, have moderate permeability, low to neglible runoff, and a water table that is 6 or more feet below the surface. None of the SMUs are flooded per NRCS Soil Survey information.

USGS 7.5 minute Hugoton and Feterita topographical quadrangle maps review did not note any indications of springs, marsh, and/or streams. One area was shown as open water. The open water area is a former borrow pit. The site is not in the 100-year floodplain.

The USFWS Critical Habitat mapper was used to search for Critical Habitat or known locations of T & E Species as well as federally managed lands. No know T & E locations, Critical Habitat, or federally managed lands were noted within or adjacent to the proposed construction site. The USGS topographical and NRCS Soil Survey did not indicate the presence of any federal or state lands managed lands within or adjacent to the site. The proposed ethanol plant is five or more miles from the Cimarron National Grassland to the west and Cimarron River to the northwest.

Review of the KDWP internet site indicated the potential historic presence of 11 T & E Species and 7 Species In Need of Conservation Concern (SINC) in Stevens County. The range maps and habitat descriptions were reviewed for all 18 species listed for Stevens County. Habitats for the 18 species of concern included streams, rivers, lakes, relatively large natural wetlands and marshes, sand bars, relatively large areas of native prairie, riparian forest, rocky areas or outcrops, and canyons. Most of the species are intolerant of frequent human disturbance.

The only KDWP listed species with designated Critical Habitat in Stevens County was the Arkansas River Shiner, which is the Cimarron River when it is flowing. The Bald Eagle was noted for historic range, but prefers large water bodies with nearby large trees with lateral branches. Large water bodies are absent within or adjacent to the site. The Eastern Spotted Skunk, Flathead Chub, Least Tern, Longnose Snake, Peregrine Falcon, Piping Plover, Snowy Plover, and Texas Blind Snake were listed only as "probable historic range". The SINC list included Black Tern, Chihuahuan Raven, Ferruginous Hawk, Golden Eagle, Long Billed Curlew, Plains Minnow, and Yellow-throated Warbler which were listed as "known current range" for Stevens County, but were present in habitats that did not occur within or adjacent to the proposed project site. Most of the SINC species were only part year residents and no nesting in Stevens County was noted.

As stated above, our analysis does not indicate the need for any on-site surveys for species of concern. Please review and let us know if you concur. Thank you for your time and help. If you have any questions please contact me at (913) 962-0909.

Respectfully submitted,
KLEINFELDER

Tom Plattner

Tom Plattner
Natural Resources Professional
Kleinfelder
7802 Barton
Lenexa, Kansas 66214

Attachments (11):
- Figure 1
- Figure 2
- Stevens Co. T & E List
- USFWS Critical Habitat (2)
- Topographical Maps (3)
- Aerial Photographs (3)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

February 22, 2008

Tom Plattner
Natural Resources Professional
Kleinfelder
7802 Barton
Lenexa, KS 66214

RE: Proposed Abengoa Ethanol Plant, Stevens County, KS 64411-2008-B-0256

Dear Mr. Plattner:

This is in response to your January 29, 2008 letter requesting Fish and Wildlife Service review of a proposed ethanol plant near the city of Hugoton, Stevens County, Kansas. The facility will be located at S18-T33S-R37W, one mile west of Hugoton and adjacent to the Atchison, Topeka and Santa Fe Railway line. Additional support facilities such as parking and biomass storage will be located immediately east of the proposed plant site, for a total of 810 acres. These comments are being provided pursuant to our authorities under the Fish and Wildlife Coordination Act, Clean Water Act, Migratory Bird Treaty Act, Endangered Species Act, and the National Environmental Policy Act.

There are no records of any federally-listed threatened or endangered species occurring in the vicinity of the proposed projects. However, the candidate lesser prairie-chicken (*Tympanuchus pallidicinctus*) may occur in the project area. The lesser prairie-chicken is a medium-sized grouse which prefers shortgrass and sandsage prairie and also uses cropland for winter foraging. Research has shown that nesting prairie-chicken hens may exhibit a behavioral avoidance of tall vertical structures such as towers, overhead power lines, and silos. Although the footprint of any given project may be limited, a zone of avoidance can be created which renders otherwise suitable habitat unusable for nesting by this species. This avoidance may extend as much as a mile in every direction of large structures. Candidates are those species for which the Service has on file substantial information on biological vulnerability and threats to support proposals to list them as endangered or threatened species. Development and publication of proposed rules to list candidate species as threatened or endangered are anticipated at some point in the future. Candidate species have no legal protection under the Endangered Species Act; however, the USFWS is concerned for their conservation due to their uncertain status.

The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Takings could result from projects in prairies, wetlands, stream and woodland habitats, and those that occur on bridges and other structures if swallow or phoebe nests are present. While the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Kansas occurs during the period of April 1 to July 15. However, some migratory birds are known to nest earlier than this (e.g., hawks and owls) and some later (e.g., goldfinches). If construction of the proposed project will occur during the nesting season in habitat capable of supporting bird nesting, I recommend a field survey during the nesting season of the affected habitats and structures to determine the presence of active nests. Our office should be contacted immediately for further guidance if a field survey identifies the existence of one or more active bird nests that you believe cannot be avoided temporally or spatially by the planned activities.

While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed during project construction and implementation even if all reasonable measures to protect them are used. Our Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. It is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, Law Enforcement focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without regard for their actions or without following recommendations to avoid take.

Construction and operational activities should avoid wetlands, streams, and riparian woodlands to the maximum extent possible. The results of your wetland assessment will help determine whether a permit from the U.S. Army Corps of Engineers may be necessary. If impacts to wetlands, including seasonal playa lakes are unavoidable, a permit will likely be required, and we will be given another opportunity to review the public notice and provide additional comments at that time. Seasonal wetlands in this arid portion of the state are very important for a variety of fish and wildlife species, including migratory birds.

We are concerned about the continuing loss of native prairies, pasture, ground water and stream flows in this region of Kansas. Construction of this ethanol plant and associated activities may result in conversion of native prairie and/or existing CRP fields to irrigated corn production and subsequent water use increases if existing corn production is insufficient to supply plant needs. Similarly, this project and other energy projects may contribute to additional depletions of streamflow in the Cimarron River Basin. We recommend you evaluate and consider these potential cumulative and indirect effects during the National Environmental Policy Act (NEPA) process. Loss of grassy habitats resulting from increased tillage for corn production to support bioenergy plants has been identified as a significant threat to the candidate lesser prairie-chicken. Further reductions in streamflow due to increased pressure on groundwater reserves to support additional agriculture would have a detrimental effect on aquatic fish and wildlife resources of the region.

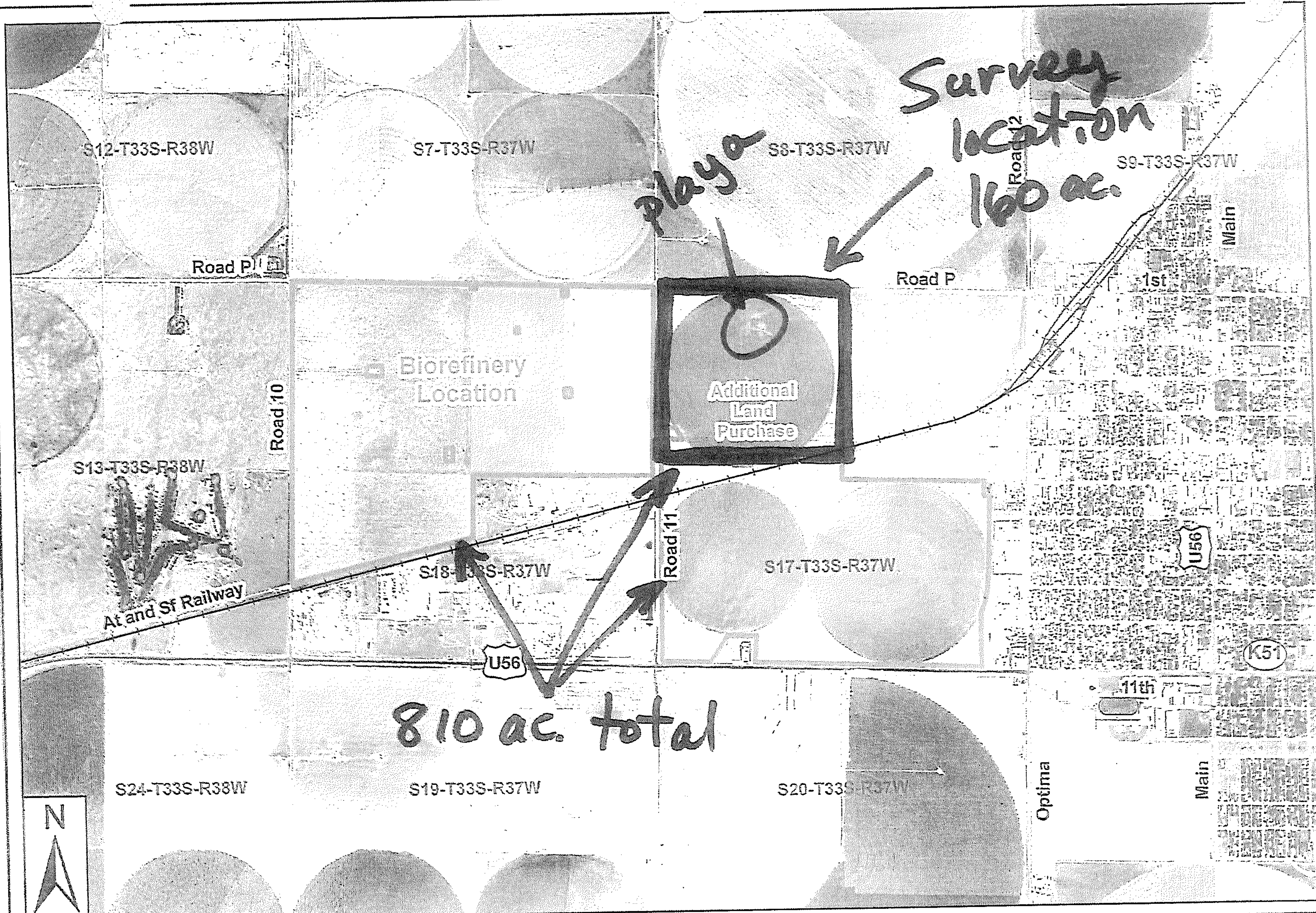
Thank you for providing this opportunity to review and comment on the proposed action. Should the NEPA process result in project plans being modified, please provide Dan Mulhern of this office with the changes for further review.

Sincerely,

Michael J. LeValley

Michael J. LeValley
Field Supervisor

cc: KDWP, Pratt, KS (Environmental Services)



VICINITY MAP
Abengoa Ethanol Plant and Properties
Stevens County, Hugoton, Kansas

Project Number: 88404
Scale: 1 inch = 1,773 feet

Figure 2

KLEINFELDER

KANSAS

KSR&C No. 07-12-046

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

December 7, 2007

Tom Plattner
Natural Resources Professional
Kleinfelder, Inc.
7802 Barton
Lenexa, Kansas 66214

RE: Abengoa Ethanol Plant and Properties
City of Hugoton
Stevens County

Dear Mr. Plattner:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the proposed project as described in your e-mail message of November 28, 2007 in accordance with 36 CFR 800. A portion of the proposed project area should be surveyed by a professional archeologist prior to beginning construction, as it is in an area of high and/or moderate archeological potential which has never undergone an archeological survey. Our area of concern (as noted on the attached maps) is the northern portion of the area marked "Additional Land Purchase". According to our records, this area contains a shallow playa basin, which on the High Plains can be a topographic setting conducive to archeological sites

Any archeologist meeting the Minimum Professional Qualifications of this office as outlined in *The State Historic Preservation Officer's Guide For Archeological Survey, Assessment, and Reports* (SHPO's Guide), is eligible to perform the requested work. A list of archeological contractors meeting these standards is available from our web site at http://www.kshs.org/resource/section106home.htm. Two **unbound** copies of the report documenting the survey, its results, and recommendations for mitigating the effects of construction on archeological sites, if any, should be sent to this office.

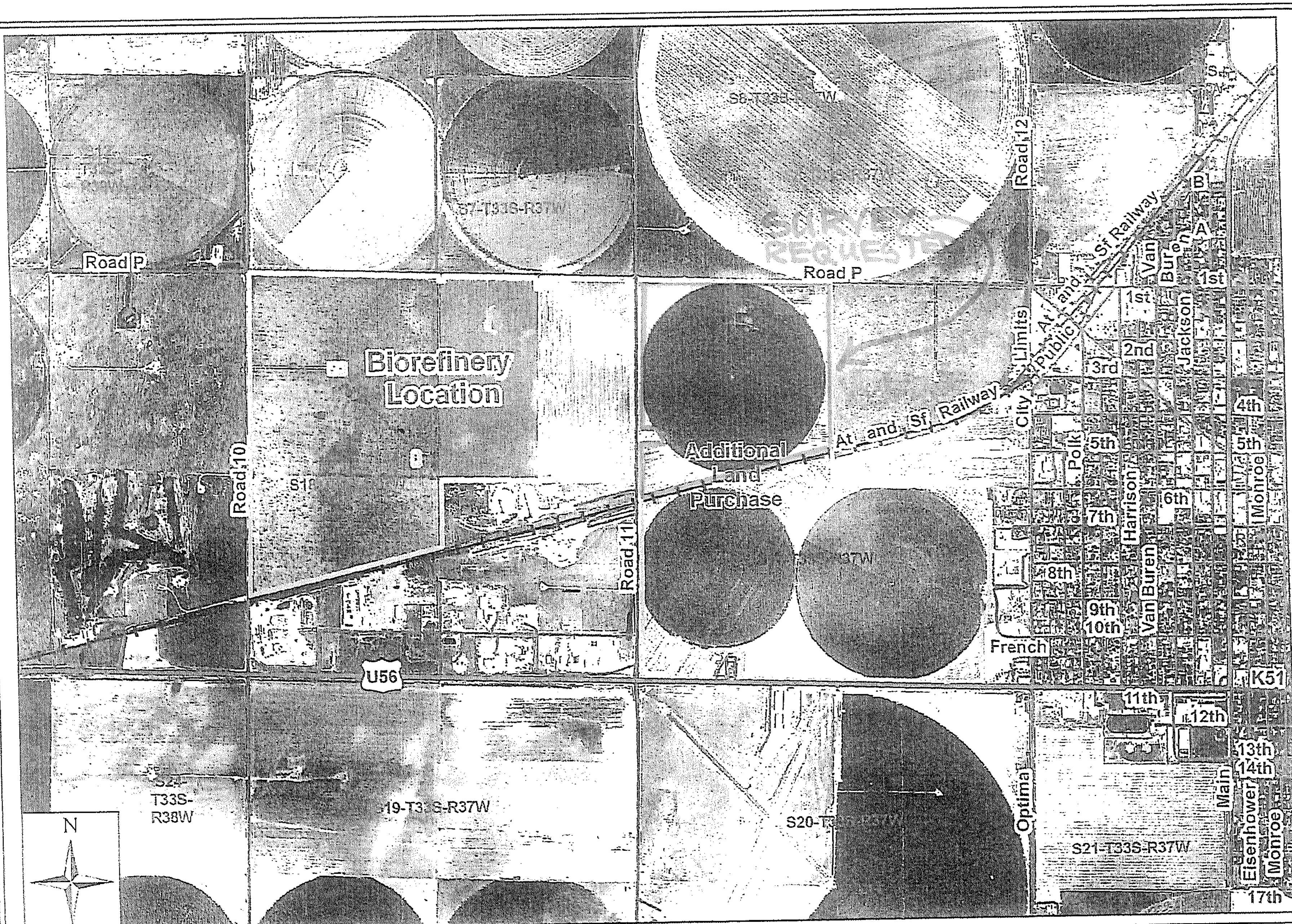
This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ext. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer



VICINITY MAP
Abengoa Ethanol Plant and Properties
Stevens County, Hugoton, Kansas

Project Number: 88404
Scale: 1 inch = 1,646 feet

Figure 2

KLEINFELDER

KANSAS

KSR&C No. 07-12-046

KATHLEEN SEBELIUS, GOVERNOR

Kansas State Historical Society
Jennie Chinn, *Executive Director*

October 6, 2008

Kristin Kerwin
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

RE: Abengoa Bioenergy Biorefinery Project
City of Hugoton
Stevens County

Dear Ms. Kerwin:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the proposed project as described in your Environmental Impact Statement notice dated September 2, 2008. According to our records, this project was reviewed in 2007. In our letter and map (attached) dated December 7, 2007, we requested that a portion of the proposed project area be surveyed by a professional archeologist prior to beginning construction, as it was in an area of high and/or moderate archeological potential which had never undergone an archeological survey. Our area of concern (as noted on the map which accompanied our original letter) was the northern portion of the area marked "Additional Land Purchase". According to our records, this area contains a shallow playa basin, which on the High Plains can be a topographic setting conducive to archeological sites.

In our letter we noted that any archeologist meeting the Minimum Professional Qualifications of this office as outlined in *The State Historic Preservation Officer's Guide For Archeological Survey, Assessment, and Reports* (SHPO's Guide), is eligible to perform the requested work. A list of archeological contractors meeting these standards is available from our web site at http://www.kshs.org/resource/section106home.htm. We requested that two **unbound** copies of the report documenting the survey, its results, and recommendations for mitigating the effects of construction on archeological sites, if any, should be sent to this office.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ext. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 205 • Fax 785-272-8682 • Email jchinn@kshs.org • TTY 785-272-8683
www.kshs.org

KANSAS

KSR&C No. 07-12-046

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

November 17, 2008

Steve Blazek
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

RE: Abengoa Bioenergy Biorefinery Project
City of Hugoton
Stevens County

Dear Mr. Blazek:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the proposed project as described in your letter dated November 4, 2008. According to our records, this project was initially reviewed in 2007. In our letter and map dated December 7, 2007, we requested that a portion of the proposed project area be surveyed by a professional archeologist prior to beginning construction, as it was in an area of high and/or moderate archeological potential which had never undergone an archeological survey. Our area of concern was the northern portion of the area marked "Additional Land Purchase". According to our records, that area contains a shallow playa basin, which on the High Plains can be a topographic setting conducive to archeological sites. This summary of concerns and survey request was reiterated in a letter dated October 6, 2008 to Kristin Kerwin of your office. We would be happy to review the archeological survey report once it becomes available.

It is our understanding that the biorefinery project will involve gathering and grinding of biomass from farms located at some distance from the actual plant site. Such dispersed on-farm processing is not, in our view, part of direct project impacts. Should Abengoa build a central grinding/processing facility for the project at a location separate from the main plant though, that facility would be subject to review for impacts to cultural resources.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ext. 214) or Kim Norton at 785-272-8681 (ext. 225). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

Patrick Zollner

Patrick Zollner
Deputy State Historic Preservation Officer

USDA
United States Department of Agriculture
Farm Service Agency
Stevens County FSA Office
607 East 11th Street
Hugoton, KS 67951-2911
620 544-2261 FAX 620 544-8577

May 5, 2008

Kleinfelder
Attn: Brent A. Peterson
1601 S.W. 41st St
Topeka, KS 66609

RECEIVED
MAY - 7 2008

Re: Potential USDA Programs
Abengoa Bioenergy Hybrid of Kansas
Hugoton, Stevens County, Kansas

Dear Mr. Peterson:

In regards to your letter dated April 30, 2008, I have reviewed the proposed Biorefinery site location in the north half of the southwest quarter and the north half of Section 18, Township 33 South, Range 37 West.

At this time in our agency, there are no USDA programs that these sites are subject to.

If additional information is needed, please contact me.

Sincerely,

Tia Bell

Tia Bell,
County Executive Director

Appendix E

National Historic Preservation Act (NHPA) Section 106 Phase II Archaeology Investigation Kleinfelder, Inc. Abengoa Ethanol Plant/Properties

NATIONAL HISTORIC PRESERVATION ACT (NHPA) SECTION 106
PHASE II ARCHAEOLOGY INVESTIGATION
KLEINFELDER, INC. ABENGOA ETHANOL PLANT/PROPERTIES
HUGOTON, STEVENS COUNTY, KANSAS

KSR&C NO. 07-12-046

US COE PROJECT

Prepared for:
KLEINFELDER, INC.
7802 Barton
Lenexa, Kansas 66214

Prepared by:
K&K ENVIRONMENTAL LLC
23184 151st Street
Leavenworth, Kansas 66084

10 July 2008

K&K Project No. 003039

ABSTRACT

A phase II cultural resources investigation was conducted in May-June 2008 by K&K Environmental LLC (K&K) 36 CFR 61-qualified cultural resources staff on a portion of the proposed Abengoa Ethanol Plant and Properties project site, as herein described, located in the vicinity of Hugoton, Stevens County, Kansas. The Kansas State Historical Society (KSHS) Historic Preservation Office determined "...a portion of the proposed project area should be surveyed by a professional archeologist prior to beginning construction, as it is in an area of high and/or moderate archeological potential which has never undergone an archeological survey." The portion for which a survey was requested contains a playa basin.

The records review disclosed no evidence of previously reported significant cultural resources likely to be threatened by the construction of the proposed project. There are no KSHS-recorded sites located on or immediately adjacent to the proposed project site or within an actionable radius of the project area, per research conducted by KSHS Records Manager. Regardless, based on the presence of a shallow playa basin, an intensive field investigation was conducted consisting of a systematic surficial walkover and a series of screened shovel tests on the property (presently under cultivation). **No cultural materials were discovered during the investigation of the proposed Abengoa Ethanol Plant and Properties project site indicative of a prehistoric or early historic occupation.**

Based on the results of this Phase II investigation, it is unlikely the proposed project will result in adverse effects on the cultural resources of Kansas. It is recommended, therefore, that the construction project, as proposed, be permitted to proceed, with the qualification that buried cultural resources may always be exposed by trenching or below-grade excavation. If such should occur, it is strongly recommended that all construction activity cease within an appropriate radius (no less than 50') until the exposed cultural resources be examined by a 36 CFR 61-qualified archaeologist and KSHS staff notified (immediate notification strongly recommended @ 785-272-8681, ext. 214).

TABLE OF CONTENTS

PHASE II INVESTIGATION

Identification:	Abengoa Ethanol Plant and Properties	
Project:	Construct ethanol production plant with associated facilities/utilities/amenities	
Location:	±NW¼ Sec. 17, T33S, R37W in Stevens County, Kansas (also includes a triangular-shaped portion within the SW¼ Sec. 17, as shown herein - no precise legal description provided)	
Quadrangle(s):	USGS Hugoton, KS 7.5-minute series quadrangle map	
UTM Coordinates:	Northeast corner:	Zone 14: 289959 E; 4117951 N (NAD83)
	Northwest corner:	Zone 14: 289151 E; 4117987 N (NAD83)
	Southwest corner:	Zone 14: 289141 E; 4117118 N (NAD83)
	Southeast corner:	Zone 14: 289938 E; 4117301 N (NAD83)
Elevation:	Northeast corner:	3124' amsl
	Northwest corner:	3127' amsl
	Southwest corner:	3123' amsl
	Southeast corner:	3123' amsl
	Playa basin interior:	3113' amsl
Soil Association:	(1) Belfon loam, 0 to 1 percent slopes (primarily west perimeter of property and east of depression/basin) (2) Canina loam, 0 to 1 percent slopes (linear depression/basin) (3) Vorhees fine sandy loam, 1 to 3 percent slopes (east perimeter of property)	
Nearest Water:	Playa basin only; no perennial stream within a one-mile radius	
Acreage:	±170 acres	

Location and Setting

The project area investigated is a ±170-acre site located generally in central Stevens County, west of the City of Hugoton, in the southeast quadrant of the intersection of Road 11 and Road P and lying north of the BNSF Railroad right-of-way - excluding a small parcel of realty utilized for oil/gas-use purposes, accessed via and fronting on Road 11, as shown herein on Photograph Nos. 2 and 7. The majority of the project area appears to have previously been disturbed by agricultural practices (cultivation). Further, a deep water well spigot and pump are centrally located within the project area from which a ±1,120'-length, seven-section, center pivot, wheeled irrigation system is operated on the subject tract.

In general, the subject property consists of a relatively level, minimally dissected upland with a north-south trending depressional area or playa basin situated centrally within the interior of the property. Elevation of the project area ranges from 3113' amsl (interior of linear depression/playa basin) to 3127' amsl at the northwest corner (intersection of Road P and Road 11). No areas of undisturbed property appear to remain within the proposed project area. The project site is located generally in the NW¼ of Section 17, Township 33 South, Range 37 West, as shown on the 7.5-minute series USGS quadrangle map: Hugoton, KS (also includes a triangular-shaped portion within the SW¼ Sec. 17 - no precise legal description provided). Adjoining properties located to the west (beyond Road 11 right-of-way), north (beyond Road P right-of-way), east, and south (beyond the BNSF Railroad right-of-way) are agricultural-use tracts (under cultivation).

Physiographically, the proposed project site is located within the southern High Plains section of the Great Plains physiographic province, an area of semi-arid plains and vast flatlands with playa basins interspersed throughout. In the project area, agricultural practices depends almost exclusively on the underlying Ogallala aquifer for irrigation, in that no perennial waterways are located in proximity to the subject property. The historic vegetation of the proposed ethanol plant site is identified by Kuchler as sandsage-bluestem.

Per NRCS Soil Survey of Stevens County, Kansas (2006), most of the soils in this region developed from sediments deposited in Pleistocene and Recent epochs. The parent materials are mainly loess, eolian sand, and recent alluvium. As to the project area, multiple soil classifications are noted, including (1) *5210 - Belfon loam, 0 to 1 percent slopes*; (2) *5205 - Canina loam, 0 to 1 percent slopes*; and (3) *1611 Vorhees fine sandy loam, 1 to 3 percent slopes*.

The *Belfon* soils consist of very deep, well drained soils that formed in loamy, eolian loess deposits of Holocene age. Permeability is moderate. This soil classification is located generally to the east and west of the centrally-located linear depressional area/playa basin.

The *Canina* classification consists of very deep, well drained soils that formed in loamy, calcareous, eolian loess deposits of Holocene age. These soils are typically located on nearly level to very gently sloping plains. Permeability is moderate. This soil classification is relegated to the north-south trending depressional area (includes the playa basin) located between areas comprised of *Belfon* soils to the east and west.

The *Voorhees* series consists of very deep, well drained soils that formed in calcareous, loamy eolian sediments of late Pleistocene to Holocene age. These soils are on very gently to gently sloping plains. Permeability is moderate. This soil classification is located generally along the east perimeter of the property being investigated.

Site Disturbance Discussion

Disturbance of the project area was documented using landowner interview (conducted by Kleinfelder, Inc.), aerial photography, topographical maps, and published Stevens County soil surveys. Aerial photographs from 1983, 1997, 2002, and 2006 are provided herein. Further, the aerial photographs contained in the Stevens County, Kansas Soil Surveys of 1958 and 2006 were reviewed. The 1974 USGS 7.5-minute series topographical map was reviewed and is presented herein (Figure No. 1). The following observations from the photographs and maps are provided:

1958 Stevens County Soil Survey aerial photograph (black/white - 1" = 1,667')**:** The railroad right-of-way is present to the south and Road P (current designation) is shown to the north. Some ponding is evident on the subject property (note: an open diamond symbol is shown in the bottom of the playa basin identified as a “small depression that is crossable with tillage instruments.” The subject site and adjacent areas are being used for hay production and row-crops. The soil survey map sheet indicates approximately two acres within the depressional area are subject to ponding.

1974 topographical map (1" = 2,000')**:** The map portrays a squared open water area within the depressional area. Approximately ten acres have been fenced in the west central portion of the NW¼ Section 17. County roads are shown along both the north and west boundary of the project site; the railroad right-of-way is shown along the south boundary.

1983 aerial photograph (black/white - 1" = 1,000')**:** An excavated pond is shown within the depressional area/basin and the adjacent fields in the NW¼ Section 17 are being flood irrigated. Some leveling/grading and/or benching of the SW¼ Section 17 has occurred (based on contours from the 1974 USGS topographical map the bench was likely made in the early 1970s).

1997 aerial photograph (black/white - 1" = 750')**:** A four-sided excavated/bermed pond is shown within the depressional area/basin with small trees and/or structures shown surrounding. A center pivot irrigation system is shown to the north in Section 8. A gas well is present in the SW¼ NW¼ Section 17 and agricultural-use development is shown in the SE¼ Section 18 along the railroad right-of-way.

2002 aerial photograph (black/white - 1" = 750')**:** The excavated/bermed pond noted above is still present with trees and/or small structures shown surrounding. Adjacent fields are being flood irrigated.

2006 aerial photograph (color)**:** A center pivot irrigation system has been installed in the NW¼ Section 17. The four-sided/squared bermed containment pond utilized for irrigation return water collection has been removed and multiple east-west trending berms have been constructed in the midst of the depressional area/playa basin for support as to the center pivot irrigation wheel tracks. It appears field corners in the NW¼ Section 17 are being flood irrigated.

2006 Stevens County Soil Survey (black/white - 1" = 2,000')**:** The depressional area/playa basin is mapped as a "borrow pit."

Landowner interview (conducted by Kleinfelder, Inc.; text obtained subsequent to archaeological investigation testing)**:** Section 17 was purchased by Abengoa from Fred Walkenmeyer. Mr. Walkemeyer was interviewed on 29 May 2008 concerning historic activities within Section 17. Mr. Walkemeyer, currently retired, farmed in the Hugoton area for several decades. Mr. Walkenmeyer indicated that the subject site has "always" been used for agricultural purposes and that he had farmed the project site during his adult lifetime. Mr. Walkenmeyer reported that 35 years ago the bottom of the playa basin had been excavated to approximately five feet below grade to produce an irrigation return water pond, the excavated soil being used to construct the four-sided berm, as shown on the aerial photographs. Mr. Walkenmeyer further reported that additional earth-moving/leveling activities were completed in other parts of the section. Mr Walkenmeyer provided the irrigation return water pond berms were bulldozed four years ago into the previously excavated pit and that an approximate four feet of additional fill material was placed in the bottom of the playa basin to at-grade levels (earth obtained from elsewhere in Section 17). The elevated center pivot wheel track berms were constructed two years ago utilizing soil (and ballast) removed from the higher elevation areas of Section 17 (wheel tracks raised approximately three feet above the basin floor, as shown herein).

To the extent tested by relatively shallow screened shovel tests (30-40cm), the soils within and surrounding the depressional area/playa basin do not conform with the profiles as presented in the NRCS Soil Survey of Stevens County (2006).

Survey Objectives and Methodology

The nominal objectives of the Phase II cultural resources investigation are to:

1. Locate and identify prehistoric and historic sites within (or perhaps adjoining) the proposed project boundaries;
2. Gather data to be used in the evaluation of the significance of each identified cultural resource;

3. Provide a preliminary assessment and recommendation of eligibility for nomination to the NRHP for each identified cultural resource in accordance with 36 CFR 60.4; and
4. Identify the impact proposed construction will have on each identified cultural resource and make recommendations for appropriate mitigation strategies.

The project area, as identified by KSHS for survey, was subjected to a ±100 percent walkover by a two-person team, walking transects spaced at three meter intervals. The site perimeters were clearly identified. The overall surface visibility was considered exceptional within the project area (in excess of 90 percent) - except for the un-cultivated, vegetated roadbed rights-of-way, as shown herein to the north, west, and south. Nevertheless, in an effort to more capably examine the proposed project site for the presence of cultural resources, a series of screened subsurface shovel tests was conducted. The testing methodology primarily was anchored to the limits of the depressional area; tests were excavated at ±30m intervals around the depressional area on the perceived rim (the area extending outward from the depressional or playa basin) and, further, multiple tests were excavated within the limits of the depressional area on an east-west grid spaced at 30m intervals, as shown herein.

Literature / Records / File Search

Archaeological evidence recovered from the state of Kansas represents every major culture period of human occupation in North America, including some of the earliest recorded Amerindian occupations and European incursions. These periods are divided into regional cultural complexes as stipulated by certain localized manifestations. The generally-accepted cultural sequence for the state of Kansas consists of the following:

Paleoindian period	10,000 to 7,000 BC
Archaic period	7,000 BC to AD 1
Early Ceramic period	AD 1 to 1000
Middle Ceramic period	AD 1000 to 1500
Late Ceramic period	AD 1500 to 1800
Historic period	AD 1541 to present

As to the Historic period, the area within which the project site is located was primarily occupied by the present-day Apache Tribe of Oklahoma, the Comanche Nation of Oklahoma, the Kiowa Tribe of Oklahoma, and the Wichita and Affiliated Tribes. The Pawnee Nation of Oklahoma has also requested notice of federal oversight projects located within the area, in that their pre-historic meanderings traversed the area from eastern Oklahoma to western Nebraska. All tribal groups noted have been solicited for information regarding the location of religious or otherwise historically significant sites within the vicinity of the proposed project corridor, per consultation with Kleinfelder, Inc. No responses/identified concerns have been received and/or forwarded the Consultant. Should tribal responses prove forthcoming, KSHS and project managers will be so informed by the Consultant. Any specific concerns will be promptly noted and forwarded to responsible personnel along with recommendations by the Consultant, if warranted. Should responses be received by the identified tribes subsequent to the production of this report, requesting an archaeological survey be conducted, a copy of this report will be forwarded to the tribal respondent for their review and comment.

As to the historic European excursions into the general area, the earliest known treks into and through the area were made by such notable explorers as Don Francisco Vásquez de Coronado in ca. 1541 and Don Juan de Oñate in ca. 1601. Early-day American personnel in the area include the government-financed explorations of Captain Zebulon Pike (1806) and the detachment headed by Lieutenant John R. Bell of the

Stephen H. Long expedition in 1820. These explorations were followed by the trappers and traders, including Jacob Fowler in ca. 1821-1822 and Jedediah Strong Smith in ca. 1824-1831, who, in turn, were followed by traders over the Santa Fe Road, the U.S. Army to protect the traders, the settlers, railroad surveyors, and the town builders, all of which provide the basis for research questions as to the proposed project area.

The files of the Kansas State Historic Society in Topeka were examined by the Cultural Resources Division Records Manager to ascertain whether any KSHS-recorded sites are located in the project vicinity. As noted above, no previously-recorded sites are located within the proposed project site or adjacent thereto, or within an actionable radius of the project area. Indeed, no sites have been recorded within a one-mile radius of the project site (see attached correspondence).

Research Biases

As noted above, the project area is bounded by vehicular roads on the west and north and by the BNSF Railroad right-of-way to the south. The subject property is an agricultural-use tract (cultivated), excluding one small parcel accessed via Road 11 to the west (an oil/gas pad site and tank site). Predominant activity within the immediate area appears to be agricultural (primarily cultivated tracts), although multiple gas wells are noted throughout the vicinity. Additional developmental activity (both historic and ongoing) in the project vicinity includes the construction/maintenance of farm roads/driveways and stormwater channels, construction of stock impoundments, and construction of farm-related buildings, etc. All evidence obtained reflecting the activities of the current occupation of the subject was discounted as relevant material in this investigation.

Archaeological Investigation

The investigation of the Abengoa Ethanol Plant and Properties project area, comprising ±170 acres of cultivated property, was conducted by a two-person team over a multi-day period in May-June 2008. The investigation, utilizing both subsurface and opportunistic surficial survey methodologies, did not result in the finding of cultural material or other evidence of cultural activity indicative of a prehistoric or early historic occupation. No mechanized survey instruments were utilized (magnetometers, metal detectors, auger/probes, etc.).

As to lithic material, an abundance of ballast material is present within the playa basin, determined to have been placed thereon to support the center pivot irrigation system wheel track (multiple tracks bisecting the linear basin, as shown herein). The ballast material appears similar to that located along the south boundary of the property, adjacent to the BNSF Railroad right-of-way. No lithic material exhibiting cultural manifestations was found. No evidence of chert or cherty limestone or other lithic material capable of being utilized for the crafting of tools was noted.

Architectural / APE Investigation

No historic properties were noted within an actionable radius of the project area (none located on adjoining properties).

Native American Consultation

The cultural resources staff of the Apache Tribe of Oklahoma, the Comanche Nation of Oklahoma, the Kiowa Tribe of Oklahoma, the Pawnee Nation of Oklahoma, and the Wichita and Affiliated Tribes were solicited for information regarding the presence of "religious sites" on or adjacent to the proposed construction project site by Kleinfelder, Inc. If religious or otherwise historically significant sites are subsequently identified by those tribes either within or adjacent to the proposed project site, the impact of the proposed construction on the identified site will be assessed and KSHS notified. Should a tribal response be subsequently received by the Consultant requesting an archaeological survey of the proposed construction project site, a copy of this summary Phase II report will be forwarded to the tribal entity requesting the survey.

Source Material

1. EDR Historical Topographic Map Report (attached);
2. EDR Aerial Photo Decade Package (attached);
3. EDR NEPA Check Historic Sites Map (attached);
4. Kansas Geological Survey, Geologic Map of Kansas (1991);
5. Kleinfelder, Inc. (Multiple maps/figures/text inserts);
6. Kuchler, A.W., "The Vegetation of Kansas on Maps," *Transactions, Kansas Academy of Science*, LXXII, 141-66;
7. NRCS "Soil Survey of Stevens County, Kansas" (2006) @ *http://www.soildatamart.nrcs.usda.gov/Manuscripts/KS189/0/Stevens_KS.pdf*;
8. Plattner, Tom, "Abengoa / Hugoton Wetland Survey" (2008);
9. Socolofsky, Homer E. and Huber Self, Historical Atlas of Kansas (1988);
10. USDA NRCS Online Seamless Soil Survey @ *www.websoilsurvey.nrcs.usda.gov*;
11. US Topographic Maps: Hugoton, KS 7.5-minute series quadrangle (1974/1981).

CONCLUSION / RECOMMENDATION

Based on the results of this Phase II investigation, it is unlikely construction of the proposed project will result in an adverse effect on the cultural resources of Kansas. **No cultural materials were discovered during the investigation of the Abengoa Ethanol Plant and Properties project site indicative of a prehistoric or early historic occupation.** It is recommended, therefore, that the project, as proposed, be permitted to proceed with construction, with the qualification that buried cultural resources may always be exposed by trenching or below-grade excavation. If such should occur, it is strongly recommended that all construction activity cease within a meaningful radius until the exposed cultural resources be examined by a 36 CFR 61-qualified professional archaeologist and KSHS staff notified (immediate notification strongly recommended @ 785-272-8681).

____

Principal Investigator Date

FIGURES

PHOTOGRAPH LOG

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 1
Comments: View NE.
View of interior of project area from vantage near southwest corner (intersection of Road 11 and BNSF Railroad track bed).

Photo No: 2
Comments: View N.
View of west boundary of project area from vantage near southwest corner. Note oil/gas facilities within area excluded from survey.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 3
Comments: View ENE.
View of south boundary of project area from vantage near southwest corner (intersection of Road 11 and BNSF Railroad track bed).

Photo No: 4
Comments: View E.
View of interior of project area from vantage near southwest corner along Road 11 (south of oil/gas cut-out parcel).

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 5
Comments: View E.
View of interior of project area from vantage on Road 11. Note presence of playa at center of photograph (location of center pivot of irrigation system).

Photo No: 6
Comments: View E.
View of north boundary of project area from vantage near northwest corner of Road 11/Road P intersection.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

K&K ENVIRONMENTAL

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 7
Comments: View S.
View of west boundary of project area from vantage near Road 11/Road P intersection. Note oil/gas cut-out parcel.

Photo No: 8
Comments: View S.
View of interior of project area from vantage on Road P.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

K&K ENVIRONMENTAL

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 9
Comments: View E.
Additional view of north boundary of project area from vantage on Road P.

Photo No: 10
Comments: View S.
View of interior of project area. Note playa lake at center of photograph. Note constructed "wheel path" dividing the playa generally east to west.

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 11
Comments: View --.
View of interior of project area, south of Road P. Note excellent surficial visibility.

Photo No: 12
Comments: View S.
View of shovel test location north of playa basin. Note elevated center pivot irrigation "wheel path" dividing the playa basin beyond..

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

K&K ENVIRONMENTAL

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 13
Comments: View N.
View of interior of project area from vantage within playa basin. Road P located beyond. Note excellent surficial visibility.

Photo No: 14
Comments: View S.
View of interior of playa basin. Note elevated center pivot irrigation "wheel path" dividing the playa basin. Flags denote shovel test locations.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 15
Comments: View N.
View of representative surficial visibility within playa basin.

Photo No: 16
Comments: View W.
View of interior of playa basin. Note elevated center pivot irrigation system. Flags denote shovel test locations.

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 17
Comments: View E.
View east from vantage within interior of playa basin, north of center pivot irrigation wheel path.

Photo No: 18
Comments: View N.
View north from vantage within interior of playa basin, north of center pivot irrigation wheel path.

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 19
Comments: View E.
View of constructed/elevated wheel path of center pivot irrigation system dividing the playa basin.

Photo No: 20
Comments: View S.
View south from vantage within interior of playa basin, south of center pivot irrigation wheel path.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 21
Comments: View SW.
View southwest from vantage within southern portion of playa basin.

Photo No: 22
Comments: View W.
View west from vantage within interior of southern portion of playa basin.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

K&K ENVIRONMENTAL

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 23
Comments: View N.
View north from vantage within southern portion of playa basin. Road P located beyond to north.

Photo No: 24
Comments: View--.
View of interior of southern portion of playa basin. Note ballast material utilized to elevate wheel path bisecting the playa basin.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 25
Comments: View --.
Additional view of interior within southern portion of playa basin. Note ballast material utilized to elevate wheel path of center pivot irrigation system.

Photo No: 26
Comments: View NNE.
View of shovel test locations along playa basin rim in foreground.

K&K ENVIRONMENTAL LLC
PHOTOGRAPHIC LOG

K&K ENVIRONMENTAL

Project: Abengoa Ethanol Plant and Properties
Location: SE Intersection Road 11/Road P
Hugoton, Stevens County, Kansas
±NW¼ Section 17, Township 33 South, Range 37 West
Client: Kleinfelder, Inc.

Photo No: 27
Comments: View --.
View of presumed ballast material located on surface within project area.

Photo No: 28
Comments: View --.
View of presumed ballast material located on surface within project area.

CORRESPONDENCE / DOCUMENTATION

KANSAS

Kansas State Historical Society
Cultural Resources Division

KATHLEEN SEBELIUS, GOVERNOR

June 16, 2008

Mark W. Kelly
K&K Environmental LLC
23184 151st Street
Leavenworth KS 66048

Ref file search: **Stevens Co** – Sec 17, T33S, R37W; **Johnson Co** – Sec 5, T12S, R25E; Sec 34, T14S, R25E; and **Jefferson Co** – Sec 14, T11S, R18E

Dear Sir:

This letter is in response to your request for information. This is **NOT A CULTURAL RESOURCES CLEARANCE LETTER**; it does not represent consultation with the State Historic Preservation Office (SHPO). Correspondence for the SHPO should be addressed to:

Jennie Chinn
State Historical Preservation Officer
Kansas State Historical Society
6425 SW 6th Ave.
Topeka, KS 66615-1099

You may also call the Preservation Archeologist, Tim Weston, at (785) 272-8681 ext. 214 for more information.

Upon review of the sections you requested, I found no recorded/reported sites within Sec 17, T33S, R37W or Sec 34, T14S, R25E. There is one site recorded in a section adjoining Sec 5, T12S, R25E – 14JO1408 in Sec 12. There are three (3) sites in sections adjoining Sec 14, T11S, R18E. They are 14JF383 in Sec. 12 and 14JF29 and 357 in Sec 23. I am attaching copies of those site forms to this e-mail.

If you need more information, or if I can be of further assistance, please feel free to contact me at (785) 272-8681 ext. 268.

Sincerely,
Anita Frank
Records Manager

KANSAS

KSR&C No. 07-12-046

Kansas State Historical Society
Jennie Chinn, *Executive Director*

KATHLEEN SEBELIUS, GOVERNOR

December 7, 2007

Tom Plattner
Natural Resources Professional
Kleinfelder, Inc.
7802 Barton
Lenexa, Kansas 66214

RE: Abengoa Ethanol Plant and Properties
City of Hugoton
Stevens County

Dear Mr. Plattner:

The Kansas State Historic Preservation Office has reviewed its cultural resources files for the area of the proposed project as described in your e-mail message of November 28, 2007 in accordance with 36 CFR 800. A portion of the proposed project area should be surveyed by a professional archeologist prior to beginning construction, as it is in an area of high and/or moderate archeological potential which has never undergone an archeological survey. Our area of concern (as noted on the attached maps) is the northern portion of the area marked "Additional Land Purchase". According to our records, this area contains a shallow playa basin, which on the High Plains can be a topographic setting conducive to archeological sites

Any archeologist meeting the Minimum Professional Qualifications of this office as outlined in *The State Historic Preservation Officer's Guide For Archeological Survey, Assessment, and Reports* (SHPO's Guide), is eligible to perform the requested work. A list of archeological contractors meeting these standards is available from our web site at http://www.kshs.org/resource/section106home.htm. Two **unbound** copies of the report documenting the survey, its results, and recommendations for mitigating the effects of construction on archeological sites, if any, should be sent to this office.

This information is provided at your request to assist you in identifying historic properties, as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional information regarding these comments, please contact Tim Weston 785-272-8681 (ext. 214). Please refer to the Kansas Review & Compliance number (KSR&C#) above on all future correspondence relating to this project.

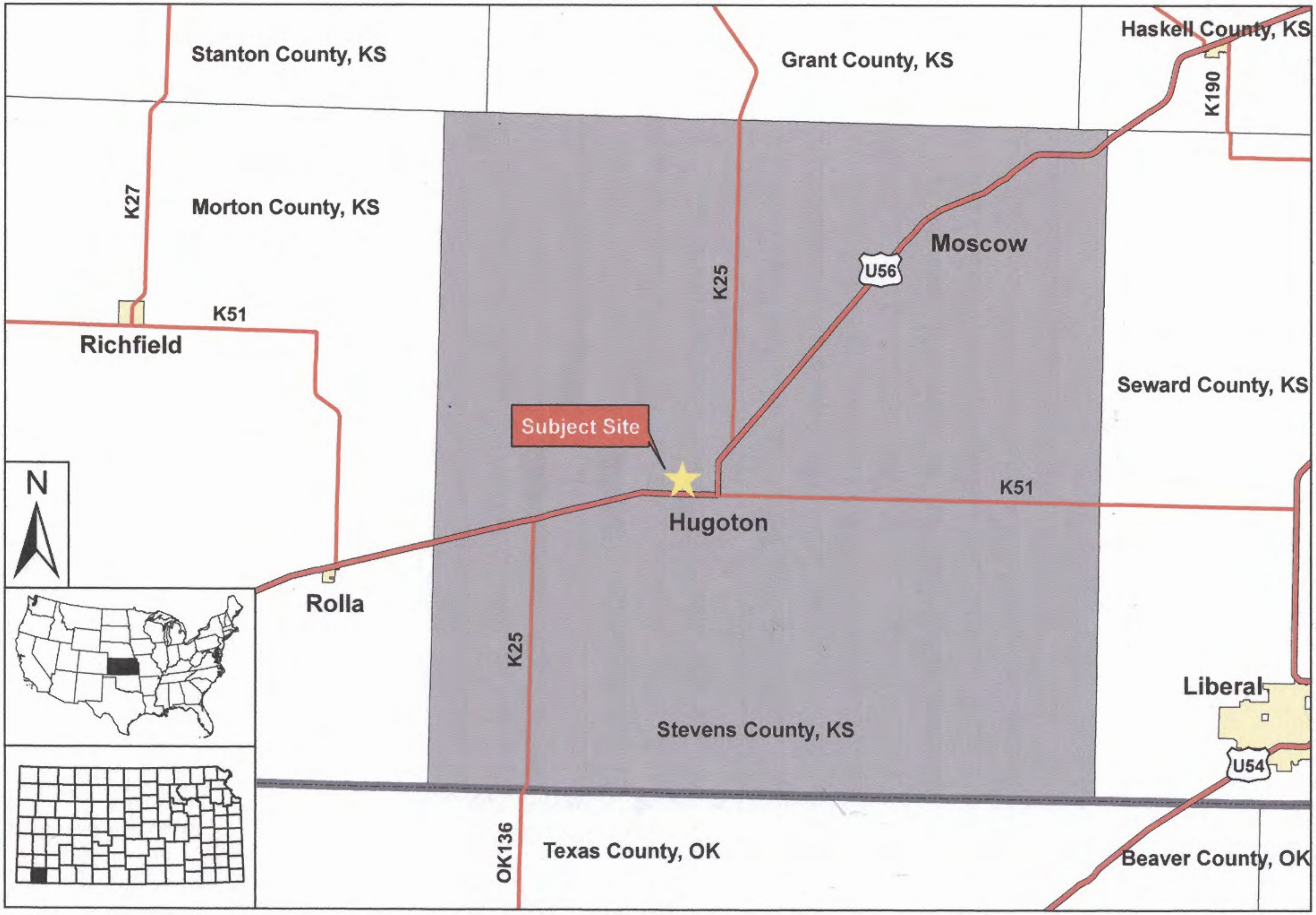
Sincerely,

Jennie Chinn
Executive Director and
State Historic Preservation Officer

Timothy Weston
for

Patrick Zollner
Deputy State Historic Preservation Officer

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 205 • Fax 785-272-8682 • Email jchinn@kshs.org • TTY 785-272-8683
www.kshs.org

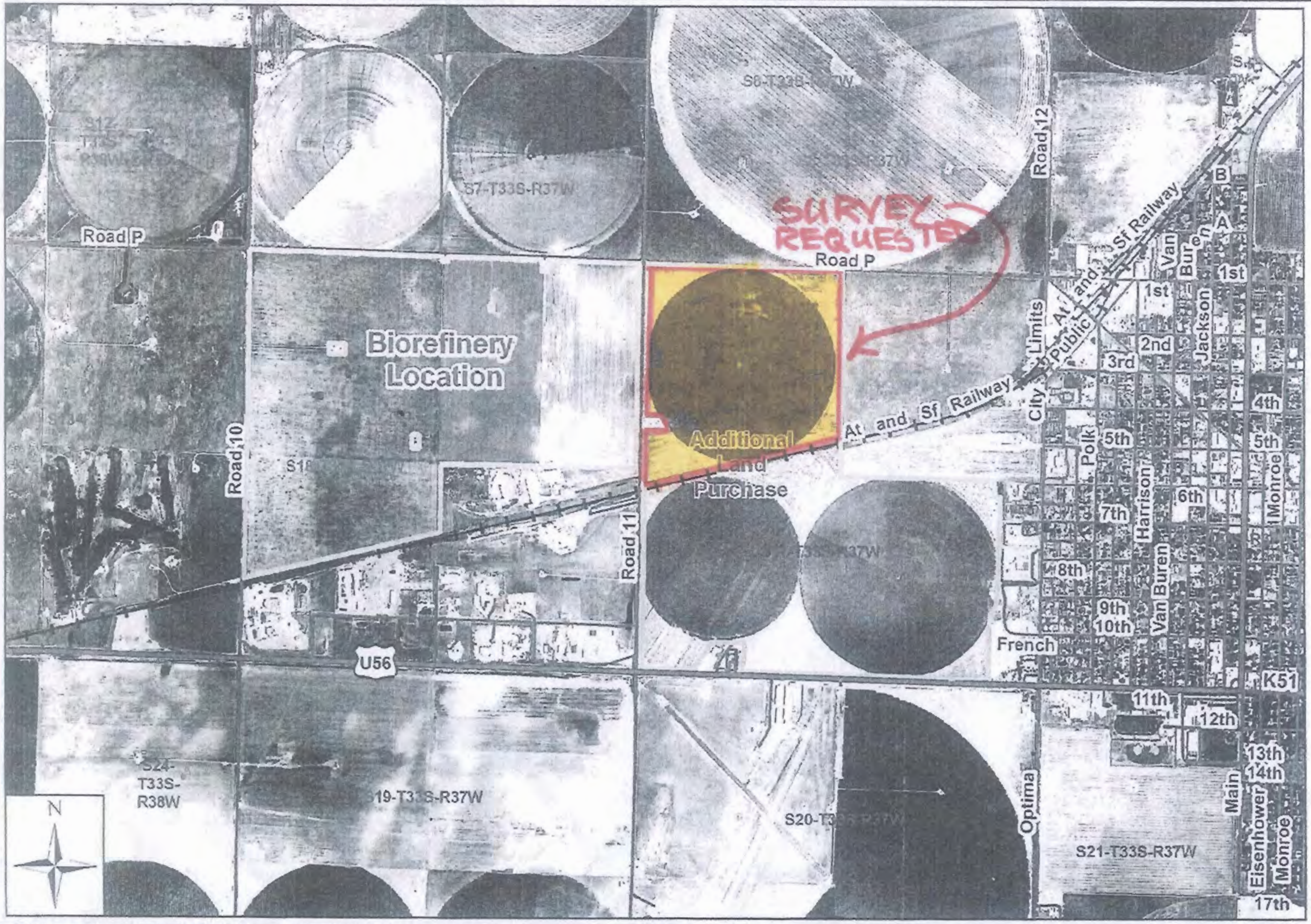


GENERAL SITE LOCATION
Abengoa Ethanol Plant
Hugoton, Kansas

Project Number: 88404
Scale: 1 inch = 5 miles

Figure 1

KLEINFELDER



VICINITY MAP Abengoa Ethanol Plant and Properties Stevens County, Hugoton, Kansas	Project Number: 88404 Scale: 1 inch = 1,646 feet	**Figure 2**	KLEINFELDER

Soil Map–Stevens County, Kansas
(Kleinfelder-Hugoton)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Public Land Survey
- Township and Range
- Section

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Stevens County, Kansas
Survey Area Data: Version 6, Dec 31, 2007

Date(s) aerial images were photographed: 9/24/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Stevens County, Kansas (KS189)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1611	Vorhees fine sandy loam, 1 to 3 percent slopes	11.3	6.2%
5205	Canina loam, 0 to 1 percent slopes	65.3	35.6%
5210	Belfon loam, 0 to 1 percent slopes	107.0	58.3%
Totals for Area of Interest (AOI)		183.6	100.0%

T. 33 S.

(Joins sheet 23)

0 ½

The EDR Aerial Photo Decade Package

Abengoa Ethanol Plant - Hugoton
Abengoa Ethanol Plant - Hugoton
Hugoton, KS 67951

Inquiry Number: 2094949.1

December 11, 2007

EDR® Environmental Data Resources Inc

The Standard in Environmental Risk Information

440 Wheelers Farms Road
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDRs professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:
Aerial Photography December 11, 2007

Target Property:
Abengoa Ethanol Plant - Hugoton Kansas
Hugoton, KS 67951

Year	***Scale***	***Details***	***Source***
1983	Aerial Photograph. Scale: 1"=1000'	Panel #: 2437101-B3/Flight Date: July 10, 1983	EDR
1997	Aerial Photograph. Scale: 1"=750'	Panel #: 2437101-B3/Flight Date: March 10, 1997	EDR
2002	Aerial Photograph. Scale: 1"=750'	Panel #: 2437101-B3/Flight Date: March 26, 2002	EDR


INQUIRY #: 2094949.1
YEAR: 1983
= 1000'
N


INQUIRY #: 2094949.1
YEAR: 1997
= 750'
N


INQUIRY #: 2094949.1
YEAR: 2002
= 750'
N

EDR Historical Topographic Map Report

Abengoa Ethanol Plant - Hugoton Kansas

Abengoa Ethanol Plant - Hugoton Kansas

Hugoton, KS 67951

Inquiry Number: 2081303.4

November 20, 2007

EDR® Environmental Data Resources Inc

The Standard in Environmental Risk Information

440 Wheelers Farms Rd
Milford, Connecticut 06461

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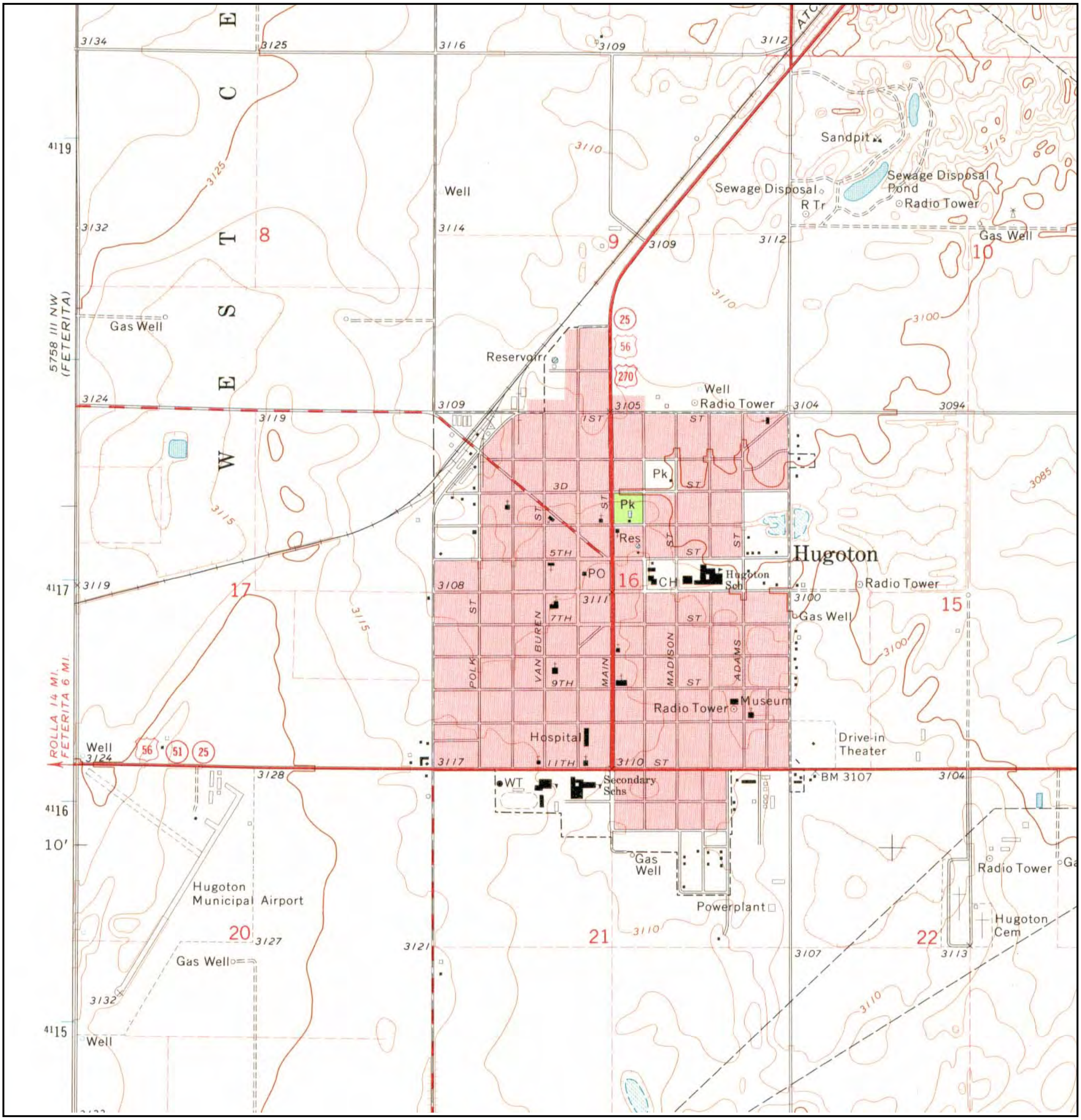
Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



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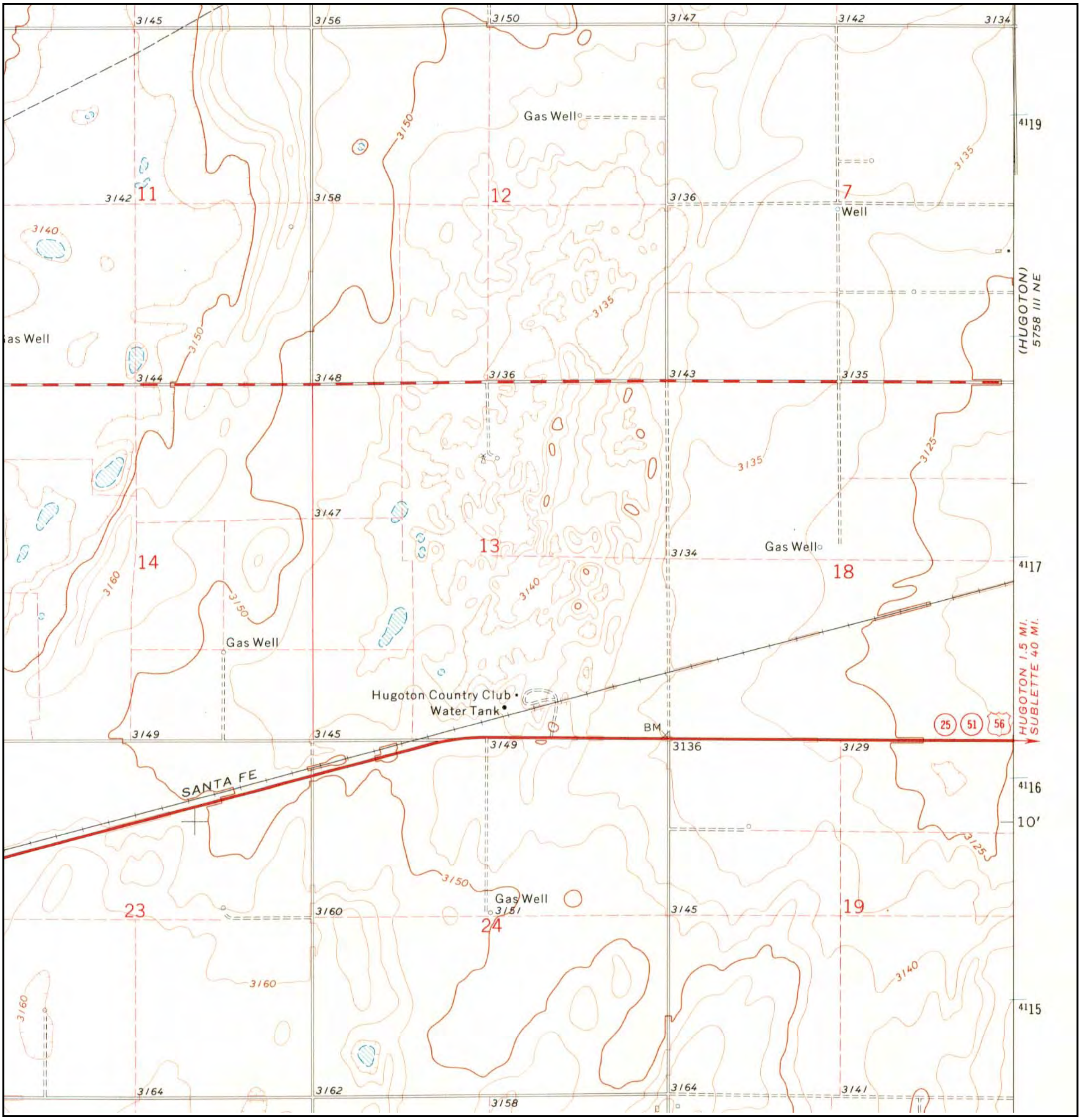
Historical Topographic Map



N	ADJOINING QUAD NAME: Feterita, KS MAP YEAR: 1975 SERIES: 7.5 SCALE: 1:24,000	SITE NAME: Abengoa Ethanol Plant - Hugoton Kansas ADDRESS: Abengoa Ethanol Plant - Hugoton Kansas Hugoton, KS 67951 LAT/LONG: 37.1779 / 101.3688
		CLIENT: Kleinfelder, Inc. CONTACT: Larry Mason INQUIRY#: 2081303.4 RESEARCH DATE: 11/20/2007

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Hugoton, KS 67951

Inquiry Number: 02081303.8r

November 19, 2007

The Standard in Environmental Risk Information

440 Wheelers Farms Road
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

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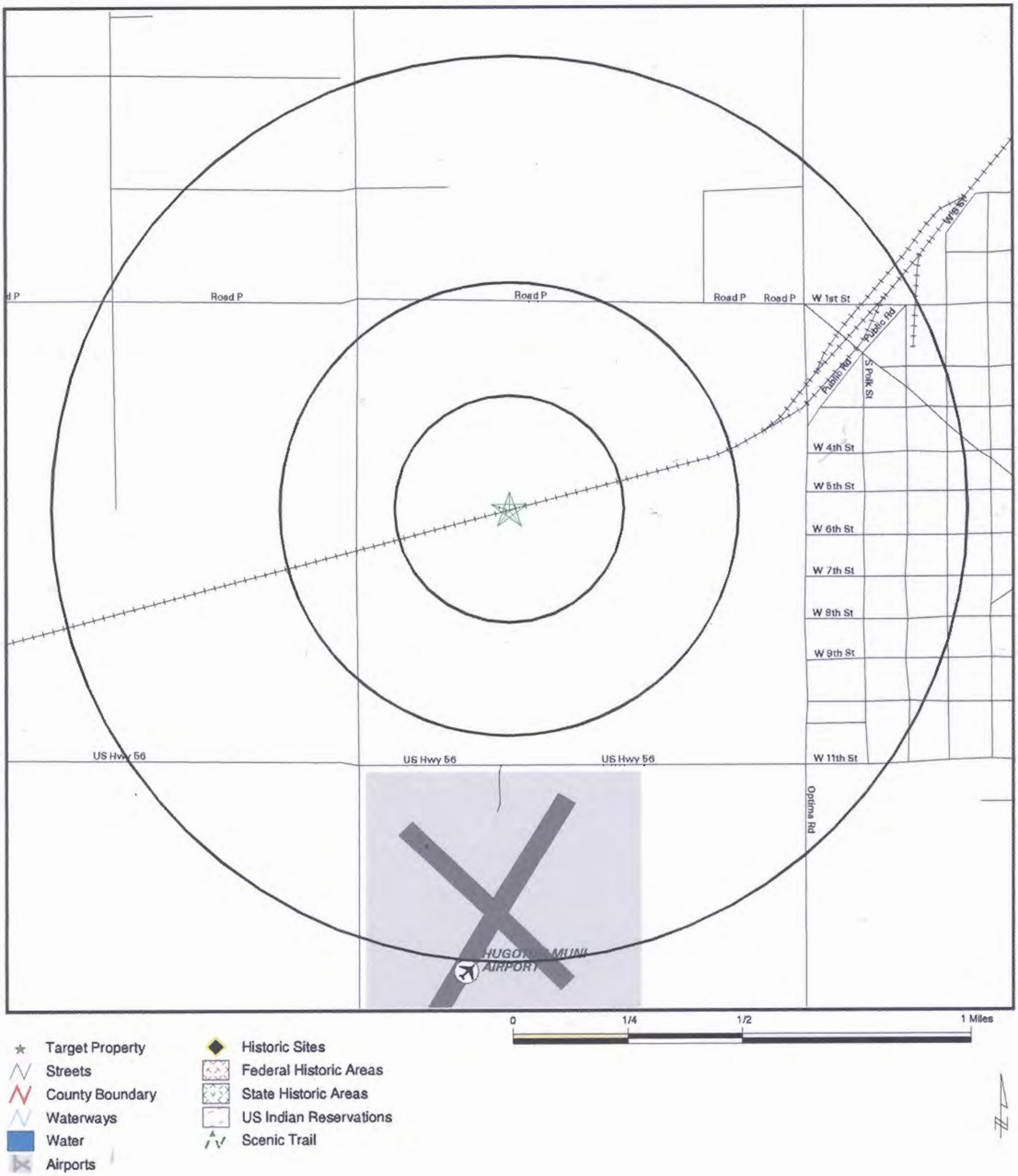
Historic Sites Map



SITE NAME: Abengoa Ethanol Plant - Hugoton Kansas ADDRESS: Abengoa Ethanol Plant - Hugoton Kansas Hugoton KS 67951 LAT/LONG: 37.1779 / 101.3688	CLIENT: Kleinfelder, Inc. CONTACT: Larry Mason INQUIRY #: 02081303.8r DATE: November 19, 2007

Appendix F

Air Quality Impact Assessment

LIST OF ACRONYMS

ABBK	Abengoa Bioenergy Biomass of Kansas
AQIA	Ambient Air Quality Assessment
AQS	EPA Air Quality System
CASTNET	EPA Clean Air Status and Trends Network
DEM	Digital Elevation Model
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Service
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
HAP	Hazardous Air Pollutant
ISC3	Industrial Source Complex
KDHE	Kansas Department of Health and Environment
NAD27	North American Datum of 1927 system
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometers
UTM	Universal Transverse Mercator
WBAN	Weather-Bureau-Army-Navy

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F. AIR QUALITY IMPACT ASSESSMENT

F.1 Executive Summary

This report documents the technical approach and results of an Air Quality Impact Analysis (AQIA) conducted to evaluate the impacts from the proposed Abengoa Bioenergy Biomass of Kansas, LLC (Abengoa Bioenergy) biomass-to-ethanol and -energy production facility. The analysis assessed the ambient air quality impacts of regulated criteria pollutants and odorous compounds. The methods and programs utilized for this analysis follow standard guidance from the U.S. Environmental Protection Agency (EPA) (EPA 2005) and Kansas Department of Health and Environment (KDHE). The AQIA is in support of the *National Environmental Policy Act* (NEPA) environmental impact statement (EIS) in which four scenarios were evaluated:

- Proposed Action with biomass-to-ethanol production and biomass-to-energy production;
- Action Alternative with only biomass-to-ethanol production;
- Proposed Action with grain-to-ethanol production; and
- Action Alternative with grain-to-ethanol production.

The National Ambient Air Quality Standards were used as a basis for evaluating the regulated criteria pollutants and published odor thresholds were used as the basis for evaluating odors. The results of the analysis are summarized in Tables F-1 through F-3a below.

Based on the maximum modeled concentrations for the Proposed Action, Action Alternative, Proposed Action with the grain-to-ethanol facility, and Action Alternative with grain-to-ethanol facility, the results are well below the National Ambient Air Quality Standards. Therefore, impacts to air quality in the Hugoton area would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality.

Modeled concentrations of odorous compounds emitted from the Proposed Action, Action Alternative, and Proposed Action with the grain-to-ethanol facility were less than referenced odor threshold values offsite of the 385-acre (1.6 square kilometers) biorefinery parcel. Additionally, the concentrations of odorous compounds emitted by the Action Alternative with grain-to-ethanol facility would be anticipated to be below the detection threshold levels offsite of the proposed biorefinery because the addition of the grain-to-ethanol facility to the Proposed Action would not increase the odorous compound concentrations significantly; thus, it is not anticipated that the addition of the grain-to-ethanol facility would increase the odorous concentrations of the Action Alternative significantly.

Greenhouse gas lifecycle analyses of the Proposed Action, Action Alternative, and grain-to-ethanol facility were conducted by taking into account the full fuel cycle, starting with feedstock recovery and ending with fuel use in vehicles. The lifecycle greenhouse gas emissions from the Proposed Action, Action Alternative, and grain-to-ethanol facility were compared with a gasoline lifecycle analysis. All three scenarios showed a reduction in greenhouse gas emissions when ethanol produced by the Proposed Action, Action Alternative, or grain-to-ethanol facility was used instead of gasoline in passenger vehicles. When directly replacing gasoline in passenger vehicles for ethanol from the Proposed Action, a 340-percent reduction in greenhouse gas can be achieved; for the Action Alternative, a 39-percent reduction in greenhouse gas can be achieved; and for the grain-to-ethanol facility, a 60-percent reduction in greenhouse gas can be achieved.

Table F-1. Maximum impact assessment results compared with National Ambient Air Quality Standards.

Pollutant	Averaging period	Background concentration[a,b]	Facility impact ($\mu g/m^3$) PA	AA	PA and GTE facility	AA and GTE facility	NAAQS[c]	Impact ($\mu g/m^3$) PA	AA	PA and GTE facility	AA and GTE facility
Carbon monoxide	1-hour	2.0 ppm (2,300 $\mu g/m^3$)	160	820	160	820	35 ppm (40 mg/m^3)	2,500	3,100	2,500	3,100
	8-hour	0.5 ppm (570 $\mu g/m^3$)	62	81	67	81	9 ppm (10 mg/m^3)	630	650	640	650
Nitrogen dioxide	Annual	0.004 ppm (8.0 $\mu g/m^3$)	4.1	4.8	4.8	5.8	0.053 (100 $\mu g/m^3$)	12	13	13	14
Sulfur dioxide	3-hour	0.004 ppm (10 $\mu g/m^3$)	23	34	25	34	0.5 ppm (1300 $\mu g/m^3$)	33	44	35	44
	24-hour	0.003 ppm (8.0 $\mu g/m^3$)	6.7	6.7	6.8	6.7	0.14 ppm (370 $\mu g/m^3$)	15	15	15	15
	Annual	0.001 ppm (3.0 $\mu g/m^3$)	0.82	0.71	0.83	0.72	0.03 ppm (78 $\mu g/m^3$)	3.8	3.7	3.8	3.7
Particulate matter (PM_{10})	24-hour	60 $\mu g/m^3$	39	19	48	27	150	99	79	110	87
	Annual	20 $\mu g/m^3$	8.3	4.6	9.1	6.7	Revoked[d]	28	25	29	27

a. Source: Lavery 2009.
b. Background concentrations are values considered representative for the region based on land use, geography, and exposure.
c. Source: 40 CFR Part 50.
d. The PM_{10} annual standard was 50 $\mu g/m^3$ prior to being revoked by EPA.

AA = Action Alternative.
GTE = grain-to-ethanol (facility).
NAAQS = National Ambient Air Quality Standards.
PA = Proposed Action.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
mg/m^3 = milligrams per cubic meter.
ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.

Table F-2. Threshold and predicted concentrations of odorous compounds emitted by the Proposed Action.

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model concentration ($\mu g/m^3$)	Location of maximum
1,3 Butadiene	990[a]	7.3×10^{-3}	southeast fence line
Acetaldehyde	90[b]	59	south fence line
Acetone	8,500[a]	0.013	north fence line
Acrolein	370[b]	5.9	south fence line
Ammonia	3,600[b]	3.1	north fence line
Benzene	38,000[b]	0.32	southeast fence line
Butane	6,400,000[b]	0.42	north fence line
Carbon disulfide	340[b]	2.3×10^{-3}	south fence line
Carbon tetrachloride	600,000[b]	3.0×10^{-3}	north fence line
Chlorine	230[a]	5.2×10^{-3}	north fence line
Chlorobenzene	3,100[b]	2.2×10^{-3}	north fence line
Chloroform	410,000[b]	1.8×10^{-3}	north fence line
Cumene	39[a]	0.012	south fence line
Dichlorobenzene	1,800[b]	3.1×10^{-5}	north fence line
Dichloromethane	550,000[a]	0.019	north fence line
Ethane	150,000,000[b]	0.62	north fence line
Ethanol	93,000[a]	410	north fence line
Ethylbenzene	10,000[b]	5.7×10^{-3}	south fence line
Ethylene dichloride	24,000[a]	1.9×10^{-3}	north fence line
Formaldehyde	1,000[b]	29	south fence line
Hexane	460,000[b]	0.36	north fence line
Hydrogen chloride	1,100[b]	9.4	north fence line
Methanol	5,500[a]	58	south fence line
Methyl chloroform	650,000[b]	2.0×10^{-3}	north fence line
Naphthalene	200[a]	0.016	southeast fence line
Nitrogen dioxide	730[b]	180	southeast fence line
Pentane	1,200,000[b]	0.52	north fence line
Phenol	150[b]	3.4×10^{-3}	north fence line
Propane	29,000,000[b]	0.32	north fence line
Propylene	39,000[a]	0.48	southeast fence line
Propylene dichloride	1,200[b]	2.2×10^{-3}	north fence line
Styrene	72[a]	0.13	north fence line
Sulfur dioxide	2,900[b]	54	southeast fence line
Toluene	80[a]	0.57	west fence line
Vinyl chloride	7,700,000[b]	1.2×10^{-3}	north fence line
Xylene	1,500[a,c]	0.076	west fence line

Note: Odor threshold values from the references were in units of parts per million (ppm) and converted to $\mu g/m^3$ for ease of comparison. Base reference values are shown in Table F-15.

a. AIHA 1989.

b. Amoore 1983.

c. Lowest value of the three isomers (m-Xylene).

$\mu g/m^3$ = microgram per cubic meters.

Table F-3. Threshold and predicted concentrations of odorous compounds emitted by the Action Alternative.

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model concentration ($\mu g/m^3$)	Location of maximum
1,3 Butadiene	990[a]	8.9×10^{-3}	north fence line
Acetaldehyde	90[b]	73	north fence line
Acetone	8,500[a]	5.8×10^{-3}	south fence line
Acrolein	370[b]	7.3	north fence line
Ammonia	3,600[b]	8.6	south fence line
Benzene	38,000[b]	0.81	north fence line
Biphenyl	5.2[b]	0.14	south fence line
Butane	6,400,000[b]	2.2	south fence line
Carbon disulfide	340[b]	7.5×10^{-3}	north fence line
Carbon tetrachloride	600,000[b]	1.4×10^{-3}	south fence line
Chlorine	230[a]	2.4×10^{-3}	south fence line
Chlorobenzene	3,100[b]	1.0×10^{-3}	south fence line
Chloroform	410,000[b]	8.6×10^{-4}	south fence line
Cumene	39[a]	0.021	north fence line
Dichlorobenzene	1,800[b]	4.8×10^{-5}	south fence line
Dichloromethane	550,000[a]	8.9×10^{-3}	south fence line
Ethane	150,000,000[b]	3.3	south fence line
Ethanol	93,000[a]	330	west fence line
Ethylbenzene	10,000[b]	0.011	north fence line
Ethylene dichloride	24,000[a]	8.9×10^{-4}	south fence line
Formaldehyde	1,000[b]	36	north fence line
Hexane	460,000[b]	0.14	south fence line
Hydrogen chloride	1,100[b]	4.3	south fence line
Methanol	5,500[a]	73	north fence line
Methyl chloroform	650,000[b]	9.5×10^{-4}	south fence line
Naphthalene	200[a]	0.14	north fence line
Nitrogen dioxide	730[b]	1,400	north fence line
	730[b]	640	closest residence
Pentane	1,200,000[b]	2.7	south fence line
Phenol	150[b]	1.6×10^{-3}	south fence line
Propane	29,000,000[b]	1.7	south fence line
Propylene	39,000[a]	2.8	north fence line
Propylene dichloride	1,200[b]	1.0×10^{-3}	south fence line
Styrene	72[a]	0.058	south fence line
Sulfur dioxide	2,900[b]	85	north fence line
Toluene	80[a]	1.1	north fence line
Vinyl chloride	7,700,000[b]	5.5×10^{-4}	south fence line
Xylene	1,500[a,c]	0.21	north fence line

Note: Odor threshold values from the references were in units of parts per million (ppm) and converted to $\mu g/m^3$ for ease of comparison. Base reference values are shown in Table F-15.

a. AIHA 1989.

b. Amoore 1983.

c. Lowest value of the three isomers (m-Xylene).

$\mu g/m^3$ = microgram per cubic meters.

Table F-3a. Summary of Odor Model results for the biorefinery (Proposed Action) and grain-to-ethanol facility.

Odorous compound	Odor threshold value (μg/m³)	Maximum model result (μg/m³)	Location of maximum
1,3 Butadiene	990[a]	7.5×10^{-3}	southeast fence line
Acetaldehyde	90[b]	79	west fence line
Acetone	8,500[a]	0.013	north fence line
Acrolein	370[b]	8.7	southeast fence line
Ammonia	3,600[b]	3.1	north fence line
Benzene	38,000[b]	1.2	west fence line
Butane	6,400,000[b]	2.0	south fence line
Carbon disulfide	340[b]	9.5×10^{-3}	west fence line
Carbon tetrachloride	600,000[b]	3.0×10^{-3}	north fence line
Chlorine	230[a]	5.2×10^{-3}	north fence line
Chlorobenzene	3,100[b]	2.2×10^{-3}	north fence line
Chloroform	410,000[b]	1.8×10^{-3}	north fence line
Cumene	39[a]	0.047	west fence line
Dichlorobenzene	1,800[b]	1.2×10^{-3}	south fence line
Dichloromethane	550,000[a]	0.019	north fence line
Ethane	150,000,000[b]	3.0	south fence line
Ethanol	93,000[a]	890	west fence line
Ethylbenzene	10,000[b]	0.024	west fence line
Ethylene dichloride	24,000[a]	1.9×10^{-3}	north fence line
Formaldehyde	1,000[b]	41	west fence line
Hexane	460,000[b]	1.7	south fence line
Hydrogen chloride	1,100[b]	9.4	north fence line
Methanol	5,500[a]	78	west fence line
Methyl chloroform	650,000[b]	2.0×10^{-3}	north fence line
Naphthalene	200[a]	0.016	southeast fence line
Nitrogen dioxide	730b	180	southeast fence line
Pentane	1,200,000[b]	2.5	south fence line
Phenol	150[b]	3.4×10^{-3}	north fence line
Propane	29,000,000[b]	1.6	south fence line
Propylene	39,000[a]	0.50	southeast fence line
Propylene dichloride	1,200[b]	2.2×10^{-3}	north fence line
Styrene	72[a]	0.13	north fence line
Sulfur dioxide	2,900[b]	56	southeast fence line
Toluene	80[a]	2.4	west fence line
Vinyl chloride	7,700,000[b]	1.2×10^{-3}	north fence line
Xylene	1,500[a,c]	0.26	west fence line

Note: Odor threshold values from the references were in units of parts per million (ppm) and converted to μg/m³ for ease of comparison. Base reference values are shown in Table F-15.

a. AIHA 1989.
b. Amoore 1983.
c. Lowest value of the three isomers (m-Xylene).
μg/m³ = microgram per cubic meter.

F.2 Introduction and Purpose

The U.S. Department of Energy (DOE or the Department) is proposing to provide federal funding to Abengoa Bioenergy Biomass of Kansas, LLC (ABBK) to support the final design, construction, and initial operation of a biomass-to-ethanol and biomass-to-energy production facility (hereafter referred to as the proposed biorefinery). In accordance with DOE [10 Code of Federal Regulations (CFR) Part 1021] and the Council on Environmental Quality regulations (40 CFR Parts 1500 to 1508) that implement NEPA, DOE is required to evaluate the potential environmental impacts of its proposal, whether initiated by DOE or an applicant, because DOE's decision in this instance would constitute a major federal action. Since DOE must decide whether to use federal funds to support the proposed biorefinery, an EIS must be prepared for the proposed biorefinery to evaluate the potential environmental impacts of the Proposed Action, Action Alternative, and No-Action Alternative.

Pursuant to the NEPA requirements, the ambient air quality impacts from the Biorefinery Project site must be evaluated as a component of the affected environment being analyzed for the EIS. This AQIA was performed to support the EIS by evaluating the potential project impacts to the air quality. This is intended to show that sufficient consideration has been given to the preservation of air quality in the vicinity of the proposed project.

The study evaluates operational impacts from regulated pollutants including carbon monoxide, nitrogen dioxide (assuming 100 percent conversion from nitrogen oxides), sulfur dioxide, and particulate matter with an aerodynamic diameter of less than 10 micrometers (PM_{10}). The modeled concentrations of the regulated pollutants will be added to representative ambient background concentrations and then compared to the National Ambient Air Quality Standards in order to demonstrate that the emissions from the proposed biorefinery will not be in excess of the standards and will thus not degrade the existing air quality to unacceptable levels.

In addition to the regulated pollutant impacts, this AQIA addressed impacts of odorous compounds emitted by the proposed biorefinery for aesthetic purposes. The analysis compares modeled concentrations of odorous compounds with odor threshold values published by the American Industrial Hygiene Association (AIHA 1989) and the Journal of Applied Toxicology (Amoore 1983) in order to determine if the compounds would be detectable.

In addition to the regulated pollutant impacts, this AQIA addresses the greenhouse gas lifecycle of the Proposed Action, Action Alternative, and grain-to-ethanol facility. DOE evaluated Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model representations of the Proposed Action, Action Alternative, and grain-to-ethanol facility in order to determine the level of greenhouse gas reduction, if any, that could be achieved by producing and using ethanol in vehicles rather than gasoline.

F.3 Project Background and Location

The Biorefinery Project site would be located adjacent to and west of the city of Hugoton, in Stevens County, Kansas (Chapter 1, Figure 1-1). Land use in the area is primarily agricultural with cropland as the dominant use and grassland as the secondary use. Various grains are grown in the area, providing a diversity of biomass feedstocks and food for large cattle feedlots in the vicinity. The Biorefinery Project site, comprising approximately 810 acres (3.3-square-kilometer) of row-cropped agricultural land, is within an area bordered on the south by U.S. Highway 56/Kansas State Highway 51, County Road 10 to the west, Rural Road P to the north, and Rural Road 12, which is east of the Project site along the western side of Hugoton (KDOT 2008). Grain elevators, an asphalt plant, and an industrial park are located nearby. There is an airport to the south, a golf course and agricultural land to the west, two residences to the northwest, agricultural cropland to the north, and the city of Hugoton (population approximately 3,700) to the east (Chapter 1, Figure 1-2). The proposed biorefinery would be developed on the western 385 acres (1.6 square kilometers) of the site, and the remaining 425 acres (1.7 square kilometers) would act as a buffer between the proposed biorefinery and the city of Hugoton.

The airshed around Hugoton is designated by the EPA as an area that is not shown to pose a threat to human health or the environment for which it is termed unclassified (due to limited data) or in *attainment* of the National Ambient Air Quality Standards for sulfur oxides, carbon monoxide, ozone (as volatile organic compounds), nitrogen oxides, and particulate matter [including particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) and particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}). Activities related to agriculture are anticipated to be the largest contributors of air pollution in this region. Due to the general rural nature of these activities, and based on available air monitoring data, the region is considered to have relatively low levels of air pollution.

F.4 Model Description and Justification

To evaluate the impacts to the existing air quality and to determine if concentrations of odorous compounds would be above detection thresholds, air dispersion modeling was performed using the American Meteorological Society and EPA Regulatory Model (AERMOD) (EPA 2004a, 2009). AERMOD was chosen over simple screening models (that is, SCREEN3) since the facility consists of a complex array of buildings and emission sources that can not be merged into a single emission point per the EPA Guidelines on Air Quality Modeling and thus does not meet the guidelines for modeling using the screening technique (EPA 2005). Additionally, AERMOD was chosen over the traditional Industrial Source Complex (ISC3) model because it has replaced ICS3 as a preferred model for complex industrial sources effective as of December 9, 2006. AERMOD was also chosen as an appropriate model over more advanced and complex models such as CALPUFF since the modeling domain is less than 50 kilometers and the terrain surrounding the facility is not complex. Further, the treatment of the emissions using a Gaussian plume dispersion approach is considered as an acceptable approach for the intended purpose. AERMOD is considered the best state-of-the-practice Gaussian plume dispersion model and provides appropriate characterization of plume dispersion needed for regulatory decision making. The current EPA-approved model version 90292 was implemented using the BREEZE software (version 7.2.3).

For this AQIA, AERMOD was run using the regulatory default modeling options. These options include elevated terrain effects, a calm wind processing routine, and the use of stack tip downwash. It is recognized that the AERMOD program does not address complex chemical transformations that may occur as emissions react in the ambient air. Therefore, it is assumed the analyzed gaseous pollutants act as particles once released. Analyzing dispersion and chemical transformations is a complex process that requires highly advanced modeling methods that go beyond the scope of this analysis.

F.5 Emission and Source Data

Maximum ground-level predicted concentrations are determined by using AERMOD for each regulated pollutant and each applicable averaging time for comparison to the standards. Sources and emissions for the Proposed Action are consistent with those that have been identified for the recent air quality permit application that has been submitted to the KDHE (ABBK 2010a, 2010b). Maximum ground-level concentrations at specific receptors have also been determined by using AERMOD for odorous compounds for comparison to odor threshold values. Tables describing the source parameters and emission rates for the Proposed Action are presented in Attachment B of this appendix, tables for the Action Alternative are presented in Attachment C of this Appendix, tables for the Proposed Action with grain-to-ethanol facility are presented in Attachment D of this Appendix, and tables for the Action Alternative with grain-to-ethanol facility are presented in Attachment E of this Appendix (Salter 2010a).

F.5.1 DESCRIPTION OF OPERATIONS FOR THE PROPOSED ACTION

The proposed biorefinery under the Proposed Action will utilize the enzymatic hydrolysis process to nominally produce up to 19,000,000 gallons (68 million liters) of denatured ethanol per year to be used as biofuel. The enzymatic hydrolysis process will utilize biomass such as corn stover, wheat straw, mixed warm season grasses, and other feedstocks that are locally available. In addition to ethanol production, biomass will be used as a solid fuel to directly fire biomass boilers to produce enough biopower to power the proposed biorefinery and also excess power that can be sold to the regional power grid. The nominal gross power produced at the biorefinery would be 125 megawatts. In addition to using biomass to produce steam, the boilers would use waste resulting from ethanol production including the stillage cake. A portion of the ash produced by the boilers would be pelletized and sold locally to biomass producers as a soil amendment. Table F-4 presents a summary of the emission sources by group and the expected emissions from each source group for the Proposed Action.

Table F-4. Emission sources under the Proposed Action.

Equipment/Process	Expected emissions
Onsite biomass handling and milling (wood and crop residues)	PM, PM_{10}, and $PM_{2.5}$
Enzymatic hydrolysis pretreatment, fermentation, and distillation	VOCs, HAPs, GHGs
Lignin-rich stillage storage and loadout	VOCs and HAPs
Ethanol and denaturant loadout	VOCs, HAPs
Power generation	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Ash storage and handling	PM, PM_{10}, and $PM_{2.5}$
Ash pelletizer dryer	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Cooling towers and air condensers	PM, PM_{10}, and $PM_{2.5}$
Emergency equipment	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Fugitive emissions	PM, PM_{10}, and $PM_{2.5}$, VOCs, HAPs

Source: Salter 2010b.
CO = carbon monoxide.
GHG = greenhouse gas (e.g., carbon dioxide and methane).
HAP = hazardous air pollutant (e.g., acetaldehyde and formaldehyde).
NO_x = nitrogen oxides.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.
PM = particulate matter.
SO_2 = sulfur dioxide.
VOC = volatile organic compound (e.g., ethanol).
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F.5.2 DESCRIPTION OF OPERATIONS FOR THE ACTION ALTERNATIVE

Under the Action Alternative, the proposed biorefinery would nominally produce 12 million gallons (45 million liters) of denatured ethanol and would not provide electricity to the regional power grid. Only 20 megawatts would be generated to operate the proposed biorefinery, with additional electricity purchased from the grid. Because of the reduction in power generation under the Action Alternative, Abengoa Bioenergy would use only one biomass boiler in the Action Alternative as compared with the four biomass boilers under the Proposed Action. In addition, feedstock would be processed in a gasifier, resulting in syngas that would be used to fire a gas-fired boiler and reduce the proposed biorefinery's demand for natural gas. Further, under the Action Alternative, the amount of biomass that would be shipped to and received by the proposed biorefinery would be less than under the Proposed Action. Under the Action Alternative, the proposed biorefinery would not utilize wood waste as one of the biomass options, nor would the boiler ash be pellitized.

The nominal ethanol production is based on a designed production rate of 12 million gallons (45 million liters) per year on a 350-day annual operating schedule. The maximum ethanol production is based on a maximum potential 10-percent increase in plant efficiency and an operating schedule of 365 days per year, resulting in a maximum annual ethanol production of 14 million gallons (52 million liters) per year. For modeling purposes, emissions are based on the maximum annual production rate.

F.5.3 DESCRIPTION OF OPERATIONS FOR THE GRAIN-TO-ETHANOL FACILITY

The grain-to-ethanol facility would be in addition to the Proposed Action or Action Alternative. The grain-to-ethanol facility will utilize a traditional grain-to-ethanol production process. Nominal production for the grain-to-alcohol facility is based on a designed production rate of 88 million gallons (333 million liters) per year of ethanol produced on a 350-day annual operating schedule. The maximum ethanol production rate is based on a maximum potential 10 percent increase in plant efficiency and an annual operating schedule of 365 days per year, resulting in a maximum annual ethanol production of 96 million gallons (360 million liters) per year. For modeling purposes, emissions are based on the maximum annual production rate.

Solids, termed wet distiller's grains, from the grain-to-ethanol process will be converted to animal feed. The grain-to-ethanol facility would have the capability to dry up to 50 percent of the wet distiller's grains depending on the demand for animal feed. Thus, two possible operational scenarios considered for analysis were the scenario without any drying of the wet distiller's grains, and the scenario with drying the maximum of 50 percent of the wet distiller's grains. The operational scenario with 50 percent dried distiller's grains was chosen for the modeling analysis since the facility-wide emissions would be higher than the operational scenario with 100 percent wet distiller's grains. The scenario with 50 percent dried distiller's grains would have higher emissions because of the operation of the dryer to dry the distilled grains.

While the grain-to-ethanol facility would essentially operate independently of the Proposed Action or Action Alternative, there would be some shared resources such as the haul roads and ethanol loadout equipment. Further, the grain-to-ethanol facility would require steam production separate from that of the Proposed Action or Action Alternative and, therefore, the grain-to-ethanol facility would require additional natural gas-fired boilers. For modeling purposes, the emissions of the Proposed Action or Action Alternative and grain-to-ethanol facility were added together because the biorefinery under the Proposed Action or Action Alternative and the grain-to-ethanol facility would be operating together. Table F-5 shows the combined emission source groups and expected emissions from each source group for the Proposed Action with the grain-to-ethanol facility.

Table F-5. Emission sources of the biomass-to-ethanol and grain-to-ethanol facilities.

Equipment/Process	Expected Emissions
Onsite biomass handling and milling (wood and crop residues)	PM, PM_{10}, and $PM_{2.5}$
Onsite grain handling and milling	PM, PM_{10}, and $PM_{2.5}$
Enzymatic hydrolysis pre-treatment, fermentation, and distillation	VOCs, HAPs, GHGs
Grain fermentation and distillation	PM, PM_{10}, and $PM_{2.5}$, VOCs, HAPs, GHGs
Lignin-rich stillage storage and loadout	VOCs and HAPs
Dried distiller's grains drying, storage and loadout	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Wet distiller's grains storage and loadout	VOCs and HAPs
Ethanol and denaturant loadout	VOCs, HAPs
Power generation	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Ash storage and handling	PM, PM_{10}, and $PM_{2.5}$
Ash pelletizer dryer	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Cooling towers and air condensers	PM, PM_{10}, and $PM_{2.5}$
Emergency equipment	PM, PM_{10}, and $PM_{2.5}$, NO_x, SO_2, CO, VOCs, HAPs, GHGs
Fugitive emissions	PM, PM_{10}, and $PM_{2.5}$, VOCs, HAPs

Source: Salter 2010b.
CO = carbon monoxide.
GHG = greenhouse gas (e.g., carbon dioxide and methane).
HAP = hazardous air pollutant (e.g., acetaldehyde and formaldehyde).
NO_x = nitrogen oxides.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.
PM = particulate matter.
SO_2 = sulfur dioxide.
VOC = volatile organic compound (e.g., ethanol).

F.5.4 EMISSIONS

This AQIA analyzed four criteria pollutants using the air dispersion model: carbon monoxide, PM_{10}, nitrogen dioxide, and sulfur dioxide. Each of the four pollutants was modeled for the averaging periods for which federal air quality standards exist, with the exception of the 1-hour nitrogen dioxide standard. The emission rates used in the model assume the proposed controls and best management practices are in place and operational. Annual averages for nitrogen dioxide were evaluated using a Tier 1 approach assuming 100-percent conversion from nitrogen oxides. In addition, odorous compounds, generally volatile organic compounds, hazardous air pollutants, nitrogen dioxide, and sulfur dioxide, were analyzed. Table F-6 summarizes the total facility potential to emit (including fugitive emissions) for the Proposed Action; Table F-7 summarizes the total facility potential to emit (including fugitive emissions) for the Action Alternative; Table F-8 summarizes the total facility potential to emit (including fugitive emissions) for the Proposed Action with the grain-to-ethanol facility; and Table F-8a summarizes the total facility potential to emit (including fugitive emissions) for the Action Alternative with the grain-to-ethanol facility.

Although the dispersion modeling completed for this AQIA was performed independent of the air permit, the same emission calculations for the Proposed Action that were developed for the air quality permit application were used in this AQIA. Potential to emit tables for modeled criteria pollutants for the Proposed Action are located in Attachment B, Table B1 (Salter 2010b), potential to emit for modeled

Table F-6. Summary of emissions under the Proposed Action.

Pollutant	Uncontrolled facility-wide emissions		Controlled facility-wide emissions	
	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year
Particulate matter	13,398.71	12,155.04	380.29	344.99
PM_{10}	11,605.95	10,528.69	351.96	319.29
$PM_{2.5}$	9,900.56	8,981.59	330.93	300.21
Nitrogen oxides	1,952.10	1,770.91	1,270.91	1,152.94
Sulfur dioxide	2,568.68	2,330.25	257.56	233.66
Carbon monoxide	1,217.37	1,104.37	1,217.37	1,104.37
Volatile organic compounds	7,929.86	7,193.81	233.11	211.48
Single hazardous air pollutant	2,487.28	2,256.41	124.36	112.82
Total hazardous air pollutants	2,698.66	2,448.17	158.05	143.38

a. Source: Salter 2010b.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.

Table F-7. Summary of emissions under the Action Alternative.

Pollutant	Uncontrolled facility-wide emissions		Controlled facility-wide emissions	
	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year
Particulate matter	1,439.96	1,306.30	70.20	63.69
PM_{10}	1,161.80	1,053.96	63.42	57.53
$PM_{2.5}$	959.88	870.78	60.14	54.56
Nitrogen oxides	1,955.86	1,774.32	313.92	284.78
Sulfur dioxide	464.30	421.20	46.50	42.18
Carbon monoxide	216.78	196.66	216.78	196.66
Volatile organic compounds	7,803.33	7,079.02	108.59	98.51
Single hazardous air pollutant	233.68	211.99	11.68	10.60
Total hazardous air pollutants	296.71	269.17	19.78	17.95

a. Source: Salter 2009, modified.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.

Table F-8. Summary of emissions under the Proposed Action with the grain-to-ethanol facility.

Pollutant	50% Dried distiller's grains production				100% Wet distiller's grains production			
	Uncontrolled facility-wide emissions		Controlled facility-wide emissions		Uncontrolled facility-wide emissions		Controlled facility-wide emissions	
	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year
Particulate matter	14,396.01	13,059.77	406.72	368.97	14,167.49	12,852.46	388.05	352.03
PM_{10}	12,489.30	11,330.05	375.75	340.87	12,274.53	11,135.20	357.89	324.67
$PM_{2.5}$	10,232.69	9,282.89	353.93	321.08	10,024.43	9,093.96	336.30	305.08
Nitrogen oxides	2,032.66	1,843.99	1,351.46	1,226.02	2,016.85	1,829.65	1,335.66	1,211.68
Sulfur dioxide	2,569.84	2,331.31	258.73	234.71	2,569.63	2,331.12	258.51	234.52
Carbon monoxide	1,310.86	1,189.18	1,310.86	1,189.18	1,282.12	1,163.12	1,282.12	1,163.12
Volatile organic compounds	17,534.73	15,907.15	367.93	333.78	16,661.69	15,115.15	352.35	319.64
Single hazardous air pollutant	2,487.28	2,256.41	124.36	112.82	2,487.28	2,256.41	124.36	112.82
Total hazardous air pollutants	3,220.29	2,921.38	170.26	154.46	3,147.06	2,854.95	168.87	153.19

a. Source: Salter 2010b.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.

criteria pollutants for the Action Alternative are located in Attachment C, Table C1 (Salter 2009, modified), potential to emit for modeled criteria pollutants for the Proposed Action with grain-to-ethanol facility are located in Attachment D, Table D1 (Salter 2010b), and potential to emit for modeled criteria pollutants for the Action Alternative with grain-to-ethanol facility are located in Attachment E, Table E1 (Salter 2009, modified and Salter 2010b).

Ozone precursors generally resulting from photochemical reactions associated with volatile organic compounds were not evaluated since ozone is a regional pollutant requiring advanced modeling beyond the scope of this AQIA.

On January 22, 2010, the EPA adopted a new 1-hour standard for nitrogen dioxide, which became effective on April 12, 2010. This new standard is aimed at protecting public health against the adverse effects of short-term exposure to nitrogen dioxide, which mostly occurs near major roadways. EPA has established new monitoring plans to determine compliance with the new standard. However, the new monitoring programs were not in place at the time of completion of this AQIA, so background data for 1-hour nitrogen dioxide were not available. This AQIA is determining air quality impacts, in support of the biorefinery EIS, by comparing modeled values plus background values to the National Ambient Air Quality Standards; however, background data were not available at the time of completion of this AQIA and a full impact assessment was not performed. This AQIA will rely on the fact that the air quality permit application would have to address the new standard and a permit would only be issued if the standard would be met. Issuance of the air quality permit would indicate that the impacts from the Proposed Action would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality.

On June 2, 2010, the EPA adopted a new 1-hour standard for sulfur dioxide. At the time of completion of this EIS, the new standard had not yet become effective. This new standard is aimed at protecting public health against the adverse affects of short term exposure to sulfur dioxide. The EPA is also revoking both the 24-hour and annual primary standards for sulfur dioxide because they do not provide an additional measure of public health protection over the new 1-hour standard. EPA has established new monitoring plans to determine compliance with the new standard. The EPA also intends to issue guidance on conducting air quality dispersion modeling to assess impacts against the new 1-hour standard, but had not done so at the time of completion of this EIS. Because the new 1-hour standard was not yet effective at the time of completion of this EIS, nor were the 24-hour and annual standards officially revoked, DOE determined air quality impacts based on the sulfur dioxide standards that were effective (i.e. 3-hour, 24-hour, and annual standards). DOE will rely on the fact that the air quality permit application would have to address the new standard and a permit would only be issued if the standard would be met. Issuance of the air quality permit would indicate that the impacts from the Proposed Action would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality.

In March 2010, the EPA issued a memorandum discussing modeling procedures for demonstrating compliance with $PM_{2.5}$ National Ambient Air Quality Standards. In 1997, the EPA established the PM_{10} surrogate policy, which allowed permit applicants to use PM_{10} compliance demonstrations as a surrogate for $PM_{2.5}$ compliance demonstrations due to difficulties with respect to $PM_{2.5}$ monitoring, emissions estimation, and modeling. However, the EPA is recommending that the surrogate policy no longer be used under prevention of significant deterioration programs because many of the issues with $PM_{2.5}$ have been resolved. However, as with 1-hour nitrogen dioxide, background data for $PM_{2.5}$ were not available at the time of completion of this AQIA; thus, a comparison of modeled concentrations and background data to the National Ambient Air Quality Standards was not completed for $PM_{2.5}$. For purposes of this AQIA in support of the Abengoa Biorefinery EIS, PM_{10} was used as the surrogate for estimating impacts resulting from $PM_{2.5}$. This AQIA relies on the fact that the air quality permit application would have to address $PM_{2.5}$ compliance and a permit would only be issued if the standards would be met. Issuance of the air quality permit would indicate that the impacts from the Proposed Action would be less than levels deemed to be protective of human health and the environment and would not degrade the existing air quality.

Table F-8a. Summary of emissions under the Action Alternative with the grain-to-ethanol facility.

	50% Dried distiller's grains production				100% Wet distiller's grains production			
	Uncontrolled facility-wide emissions		Controlled facility-wide emissions		Uncontrolled facility-wide emissions		Controlled facility-wide emissions	
Pollutant	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year	tons per year[a]	metric tons per year
Particulate matter	2,528.02	2,293.37	127.09	115.30	2,341.04	2,123.74	110.16	99.94
PM_{10}	2,068.28	1,876.30	113.22	102.71	1,864.09	1,691.06	95.54	86.68
$PM_{2.5}$	1,294.33	1,174.19	107.79	97.78	1,087.13	986.22	89.87	81.53
Nitrogen oxides	2,036.41	1,847.39	394.48	357.87	2,020.61	1,833.06	378.68	343.53
Sulfur dioxide	465.46	422.25	47.66	43.24	465.25	422.07	47.45	43.05
Carbon monoxide	310.27	281.47	310.27	281.47	281.53	255.40	281.53	255.40
Volatile organic compounds	17,411.08	15,794.98	244.08	221.42	16,538.04	15,002.98	228.49	207.28
Single hazardous air pollutant	233.68	211.99	11.68	10.60	233.68	211.99	11.68	10.60
Total hazardous air pollutants	818.35	742.39	32.14	29.16	745.12	675.96	30.75	27.90

a. Source: Salter 2009, modified, Salter 2010b.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$PM_{2.5}$ = particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers.

F.5.5 SOURCE PARAMETERS

The sources assessed for this AQIA for both regulated pollutants and odorous emissions include point, area, and volume sources. Point source parameters, such as stack release height and stack exit temperature, are based on vendor data or data from similar existing sources and entered into the model as such. For point sources with an exit gas temperature that is ambient, a zero was entered into the model. AERMOD then used the hourly ambient temperature from the meteorological data for those sources.

Haul roads were modeled as area sources with the width of the area sources equal to the actual width of the road [two 12 foot (3.7 meter) drive lanes] plus 32 feet (9.8 meters) to account for the turbulent wake region. The release height of the haul road area sources was equal to the actual height of a haul truck, or 13 feet (4.0 meters). The initial vertical dimension of the haul road area sources was based on a plume thickness equal to twice the height of a haul truck. Further details on the haul road parameters are provided in Table B2 in Attachment B, Table C2 in Attachment C, Table D2 in Attachment D, and Table E2 in Attachment E.

Storage piles were modeled as area sources, and truck loading and unloading were modeled as volume sources. Parameters for these sources, such as initial vertical dimension and release heights, were calculated from the actual widths and heights of associated structures or vehicles. For the Proposed

Action, the ash pellet storage pit would be a below-grade storage pit assumed to have 3 feet (0.91 meter) of ash pellets above grade. The wood storage pile would have an average height of 40 feet (12 meters). For truck loading from a silo, the release height was 15 feet (4.6 meters), which is the average of the silo chute height and the height of a truck. The initial vertical dimension for these sources was based on the silo height. For truck or railcar unloading, the release height was assumed to be 5 feet (1.5 meters), or the height of a truck or rail bed. The initial vertical dimension was based on the maximum height of a tilted truck bed, or 25 feet (7.6 meters). Further details on the area and volume source parameters are provided in Table B2 in Attachment B, Table C2 in Attachment C, Table D2 in Attachment D, and Table E2 in Attachment E.

The model input parameters including location and elevation of all emission sources are provided and described further in Attachments B through E. Input parameters for the proposed biorefinery structures included in the model are also provided in the attachments. Table B2 in Attachment B lists area source, volume source, point source, and building information for the Proposed Action. Table C2 in Attachment C lists area source, volume source, point source, and building information for the Action Alternative. Tables D2 in Attachment D lists area source, volume source, point source, and building information for the Proposed Action with the grain-to-ethanol facility. Table E2 in Attachment E lists area source, volume source, point source, and building information for the Action Alternative with grain-to-ethanol facility.

F.5.6 CRITERIA POLLUTANT SOURCES AND MODELED EMISSION RATES

The emission rates used in the model reflect the maximum controlled potential to emit and take into account variable operating hours for averaging periods other than annual. For annual averaging periods, the emissions are assumed to emit 8,760 hours per year. Thus, for some sources, emission rates for shorter averaging periods may be higher than those for annual rates. Typically, sources involved in processes such as receiving and loadout would be on a variable operating schedule rather than a 24-hour schedule. Variable operating hour sources in the Proposed Action and Proposed Action with grain-to-ethanol facility scenarios operated on a 12-hour per day schedule. Variable operating hour sources in the Action Alternative and Action Alternative with grain-to-ethanol facility operated on a 16-hour per day schedule. In addition, because not all portions of the haul roads under the Proposed Action and Proposed Action with grain-to-ethanol facility would have equal amounts of vehicle traffic, the haul road emission rates were calculated based on the distribution of traffic on each road segment. Details are provided in Table B3 in Attachment B and Table D3 in Attachment D.

To calculate annual emission rates, all source emissions in tons per year were converted to grams per second. Thus, for sources that would normally operate on a 12- or 16-hour per day operating schedule, the emissions were annualized by assuming that source would operate for 8,760 hours per year. Twenty-four-hour emission rates were calculated by converting the emissions in pounds per day and converting to grams per second. However, 12- and 16-hour per day and 24 hour per day operating schedules were taken into account and rates calculated accordingly. Emission rates for all other shorter term averaging periods used the emissions in pounds per hour and converted the emissions to grams per second. Further details as to the daily operating schedules of each source are presented in Attachments B to D. To be consistent with the emission rates, the model was set up to assess only the hours when emissions occurred for short term (less than one year) averaging periods and was set up to model all hours with the annualized emission rates for annual averaging.

Attachment B, Table B4 shows emission rates for PM_{10} sources and Table B5 shows emission rates for nitrogen oxide, sulfur dioxide, and carbon monoxide sources for the Proposed Action. Attachment C, Table C3 shows emission rates for PM_{10} sources and Table C4 shows emission rates for nitrogen oxide, sulfur dioxide, and carbon monoxide sources for the Action Alternative. Attachment D, Table D4 shows emission rates for PM_{10} sources and Table D5 shows emission rates for nitrogen oxide, sulfur dioxide, and carbon monoxide sources for the Proposed Action with grain-to-ethanol facility. Attachment E, Table E3 shows emission rates for PM_{10} sources and Table E4 shows emission rates for nitrogen oxide, sulfur dioxide, and carbon monoxide sources for the Action Alternative with grain-to-ethanol facility.

F.5.7 ODOROUS EMISSION SOURCES AND MODELED EMISSION RATES

Concentrations for odorous compounds were computed using a one hour averaging period, which is the minimum averaging time that can be modeled with AERMOD. Using the shortest averaging time results in a higher estimated concentration since the emissions have less time to disperse. The emission rates in grams per second were calculated from the emissions in pounds per hour. The odorous compounds and associated emission rates for the Proposed Action are shown in Attachment B, Table B6, the odorous compound emission rates for the Action Alternative are shown in Attachment C, Table C5, and the odorous compound emission rates for the Proposed Action with grain-to-ethanol facility are shown in Attachment D, Table D6.

F.6 Receptor Network

Receptor points, or points where concentrations of emissions were calculated by the model, were placed such that offsite impacts could adequately be determined. The entire 810-acre (3.3-square-kilometer) Biorefinery Project site comprises the 385-acre (1.6-square-kilometer) biorefinery parcel and the 425-acre (1.7–square-kilometer) buffer area. However, impacts to the air quality and aesthetic impacts due to odorous compounds would only result from emission sources located on the 385-acre biorefinery parcel. Thus, the offsite receptor grid was comprised of points outside of the 385-acre biorefinery parcel fence line.

Aesthetic impacts due to odorous compounds were assessed at offsite locations where the public would generally be located. Thus, a sensitive receptor grid containing points at the Forewinds Golf Course, West Industrial Park, residences to the west, and the closest residences, parks, and schools in Hugoton was created to assess impacts due to odors. The biorefinery parcel fence line receptor grid was used as an initial screening for odorous impacts. If the concentration of the odorous compound was below the odor detection threshold at the fence line, then no further analysis was conducted. Odors not detectable at the fence line would likewise not be detectable farther away as concentrations of the compounds disperse. If, however, the concentrations at the fence line were above the odor threshold value, then further analysis was performed to determine the concentrations at the sensitive receptor points.

Impacts to the existing air quality were determined by using the maximum offsite concentration. Thus, for determining impacts to the existing air quality, the receptor grid included the biorefinery parcel fence line receptors and nested grids consisting of fine, medium and coarse receptor distances. Additionally, the sensitive receptor grid was added to the air quality grid as additional receptor points.

For the fence line receptors, the sensitive receptor grid and the air quality grid, elevations were associated with these receptors by applying the USGS Digital Elevation Model (DEM) data as discussed in Section

7.0. Figure A-1, in Attachment A, depicts the air quality receptor grid, and Figure A-2 depicts the sensitive receptor grid.

F.6.1 FENCE LINE RECEPTORS

Fence line receptors were placed along the 385-acre (1.6 square kilometer) biorefinery parcel boundary every 50 meters (160 feet) in linear distance. It is assumed the 385-acre (1.6 square kilometer) area is controlled with fencing and the areas beyond the 385-acre biorefinery parcel boundary, including the 425-acre buffer area, are considered “ambient air” in which the public may have access.

F.6.2 AIR QUALITY GRID

A fine grid of receptors was placed at 50-meter (160-feet) spacing, from the biorefinery parcel fence line outward to approximately 250 meters (820 feet) in all directions. A medium grid was placed at 100-meter (330-feet) spacing from the fine grid outward to approximately 500 meters (1,600 feet) in each direction. A coarse grid was placed at 500-meter (1,600-feet) spacing from the medium grid outward to 4,000 meters (13,000 feet) in each direction. Because the results of the analysis demonstrate that maximum impacts are within the fine grid and do not increase beyond the locations identified, no additional grids were necessary.

F.6.3 SENSITIVE RECEPTORS

A set of sensitive receptor locations was created to determine concentrations at locations where the public would generally be located. One receptor was placed at the Forewinds Golf Course, and one at the West Industrial Park. Eight receptors were placed at locations of residences in Hugoton along the western edge. Additionally, receptors were placed at Hugoton High School, Hugoton Elementary School, Hugoton Learning Center, a hospital, a house of worship on the western edge of the city, a playground on the western edge of the city, and baseball diamonds along the western edge of the city. Other sensitive receptor locations include the following:

- Residence on Optima near Road M,
- Residence on U.S. Highway 56 near Road 11,
- Residence at the intersection of Road M and Road 10,
- Residence along Road 9 and two along Road Q,
- Residence along Road P west of Road 10, and
- Closest residence to the 385-acre biorefinery parcel on the northwest corner of Road 10 and Road P.

F.7 Elevation Data

Source, structure and receptor elevations were assigned using the U.S. Geological Survey 7.5-minute DEM data files. DEM files consist of a sampled array of elevations for a number of ground positions at regularly spaced intervals. Each 7.5-minute DEM is based on 10 to 30 meter data spacing within the Universal Transverse Mercator (UTM) projection. The AERMAP processor (version 09040) was used to interpolate the data and assign the elevation values in accordance with the EPA modeling guidance (EPA 2004b). The AERMAP preprocessor was implemented through the use of the BREEZE software (version 7.2.5).

Based on the proposed receptor grid modeling domain, a combination of the Hugoton, Hugoton SW, Hugoton SE, Feterita, Wagon Bed Spring SW, and Wagon Bed Spring SE DEM quadrants were used. The maps are in the North American Datum of 1927 (NAD27) system.

F.8 Downwash and GEP Stack Height

Based on the potential building influence from nearby structures, the stack sources were evaluated for Good Engineering Practice (GEP) stack height. GEP stack height is calculated as follows:

$$H = S + 1.5L \qquad \text{(Equation F-1)}$$

Where:

H = GEP stack height
S = height of nearby structure
L = lesser dimension, height or projected width, of nearby structure.

Actual stack heights were used in the model unless the actual height exceeded the GEP stack height, in which case the GEP value was used. Because buildings adjacent to sources in the model may change normal atmospheric flow and plume dispersion, the effects of building downwash on all point sources in the model were accounted for. The Building Profile Input Program contained within the BREEZE implementation of AERMOD was utilized to calculate projected building dimensions.

F.9 Meteorological Data

Following the recommendations of Section 8.3 of the EPA Guideline on Air Quality Models (40 CFR Part 51, Appendix W), five years (2002 through 2006) of National Weather Service meteorological data were processed. Data were processed by the KDHE and supplied to DOE for the air dispersion analysis. The surface data were acquired from the Garden City Regional Airport (Weather-Bureau-Army-Navy (WBAN # 23064), located approximately 60 miles (100 kilometers) northeast of the Biorefinery Project site. The upper air sounding data were acquired from the Dodge City Regional Airport (WBAN # 13985) located approximately 80 miles (130 kilometers) northeast of the Biorefinery Project site.

As requested by KDHE, if 10 percent or more of the data for any given day were missing, then the full day of meteorological data was invalidated and removed from the processed meteorological data files. Over the five years of consecutive data, 27 days total were invalidated and removed. The resultant data capture for the processed data after the 27 invalidated days were removed is shown in Table F-9. The resulting data capture meets the minimum 90% capture required by the EPA modeling guidelines.

Table F-9. Processed meteorological data capture.

Calendar Year	Processed Data Capture
2002	98.0%
2003	97.1%
2004	98.0%
2005	98.0%
2006	96.4%

A wind rose plot for each year of meteorological data (2002 through 2006) is included as Figures A-3 through Figure A-7 in Attachment A. The closest station with available published climatic wind data is Dodge City, Kansas. Dodge City is approximately 80 miles (130 kilometers) northeast of Hugoton. During January to March, the prevailing wind direction is north-northwest. The prevailing wind direction is from the north during April to June and from the south for the remainder of the year (NCDC 1998). The wind roses illustrate that the surface meteorological data used is consistent with the typical wind directions in the region because the wind roses show the greatest frequencies of wind from the south with the second greatest frequency from the north. Further, the wind roses illustrate that the five years of meteorology data are consistent with each other as the wind roses from the five years are similar with respect to both wind speed and direction.

F.10 Surface Characteristics

The meteorology data were processed to take into account the influences of surface features in accordance with the EPA modeling guidance. The surface characteristics applied were specified by the KDHE and are presented in Table F-10. Meteorological data were processed with the AERMET preprocessor (EPA 2004c). The EPA approved AERMET model version 06341 was implemented using the Lakes Environmental software (version 5.6.0).

Table F-10. Surface characteristics used for processing the meteorological data.

	Winter (December, January, February)	Spring (March, April, May)	Summer (June, July, August)	Autumn (September, October, November)
Albedo	0.60	0.18	0.18	0.20
Bowen Ratio	1.5	0.4	0.8	1.0
Surface Roughness	0.001	0.05	0.10	0.01

F.11 Ambient Background Concentrations

Due to the Hugoton area being predominantly agricultural, the background or pre-project air quality is considered good. For purposes of showing that the National Ambient Air Quality Standards will not be exceeded, applicable ambient background concentrations of the criteria pollutants were determined. The background concentrations will be added to the proposed biorefinery impacts to determine the total impact.

In order to estimate background air quality, air pollutant concentration levels were obtained from the EPA Air Quality System (AQS) and the EPA Clean Air Status and Trends Network (CASTNET). AQS is an EPA sponsored database of air pollutant data collected by state, local, and tribal organizations. CASTNET is a nationwide air quality and meteorological monitoring network operated to collect rural, regionally representative air pollutant levels. AQS and CASTNET air pollutant data measured in Kansas, Oklahoma, Colorado, and Texas were assembled and analyzed to estimate pre-project air quality.

The background values were selected as being representative of Hugoton based on land use, geography, and exposure and are presented in Table F-11. For example, carbon monoxide data are available from a rural AQS site near Newkirk, Oklahoma, which is located about 40 miles (60 kilometers) south of Wichita, Kansas. Although there may be AQS data for carbon monoxide from a monitoring site closer to

Hugoton, the data may be from an urban area. Thus, the AQS data from Newkirk, Oklahoma were chosen because the data are from an area with similar land use as Hugoton.

Table F-11. Ambient criteria pollutant background values representative of the Hugoton area.

Pollutant	Averaging times	Background Value: Referenced value[a]	Background Value: Conversion ($\mu g/m^3$)[b,c]	Monitoring site
Carbon monoxide	1-hour	2.0 ppm	2,300	Newkirk, OK
	8-hour	0.5 ppm	570	Newkirk, OK
Nitrogen dioxide	Annual	0.004 ppm	8.0	Sumner County, KS
Sulfur dioxide	3-hour	0.004 ppm	10	Trego County, KS
	24-hour	0.003 ppm	8.0	Trego County, KS
	Annual	0.001 ppm	3.0	KNZ184 and PAL190
Particulate matter (PM_{10})	24-hour	60 $\mu g/m^3$	60	AQS sites in KS/OK
	Annual	20 $\mu g/m^3$	20	AQS sites in KS/OK and KNZ184
Ozone	4th highest daily maximum	65 ppb	130	PAL 190

a. Source: Lavery 2009.
b. Conversion from ppm to $\mu g/m^3$: $\mu g/m^3$ = (ppm × Molecular weight × 1000)/24.5.
c. Conversion for Ozone: 1 ppb = 2 $\mu g/m^3$.
AQS = EPA Air Quality System.
CASTNET = EPA Clean Air Status And Trends Network.
EPA = U.S. Environmental Protection Agency.
KNZ184 = CASTNET site in Konza Prairie, Kansas.
PAL190 = CASTNET site in Palo Duro State Park, Texas.
$\mu g/m^3$ = micrograms per cubic meter.
ppm = parts per million.
ppb = parts per billion.

Further data were chosen from sites in Kansas, Oklahoma, and Texas. Fourteen Kansas AQS sites measured PM_{10}, and twenty AQS sites measured PM_{10} in Oklahoma. Two CASTNET sites were considered representative. One site is located at Konza Prairie, Kansas and is designated KNZ184. The second site is located at Palo Duro State Park, Texas and is designated as PAL190. Data from KNZ184 were available from 2002 through 2008; and data from 2007 and 2008 were available from PAL190.

Short-term sulfur dioxide background levels were obtained from Trego County, KS while annual sulfur dioxide levels were obtained from the two CASTNET sites. PM_{10} concentrations were selected by considering all PM_{10} monitoring sites in Kansas and Oklahoma.

As a comparison for the background levels, the National Ambient Air Quality Standards are shown in Table F-12.

Table F-12. National Ambient Air Quality Standards.

Pollutant	Averaging times	Primary standards	Secondary standards
Carbon monoxide	1-hour[a]	35 ppm (40 mg/m^3)	None
	8-hour[a]	9 ppm (10 mg/m^3)	None
Lead	Quarterly average	1.5 µg/m^3	Same as primary
	Rolling 3-month average[b]	0.15 µg/m^3	Same as primary
Nitrogen dioxide	1-hour[c]	100 ppb (188 µg/m^3)	None
	Annual (arithmetic mean)[d]	53 ppb (100 µg/m^3)	Same as primary
Ozone	1-hour[e]	0.12 ppm	Same as primary
	8-hour[f] (2008 std)	0.075 ppm	Same as primary
Sulfur dioxide	1-hour[g]	75 ppb (196 µg/m^3)	None
	3-hour[a]	None	0.5 ppm (1300 µg/ m^3)
	24-hour[a]	0.14 ppm (370 µg/m^3)	None
	Annual (arithmetic mean)	0.03 ppm (78 µg/m^3)	None
Particulate matter (PM_{10})	24-hour[h]	150 µg/m^3	Same as primary
	Annual (arithmetic mean)	Revoked[i]	Revoked[i]
Particulate matter ($PM_{2.5}$)	24-hour[j]	35 µg/m^3	Same as primary
	Annual (arithmetic mean)[k]	15 µg/m^3	Same as primary

Source: 40 CFR Part 50

a. Not to be exceeded more than once per year.
b. Final rule signed October 15, 2008.
c. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
d. The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
e. EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.
f. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 parts per million (effective May 27, 2008).
g. Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
h. Not to be exceeded more than once per year on average over 3 years.
i. The annual standard of 50 g/m3 for PM10 was revoked by the EPA in 2006.
j. To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35.0 g/m3 (effective December 17, 2006).
k. To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 g/m3.

EPA = U.S. Environmental Protection Agency.
µg/m^3 = micrograms per cubic meter.
mg/m^3 = milligrams per cubic meter.
ppm = parts per million.
ppb = parts per billion.

F.12 Odor Detection Thresholds

In order to determine if the modeled concentrations of odorous emissions from the biorefinery would be below detectable limits, odor threshold values were referenced from the American Industrial Hygiene Association (AIHA 1989) and the Journal of Applied Toxicology (Amoore 1983). The complete emission inventory was cross-referenced to the compounds listed in the two published sources that report detection thresholds of odorous compounds. Those compounds from the emission inventory with an odor threshold value reported in at least one of the two sources were analyzed further. If a threshold value occurred in both sources, then the lower of the two values was used for the threshold value (AIHA 1989; Amoore 1983). Table F-13 lists the odor threshold values from both sources. An entry of "none accepted" in the table signifies that many odor threshold values were evaluated by the American Industrial Hygiene Association but none were accepted for that particular compound due to a number of reasons such as insufficient methodology of data.

Table F-13. Odor threshold values.

	American Industrial Hygiene Association value		Journal of Toxicology value	
Odorous compound	Value from reference (ppm)	Conversion (μg/m^3)[a]	Value from reference (ppm)	Conversion (μg/m^3)[a]
1,3 Butadiene	0.45	990	1.6	3,500
Acetaldehyde	0.067	120	0.050	90
Acetone	3.6	8,500	13	31,000
Acrolein	1.8	4,100	0.16	370
Ammonia	16.7	12,000	5.2	3,600
Benzene	34	110,000	12	38,000
Biphenyl	none accepted	none accepted	0.00083	5.0
Butane	none accepted	none accepted	2,700	6.4×10^6
Carbon disulfide	none accepted	none accepted	0.11	340
Carbon tetrachloride	140	880,000	96	600,000
Chlorine	0.08	230	0.31	900
Chlorobenzene	1.3	6,000	0.68	3,100
Chloroform	133	650,000	85	410,000
Cumene	0.008	39	0.088	430
Dichlorobenzene	0.699	4,200	0.30	1,800
Dichloromethane	158	550,000	250	870,000
Ethane	none accepted	none accepted	120,000	1.5×10^8
Ethanol	49	93,000	84	160,000
Ethylbenzene	none accepted	none accepted	2.3	10,000
Ethylene dichloride	6	24,000	88	360,000
Formaldehyde	none accepted	none accepted	0.83	1,000
Hexane	none accepted	none accepted	130	460,000
Hydrogen chloride	none accepted	none accepted	0.77	1,100
Methanol	4.2	5,500	100	130,000
Methyl chloroform	385	2.1×10^6	120	650,000
Naphthalene	0.038	200	0.084	440
Nitrogen dioxide	none accepted	none accepted	0.39	730
Pentane	none accepted	none accepted	400	1.2×10^6
Phenol	0.060	230	0.040	150
Propane	none accepted	none accepted	16,000	2.9×10^7
Propylene	22.5	39,000	76	130,000
Propylene dichloride	0.26	1,200	0.25	1,200
Styrene	0.017	72	0.32	1,400
Sulfur dioxide	1.9	5,000	1.1	2,900
Toluene	0.021	80	2.9	11,000
Vinyl chloride	none accepted	none accepted	3,000	7.7×10^6
Xylene[b]	0.35	1,500	1.1	4,800

a. Conversion from ppm to μg/m^3: μg/m^3 = (ppm × molecular weight × 1000)/24.5.
b. Lowest value of the three isomers (m-Xylene).
μg/m^3 = micrograms per cubic meter.
ppm = parts per million.

F.13 Evaluation of Impacts Compared with Standards

F.13.1 CRITERIA POLLUTANT RESULTS

The modeled concentrations for the criteria pollutants were added to their respective background concentrations and compared with the National Ambient Air Quality Standards. Each of the criteria pollutants and respective averaging times were modeled for each of the five years of meteorology data used. Table F-14 presents the maximum concentration over all five years for each averaging time for the Proposed Action. The impact is the sum of the maximum model increment and the background. The

Table F-14. Summary of model results for the Proposed Action.

Pollutant	Averaging period	Year of maximum modeled impact[a]	NAAQS[b] ($\mu g/m^3$)	Background[c] ($\mu g/m^3$)	Maximum model result ($\mu g/m^3$)	Total impact ($\mu g/m^3$)
Carbon monoxide	1-hour	2004	40,000	2,300	160	2,500
	8-hour	2002	10,000	570	62	630
Nitrogen dioxide	Annual	2002	100	8.0	4.1	12
Sulfur dioxide	3-hour	2005	1,300[e]	10	23	33
	24-hour	2002	370	8.0	6.7	15
	Annual	2002	78	3.0	0.82	3.8
PM_{10}	24-hour	2005	150	60	39	99
	Annual	2002	Revoked[d]	20	8.3	28

a. The modeling analysis was completed using five years of processed meteorological data from 2002 through 2006.
b. Source: 40 CFR Part 50.
c. Source: Lavery 2009.
d. The PM_{10} annual standard was 50 $\mu g/m^3$ prior to being revoked by EPA.
e. Secondary standard.
NAAQS = National Ambient Air Quality Standards.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
$\mu g/m^3$ = micrograms per cubic meter.

maximum modeled concentration for this analysis was the first high value from each modeling result over the five years of meteorological data. Using the first high value for the comparison with the standards is conservative because, in many cases, the standards do not require comparison with the first high value. For example, as shown in Table F-12, the 1-hour and 8-hour standards for carbon monoxide can be exceeded once per year; thus, the second high value could have been used for comparison. Even with this conservative approach, all model results for the Proposed Action are well below the National Ambient Air Quality Standards. Tables F-15, F-16, and F-16a show modeling results for the Action Alternative, Proposed Action with grain-to-ethanol facility, and Action Alternative with grain-to-ethanol facility, respectively. As with the Proposed Action, all modeling results with backgrounds are well below the National Ambient Air Quality Standards for the Action Alternative, Proposed Action with grain-to-ethanol facility, and Action Alternative with grain-to-ethanol facility.

Under the Proposed Action, for both PM_{10} averaging times the location of maximum impact would occur on the north biorefinery fence line. Annual averaged impacts for both nitrogen dioxide and sulfur dioxide would occur approximately 200 meters (660 feet) north of the biorefinery fence line. The 1-hour average impact for carbon monoxide and the 3-hour average impact for sulfur dioxide both would occur on the south biorefinery fence line. The 8-hour averaged impact for carbon monoxide would occur 100 meters (330 feet) north of the biorefinery fence line. Lastly, the 24-hour average impact for sulfur dioxide would occur 300 meters (980 feet) north of the biorefinery fence line.

Table F-15. Summary of model results for the Action Alternative.

Pollutant	Averaging period	Year of maximum modeled impact[a]	NAAQS[b] (μg/m³)	Background[c] (μg/m³)	Maximum model increment (μg/m³)	Impact (μg/m³)
Carbon monoxide	1-hour	2003	40,000	2,300	820	3,100
	8-hour	2004	10,000	570	81	650
Nitrogen dioxide	Annual	2002	100	8.0	4.8	13
Sulfur dioxide	3-hour	2003	1,300[d]	10	34	44
	24-hour	2004	370	8.0	6.7	15
	Annual	2002	78	3.0	0.71	3.7
PM_{10}	24-hour	2004	150	60	19	79
	Annual	2002	Revoked[e]	20	4.6	25

a. Source: 40 CFR Part 50.
b. Source: Lavery 2009.
c. The modeling analysis was completed using five years of processed meteorological data from 2002 through 2006.
d. Secondary standard.
e. The PM_{10} annual standard was 50 μg/m³ prior to being revoked by EPA.
NAAQS = National Ambient Air Quality Standards.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
μg/m³ = micrograms per cubic meter.

Table F-16. Summary of model results for the Proposed Action with grain-to-ethanol facility.

Pollutant	Averaging period	Year of maximum modeled impact[a]	NAAQS[b] (μg/m³)	Background[c] (μg/m³)	Maximum model increment (μg/m³)	Impact (μg/m³)
Carbon monoxide	1-hour	2004	40,000	2,300	160	2,500
	8-hour	2006	10,000	570	67	640
Nitrogen dioxide	Annual	2002	100	8.0	4.8	13
Sulfur dioxide	3-hour	2003	1,300[d]	10	25	35
	24-hour	2002	370	8.0	6.8	15
	Annual	2002	78	3.0	0.83	3.8
PM_{10}	24-hour	2005	150	60	48	110
	Annual	2002	Revoked[e]	20	9.1	29

a. Source: 40 CFR Part 50.
b. Source: Lavery 2009.
c. The modeling analysis was completed using five years of processed meteorological data from 2002 through 2006.
d. Secondary standard.
e. The PM_{10} annual standard was 50 μg/m³ prior to being revoked by EPA.
NAAQS = National Ambient Air Quality Standards.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
μg/m³ = micrograms per cubic meter.

For all criteria pollutants and averaging times that were modeled for the Action Alternative and Action Alternative with grain-to-ethanol facility, the maximum impacts occur either along the north fence line or at receptors 150 meters (490 feet) north of the fence line (for annual nitrogen dioxide and annual sulfur dioxide).

Under the Proposed Action with grain-to-ethanol facility, for both PM_{10} averaging times the location of maximum impact would occur on the north biorefinery fence line. Annual averaged impacts for both nitrogen dioxide and sulfur dioxide would occur approximately 200 meters (660 feet) north of the biorefinery fence line. The 1-hour average impact for carbon monoxide would occur on the south biorefinery fence line. The 8-hour averaged impact for carbon monoxide would occur 100 meters (330 feet) south of the biorefinery fence line. The 3-hour average impact for sulfur dioxide would occur on the north biorefinery fence line. Lastly, the 24-hour average impact for sulfur dioxide would occur 300 meters (980 feet) north of the biorefinery fence line.

Full model results for all years of analysis along with location coordinates of the maximum are located in Table B7 in Attachment B for the Proposed Action, Table C6 in Attachment C for the Action Alternative, Table D7 in Attachment D for the Proposed Action with grain-to-ethanol facility, and Table E5 in Attachment E for the Action Alternative with grain-to-ethanol facility.

Table F-16a. Summary of model results for the Action Alternative with grain-to-ethanol facility

Pollutant	Averaging period	Year of maximum modeled impact[a]	NAAQS[b] (μg/m³)	Background[c] (μg/m³)	Maximum model increment (μg/m³)	Impact (μg/m³)
Carbon monoxide	1-hour	2003	40,000	2,300	820	3,100
	8-hour	2004	10,000	570	81	650
Nitrogen dioxide	Annual	2002	100	8.0	5.8	14
Sulfur dioxide	3-hour	2003	1,300[d]	10	34	44
	24-hour	2004	370	8.0	6.7	15
	Annual	2002	78	3.0	0.72	3.7
PM_{10}	24-hour	2002	150	60	27	87
	Annual	2002	Revoked[e]	20	6.7	27

a. Source: 40 CFR Part 50.
b. Source: Lavery 2009.
c. The modeling analysis was completed using five years of processed meteorological data from 2002 through 2006.
d. Secondary standard.
e. The PM_{10} annual standard was 50 μg/m³ prior to being revoked by EPA.
NAAQS = National Ambient Air Quality Standards.
PM_{10} = particulate matter with an aerodynamic diameter less than or equal to 10 micrometers.
μg/m³ = micrograms per cubic meter.

F.13.2 ODOROUS COMPOUND RESULTS

Initially, all odorous compounds were modeled to obtain a computed concentration at the 385-acre (1.6 square kilometer) biorefinery parcel fence line. If the modeled concentrations at the biorefinery parcel fence line were less than the odor threshold value, then no further analysis was performed. Modeled odor concentrations that are less than the published odor threshold value at the fence line would likewise not be detectable farther away as concentrations disperse. If, however, the modeled concentrations at the fence line were above the odor threshold value, then further analysis was performed to determine the concentrations at the sensitive receptor grid. The maximum concentrations listed are the maximum 1-hour concentrations from all five years of meteorology data used. Further, the air dispersion model does not address any chemical transformations that might occur during dispersion to the ambient air; thus, the odorous compounds are treated as particles once released. Table F-17 lists the odorous compounds, the respective odor threshold values, and the maximum model concentrations for the Proposed Action. Table F-17a lists the model results for the Action Alternative, and Table F-18 lists the model results for the Proposed Action with grain-to-ethanol facility.

Table F-17. Threshold and predicted concentrations of odorous compounds emitted by the Proposed Action.

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model concentration ($\mu g/m^3$)	Location of maximum
1,3 Butadiene	990[a]	7.3×10^{-3}	southeast fence line
Acetaldehyde	90[b]	59	south fence line
Acetone	8,500[a]	0.013	north fence line
Acrolein	370[b]	5.9	south fence line
Ammonia	3,600[b]	3.1	north fence line
Benzene	38,000[b]	0.32	southeast fence line
Butane	6,400,000[b]	0.42	north fence line
Carbon disulfide	340[b]	2.3×10^{-3}	south fence line
Carbon tetrachloride	600,000[b]	3.0×10^{-3}	north fence line
Chlorine	230[a]	5.2×10^{-3}	north fence line
Chlorobenzene	3,100[b]	2.2×10^{-3}	north fence line
Chloroform	410,000[b]	1.8×10^{-3}	north fence line
Cumene	39[a]	0.012	south fence line
Dichlorobenzene	1,800[b]	3.1×10^{-5}	north fence line
Dichloromethane	550,000[a]	0.019	north fence line
Ethane	150,000,000[b]	0.62	north fence line
Ethanol	93,000[a]	410	north fence line
Ethylbenzene	10,000[b]	5.7×10^{-3}	south fence line
Ethylene dichloride	24,000[a]	1.9×10^{-3}	north fence line
Formaldehyde	1,000[b]	29	south fence line
Hexane	460,000[b]	0.36	north fence line
Hydrogen chloride	1,100[b]	9.4	north fence line
Methanol	5,500[a]	58	south fence line
Methyl chloroform	650,000[b]	2.0×10^{-3}	north fence line
Naphthalene	200[a]	0.016	southeast fence line
Nitrogen dioxide	730[b]	180	southeast fence line
Pentane	1,200,000[b]	0.52	north fence line
Phenol	150[b]	3.4×10^{-3}	north fence line
Propane	29,000,000[b]	0.32	north fence line
Propylene	39,000[a]	0.48	southeast fence line
Propylene dichloride	1,200[b]	2.2×10^{-3}	north fence line
Styrene	72[a]	0.13	north fence line
Sulfur dioxide	2,900[b]	54	southeast fence line
Toluene	80[a]	0.57	west fence line
Vinyl chloride	7,700,000[b]	1.2×10^{-3}	north fence line
Xylene	1,500[a,c]	0.076	west fence line

Table F-17. Threshold and predicted concentrations of odorous compounds emitted by the Proposed Action (continued).

Note: Odor threshold values from the references were in units of parts per million (ppm) and converted to $\mu g/m^3$ for ease of comparison. Base reference values are shown in Table F-13.
a. AIHA 1989.
b. Amoore 1983.
c. Lowest value of the three isomers (m-Xylene).
$\mu g/m^3$ = microgram per cubic meters.

Table F-17a. Threshold and predicted concentrations of odorous compounds emitted by the Action Alternative.

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model concentration ($\mu g/m^3$)	Location of maximum
1,3 Butadiene	990[a]	8.9×10^{-3}	north fence line
Acetaldehyde	90[b]	73	north fence line
Acetone	8,500[a]	5.8×10^{-3}	south fence line
Acrolein	370[b]	7.3	north fence line
Ammonia	3,600[b]	8.6	south fence line
Benzene	38,000[b]	0.81	north fence line
Biphenyl	5.2[b]	0.14	south fence line
Butane	6,400,000[b]	2.2	south fence line
Carbon disulfide	340[b]	7.5×10^{-3}	north fence line
Carbon tetrachloride	600,000[b]	1.4×10^{-3}	south fence line
Chlorine	230[a]	2.4×10^{-3}	south fence line
Chlorobenzene	3,100[b]	1.0×10^{-3}	south fence line
Chloroform	410,000[b]	8.6×10^{-4}	south fence line
Cumene	39[a]	0.021	north fence line
Dichlorobenzene	1,800[b]	4.8×10^{-5}	south fence line
Dichloromethane	550,000[a]	8.9×10^{-3}	south fence line
Ethane	150,000,000[b]	3.3	south fence line
Ethanol	93,000[a]	330	west fence line
Ethylbenzene	10,000[b]	0.011	north fence line
Ethylene dichloride	24,000[a]	8.9×10^{-4}	south fence line
Formaldehyde	1,000[b]	36	north fence line
Hexane	460,000[b]	0.14	south fence line
Hydrogen chloride	1,100[b]	4.3	south fence line
Methanol	5,500[a]	73	north fence line
Methyl chloroform	650,000[b]	9.5×10^{-4}	south fence line
Naphthalene	200[a]	0.14	north fence line
Nitrogen dioxide	730[b]	1,400	north fence line
	730[b]	640	closest residence
Pentane	1,200,000[b]	2.7	south fence line
Phenol	150[b]	1.6×10^{-3}	south fence line
Propane	29,000,000[b]	1.7	south fence line
Propylene	39,000[a]	2.8	north fence line
Propylene dichloride	1,200[b]	1.0×10^{-3}	south fence line
Styrene	72[a]	0.058	south fence line

Table F-17a. Threshold and predicted concentrations of odorous compounds emitted by the Action Alternative (continued).

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model concentration ($\mu g/m^3$)	Location of maximum
Sulfur dioxide	2,900[b]	85	north fence line
Toluene	80[a]	1.1	north fence line
Vinyl chloride	7,700,000[b]	5.5×10^{-4}	south fence line
Xylene	1,500[a,c]	0.21	north fence line

a. AIHA 1989.
b. Amoore 1983.
c. Lowest value of the three isomers (m-Xylene).
Odor threshold values from the references were in units of parts per million (ppm) and converted to $\mu g/m^3$ for ease of comparison. Base reference values are shown in Table F-13.
$\mu g/m^3$ = microgram per cubic meters.

Table F-18. Summary of odor model results for the biomass-to-ethanol facility (Proposed Action) and grain-to-ethanol facility.

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model result ($\mu g/m^3$)	Location of maximum
1,3 Butadiene	990[a]	7.5×10^{-3}	southeast fence line
Acetaldehyde	90[b]	79	west fence line
Acetone	8,500[a]	0.013	north fence line
Acrolein	370[b]	8.7	southeast fence line
Ammonia	3,600[b]	3.1	north fence line
Benzene	38,000[b]	1.2	west fence line
Butane	6,400,000[b]	2.0	south fence line
Carbon disulfide	340[b]	9.5×10^{-3}	west fence line
Carbon tetrachloride	600,000[b]	3.0×10^{-3}	north fence line
Chlorine	230[a]	5.2×10^{-3}	north fence line
Chlorobenzene	3,100[b]	2.2×10^{-3}	north fence line
Chloroform	410,000[b]	1.8×10^{-3}	north fence line
Cumene	39[a]	0.047	west fence line
Dichlorobenzene	1,800[b]	1.2×10^{-3}	south fence line
Dichloromethane	550,000[a]	0.019	north fence line
Ethane	150,000,000[b]	3.0	south fence line
Ethanol	93,000[a]	890	west fence line
Ethylbenzene	10,000[b]	0.024	west fence line
Ethylene dichloride	24,000[a]	1.9×10^{-3}	north fence line
Formaldehyde	1,000[b]	41	west fence line
Hexane	460,000[b]	1.7	south fence line
Hydrogen chloride	1,100[b]	9.4	north fence line
Methanol	5,500[a]	78	west fence line
Methyl chloroform	650,000[b]	2.0×10^{-3}	north fence line
Naphthalene	200[a]	0.016	southeast fence line

Table F-18. Summary of odor model results for the biomass-to-ethanol facility (Proposed Action) and grain-to-ethanol facility (continued).

Odorous compound	Odor threshold value ($\mu g/m^3$)	Maximum model result ($\mu g/m^3$)	Location of maximum
Nitrogen dioxide	730b	180	southeast fence line
Pentane	1,200,000[b]	2.5	south fence line
Phenol	150[b]	3.4×10^{-3}	north fence line
Propane	29,000,000[b]	1.6	south fence line
Propylene	39,000[a]	0.50	southeast fence line
Propylene dichloride	1,200[b]	2.2×10^{-3}	north fence line
Styrene	72[a]	0.13	north fence line
Sulfur dioxide	2,900[b]	56	southeast fence line
Toluene	80[a]	2.4	west fence line
Vinyl chloride	7,700,000[b]	1.2×10^{-3}	north fence line
Xylene	1,500[a,c]	0.26	west fence line

Note: Odor threshold values from the references were in units of parts per million (ppm) and converted to $\mu g/m^3$ for ease of comparison. Base reference values are shown in Table F-13.

a. AIHA 1989.

b. Amoore 1983.

c. Lowest value of the three isomers (m-Xylene)

$\mu g/m^3$ = microgram per cubic meter.

Of all the compounds that were modeled under the Proposed Action and Proposed Action with grain-to-ethanol facility, none exceeded the odor threshold value at the biorefinery parcel fence line. Thus, it is anticipated that residents of Hugoton, residents to the west, workers at the industrial park, and golfers should not detect odors from compounds emitted at the biorefinery.

Of all the compounds that were modeled for the Action Alternative, only nitrogen dioxide exceeded the odor threshold value at the biorefinery parcel fence line. However, when nitrogen dioxide was modeled at the offsite receptor locations, the maximum impact, located at the closest residence to the northwest, was below the odor threshold level. Thus, it is anticipated that residents of Hugoton, residents to the west, workers at the industrial park, and golfers should not detect odors from compounds emitted at the biorefinery. Further, odor detection is different for each individual, so the level of perception may differ by person.

F.14 Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model

The GREET Model, developed at the Argonne National Laboratory, examines "well-to-wheel" fuel lifecycles by considering feedstock recovery, feedstock transportation, fuel production, fuel transportation, and fuel use in vehicles. DOE evaluated the Proposed Action, Action Alternative, and the grain-to-ethanol facility to determine the level of greenhouse gas reduction. For each vehicle and fuel system evaluated, the GREET Model calculates consumption of total energy, emissions of greenhouse gases, and emissions of six criteria pollutants. GREET Model includes more than 100 fuel production pathways, such as corn stover to ethanol, and more than 70 vehicle/fuel systems, such as spark ignition engine vehicles using reformulated gasoline (Wang et al. 2007a).

The GREET Model is a spreadsheet-based model with specific tabs for data entry and calculations. The input tab is where most of the user input data would be entered, and default values changed, if necessary. Other tabs in the Model have time-based lookup tables for emission factors or parameters based on fuel production pathways. Because values of parameters, such as efficiencies of energy production, may change over time, the time-based lookup tables contain values of parameters for the years of 1990 to 2020 in five-year intervals. The user is able to choose the year for analysis and then chose the correct lookup table. Other tabs in the Model have general information such as fuel specifications; however, each fuel considered in the Model contains a tab with calculations for that fuel's production pathway. For the models of the Proposed Action, Action Alternative, and grain-to-ethanol facility, DOE evaluated the ethanol tab. Lastly, the results tab contains well-to-wheels pathway information such as energy use and emissions for various vehicle-fuel combinations. The information for each vehicle-fuel combination is separated into three categories: feedstock, fuel, and vehicle operation. Feedstock includes information on the recovery, transportation, and storage of the fuel feedstock. Fuel includes information on the production, transportation, storage, and distribution of the fuel. Vehicle operation contains information on the use of fuel in vehicles (Wang et al. 2007a).

Some of the parameter values in the GREET Model were modified in order to best reflect operation of the biorefinery under the Proposed Action, Action Alternative, and with the grain-to-ethanol facility. The analyses DOE evaluated used GREET version 1.8b, September 2008, with the current user manual based on version 1.7. For the analysis of the Proposed Action, Action Alternative, and grain-to-ethanol facility, year 2010 was chosen as the year for analysis with passenger cars as the vehicle for analysis.

F.14.1 GREET MODEL OF THE PROPOSED ACTION

For the ethanol fuel pathway, the choices of feedstock in the Model include corn, farmed trees, herbaceous biomass, corn stover, forest residue, and sugar cane. To best represent the Proposed Action, 100-percent corn stover was chosen because the Model does not allow for input of other crop residues and the biorefinery would use corn stover initially as the dominant feedstock.

The Abengoa Biorefinery Project would reduce greenhouse gas emissions not only by producing a fuel that displaces gasoline, but also by producing biopower that displaces electricity from other electricity generating sources. The GREET Model combines these reductions and other factors into a single metric to express the net effect on lifecycle greenhouse gas emissions relative to a baseline scenario in which the biorefinery is not built.

The GREET Model also accounts for land use changes and nutrient replacement following biomass removal. For the 100-percent corn stover scenario, the land use change emission factor was nullified because no land use changes are anticipated for corn stover procurement. The Model used default values to estimate fertilizer-related emissions from replacing the nutrients that were removed in the corn residue. Several assumptions were made for this estimate: the nutrient content of corn stover, the fraction of replacement fertilizer applied that is emitted as greenhouse gas, corn yield, and stover collection rate. The default values are approximations of values that could vary considerably in actuality. Furthermore, the nutrient replacement emission factor assumes that all land is managed in the same way and all crop residues are otherwise left in the field. In general, the Model adds an emission factor for nutrient replacement but does not subtract emissions from how the residue would have otherwise been utilized. Therefore, relative to land use-related parameters within the Model, DOE believes the results are conservative.

Relative to biorefinery operations, the expected ethanol yield was used in the GREET Model instead of a default parameter; that is, DOE evaluated the use of 21.6 gallons (82 liters) of ethanol per dry ton of biomass. Because electricity would be exported to the grid, the GREET Model included a value of -42.28 kilowatt hour per gallon of ethanol as an electricity credit. The electricity credit represents electricity produced by biomass that would be exported to the grid. This credit for electricity was then used in the total energy balance of the biorefinery from which some of the greenhouse gas emissions were calculated. Further, it was assumed for the Proposed Action that 24 percent of the total feedstock was used for ethanol production.

The baseline in the GREET Model considers passenger vehicles that use 100-percent conventional gasoline and/or reformulated gasoline. The well-to-wheels lifecycle for this baseline includes greenhouse gas emissions from the oil field in which crude oil is pumped, transportation of the crude oil to refineries, the refining process to produce gasoline, transportation of the gasoline to stations, and then use of the gasoline in passenger vehicles.

For the Proposed Action, the well-to-wheels lifecycle includes harvesting and transporting biomass to the biorefinery, processing the biomass feedstock into ethanol and electricity, transporting the ethanol fuel to stations, and use of the fuel in vehicles. The GREET Model was used to analyze the reduction in greenhouse gas emissions that would occur if wood waste was delivered and processed as one of the biomass feedstock options, but not actually burned in the boilers. This scenario is similar to the scenario for which potential emissions are shown in Table F-6, and for which the air quality impact modeling was performed. The GREET Model was used to compare greenhouse gas emissions from three scenarios with the baseline scenario—(1) vehicles fueled only by ethanol, (2) vehicles fueled by 85-percent ethanol and 15-percent gasoline (E85), and (3) vehicles fueled by 10-percent ethanol and 90-percent gasoline (E10). The comparison of emissions, in grams per mile, is a percent reduction calculation based on fuel per mile usage and also includes any applicable emissions credits for electricity export or carbon dioxide capture. Thus, for the first scenario, the percent reduction is based on a direct replacement of gasoline with corn stover ethanol as well as the export of electricity to the grid. Based on the GREET Model, the Proposed Action under the first scenario would result in a 340-percent reduction in greenhouse gas emissions compared with the gasoline-only baseline (ABBK n.d.a). The reductions in greenhouse gas emissions are due largely to the emissions credit for the electricity being exported to the grid. The biopower that would be exported replaces electricity that would have been produced via an average U.S. mix where 50.7 percent is from coal, 18.9 percent is from natural gas, 18.7 percent is from nuclear, 2.7 percent is from residual oil, 1.3 percent is from biomass, and 7.7 percent is from other sources. Thus, the greenhouse gas emissions credit is essentially equal to the difference between the greenhouse gases from producing biomass-based electricity and greenhouse gases from producing electricity via the average U.S. mix. Because the majority of the electricity the Abengoa biorefinery would produce would be exported rather than used for operations, the greenhouse gases displaced by the biorefinery would be larger than the greenhouse gases emitted by the biorefinery for operations, thus causing a decrease in greenhouse gas that exceeds 100-percent. As a comparison, if only enough electricity was produced to run the biorefinery (none would be sold to the grid), the percent reduction under the Proposed Action would be 69-percent as compared with the gasoline-only baseline (ABBK n.d.b). In the second scenario (E85), DOE estimates a 329-percent reduction in greenhouse gas emissions; once again primarily due to the emissions credit (ABBK n.d.a). As a comparison, without the export of electricity to the grid, the percent reduction in greenhouse gas under the second scenario would be 62-percent (ABBK n.d.b). In the third scenario

(E10), DOE estimates that a 29-percent reduction in greenhouse gas emissions could be achieved relative the gasoline-only baseline (ABBK n.d.a).

F.14.2 GREET MODEL OF THE ACTION ALTERNATIVE

The GREET Model analysis of the Action Alternative was similar to the analysis of the Proposed Action, in that 100-percent corn stover was selected as the feedstock and all the assumptions regarding land use and fertilizer use were consistent with the Proposed Action. However, because the two scenarios differ in ethanol production as well as energy production and use, the GREET Model analysis of the Action Alternative differs in regard to these factors.

Relative to biorefinery operations, the expected ethanol yield was used in the GREET Model rather than a default parameter; that is 53.9 gallons (204 liters) of ethanol per dry ton of biomass. Because the biorefinery under the Action Alternative would not export electricity to the grid, the energy credit factor was not included. It was assumed in the GREET Model for the Action Alternative that 74 percent of the total feedstock was used for ethanol production. The gasification process in the biorefinery under the Action Alternative was accounted for by including calculations for energy consumption and production into the Model spreadsheet. The energy balance was then imported into the Model, where it was used in the overall energy and emissions calculations.

The GREET Model was used to compare greenhouse gas emissions from the biorefinery described under the Action Alternative for each of the three scenarios (described for the Proposed Action) with the gasoline-only baseline. Based on this analysis, the Action Alternative under the first scenario would result in a 39-percent reduction in greenhouse gas emissions compared with the gasoline-only baseline. In the second scenario (E85), DOE estimates a 33-percent reduction in greenhouse gas emissions, and in the third scenario (E10), DOE estimates a 3-percent reduction in greenhouse gas emissions could be achieved relative to the gasoline-only baseline (Van Pelt 2009).

F.14.3 GREET MODEL OF THE GRAIN-TO-ETHANOL FACILITY

Because the grain-to-ethanol facility would operate in parallel with the biorefinery under the Proposed Action or Action Alternative, the reduction in greenhouse gas emissions resulting from the lifecycle analysis of the grain-to-ethanol facility would be in addition to the greenhouse gas emissions reduction based on the lifecycle analysis of the Proposed Action or Action Alternative. As with the biorefinery under both the Proposed Action and Action Alternative, the GREET Model analysis of the grain-to-ethanol facility was compared with the baseline scenario in which passenger vehicles utilized 100-percent conventional and/or reformulated gasoline.

In the GREET Model for the grain-to-ethanol facility, it was assumed that the ethanol from the grain-to-ethanol facility was produced from 100-percent corn using a dry milling process. Feedstock for the grain-to-ethanol facility would consist of approximately 30-percent corn and 70-percent grain sorghum. However, the GREET Model does not allow for input of grain sorghum, so modeling at 100-percent corn is the only available option. Relative to grain sorghum, however, corn generally requires greater chemical inputs and irrigation, and therefore modeling 100-percent corn would be more conservative and yield greater greenhouse gas emissions.

DOE assumed, conservatively, that there would be emissions resulting from land use changes based on the demand for corn for the grain-to-ethanol facility. As discussed in the land use analysis (Chapter 5, Section 5.2.1.2.3 of the EIS), land use changes are not anticipated, so the Model results that account for land use changes would be conservative. Further, the Model accounts for emissions associated with agricultural chemicals (fertilizers and pesticides) used in corn farming and the production of those chemicals. Nitrous oxide emissions from nitrification and denitrification of nitrogen fertilizer in corn fields are a significant greenhouse gas emission source for corn ethanol facilities (Wang et al. 2007b).

Consistent with the grain-to-ethanol facility's maximum drying capability, it was assumed in the GREET Model that 50 percent of the wet distiller's grain would be dried. A calculation section was included in the Model spreadsheet to account for energy consumption and generation by the grain-to-ethanol facility; that is, 31,016 British thermal units per gallon (8,600 kilojoule per liter) of ethanol produced. The energy requirements include the energy needed for ethanol production, the energy needed for drying 50 percent of the wet distiller's grain, and electricity for plant operation and carbon dioxide capture. The energy requirements were imported into the ethanol tab and used in the overall energy and emissions calculations.

The GREET Model representation of the grain-to-ethanol facility included 100-percent carbon dioxide capture from the fermentation and distillation process. The captured carbon dioxide would be sent offsite for possible use in enhanced oil recovery systems. The carbon dioxide capture and subsequent use in oil and gas recovery systems generates a carbon dioxide emission credit in the Model, which is subtracted from the total carbon dioxide emissions.

The well-to-wheels lifecycle for the grain-to-ethanol facility included farming (direct fuel estimates for powering farming equipment, drying corn, irrigation, and for other farming operations), harvesting and transporting the corn to the grain-to-ethanol facility, processing the corn into ethanol, transporting the fuel to stations, and using the fuel in vehicles.

The GREET Model was used to compare greenhouse gas emissions from the grain-to-ethanol facility for the three scenarios described for the Proposed Action with the gasoline-only baseline. Based on this analysis, the grain-to-ethanol facility under the first scenario would result in a 60-percent reduction in greenhouse gas emissions compared with the gasoline-only baseline scenario. In the second scenario, DOE estimates that a 53-percent reduction in greenhouse gas emissions could be achieved. In the third scenario, DOE estimates that a 4-percent reduction in greenhouse gas emissions could be achieved relative to the baseline scenario (ABBK n.d.c).

These reductions in greenhouse gas emissions are only for the grain-to-ethanol facility with carbon dioxide capture. Therefore, adding the grain-to-ethanol facility to the biorefinery (Proposed Action) would increase the overall benefit to the greenhouse gas lifecycle compared with the gasoline-only scenario. The grain-to-ethanol facility would utilize some of the electricity produced by the Proposed Action; therefore, the percent reduction in greenhouse gas from the Proposed Action would decrease because less electricity would be exported to the grid. The percent reduction in greenhouse gas from the Proposed Action would be 297-percent under the first scenario as compared to the gasoline-only baseline case (ABBK n.d.d) rather than 340-percent as reported in Section F.14.1. The total greenhouse gas reduction from the Proposed Action with grain-to-ethanol facility under the first scenario as compared to the gasoline-only baseline case would be 357-percent. Likewise, the percent reduction in greenhouse gas from the Proposed Action under the second scenario would be 287-percent, and 25-percent under the third scenario (ABBK n.d.d). Thus, the total greenhouse gas reduction for the Proposed Action with grain-to-ethanol facility under the second scenario would be 340-percent, and 29-percent under the third scenario.

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Attachment A –

Figures

Figure A-1. Air quality receptor grid.

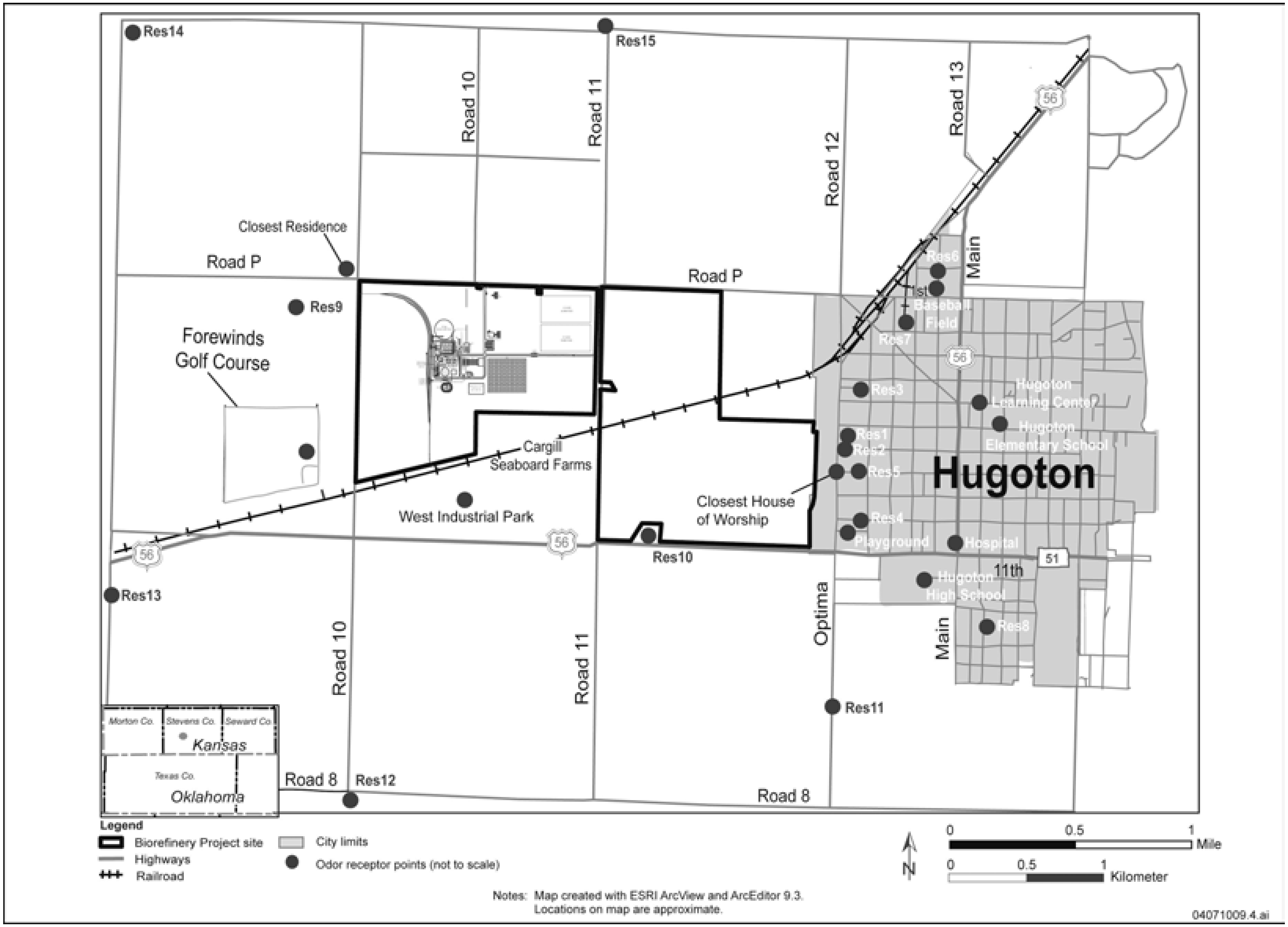

Figure A-2. Sensitive receptor grid.

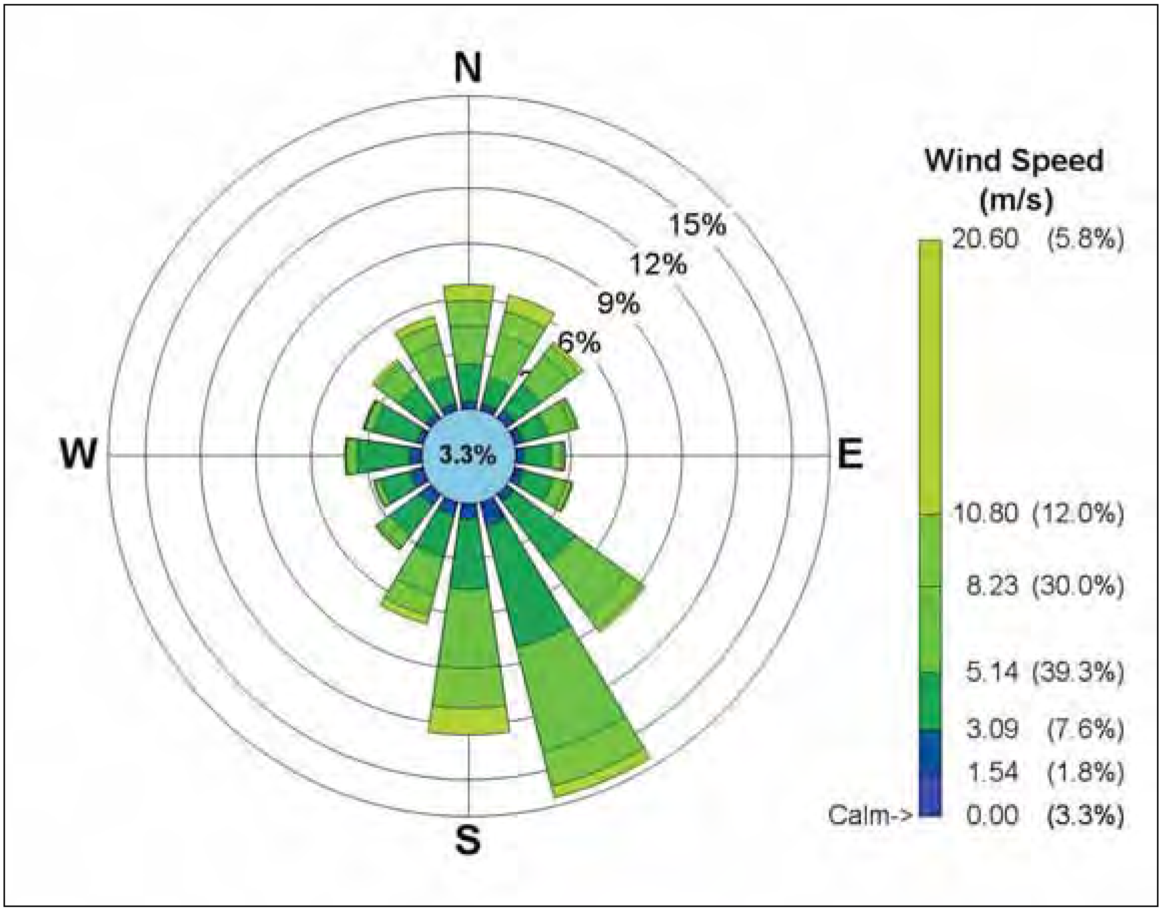

Figure A-3. 2002 Surface Wind Rose.

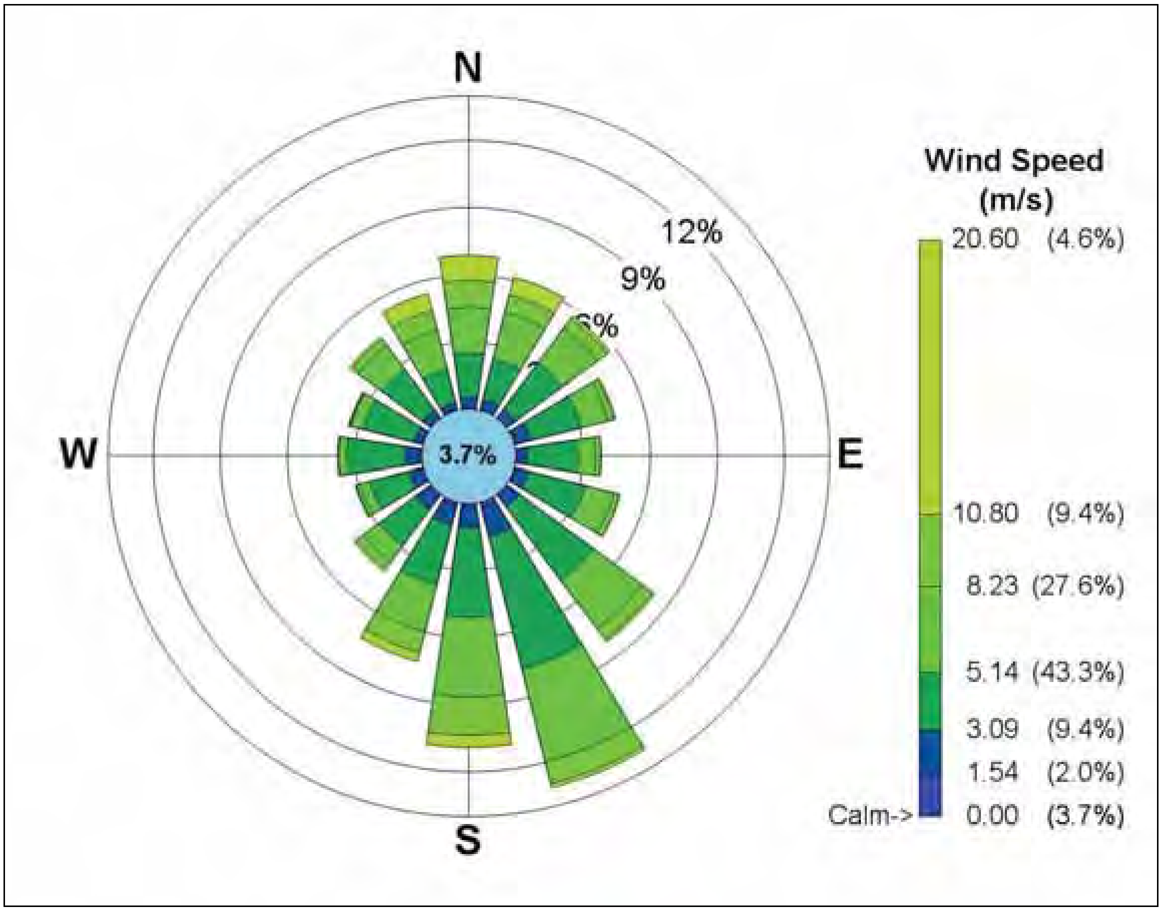

Figure A-4. 2003 Surface Wind Rose.

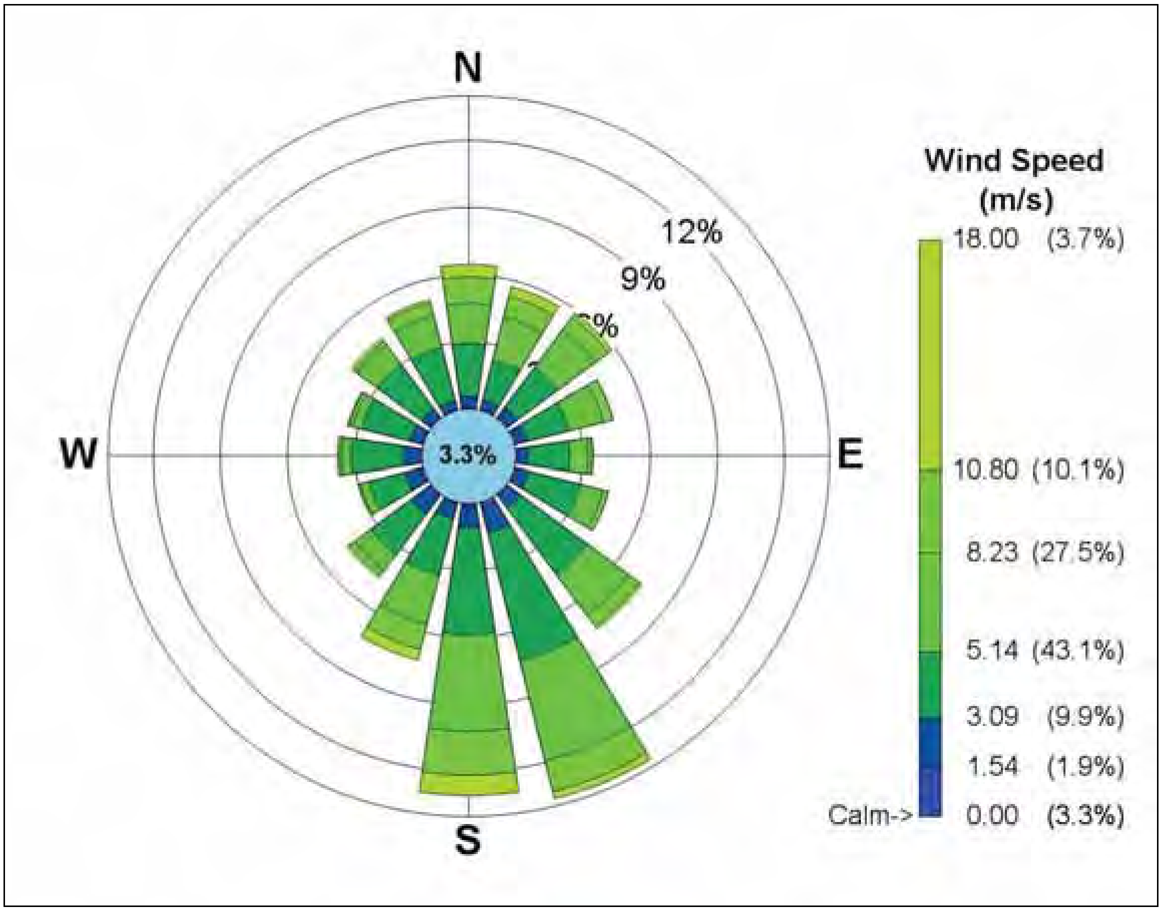

Figure A-5. 2004 Surface Wind Rose.

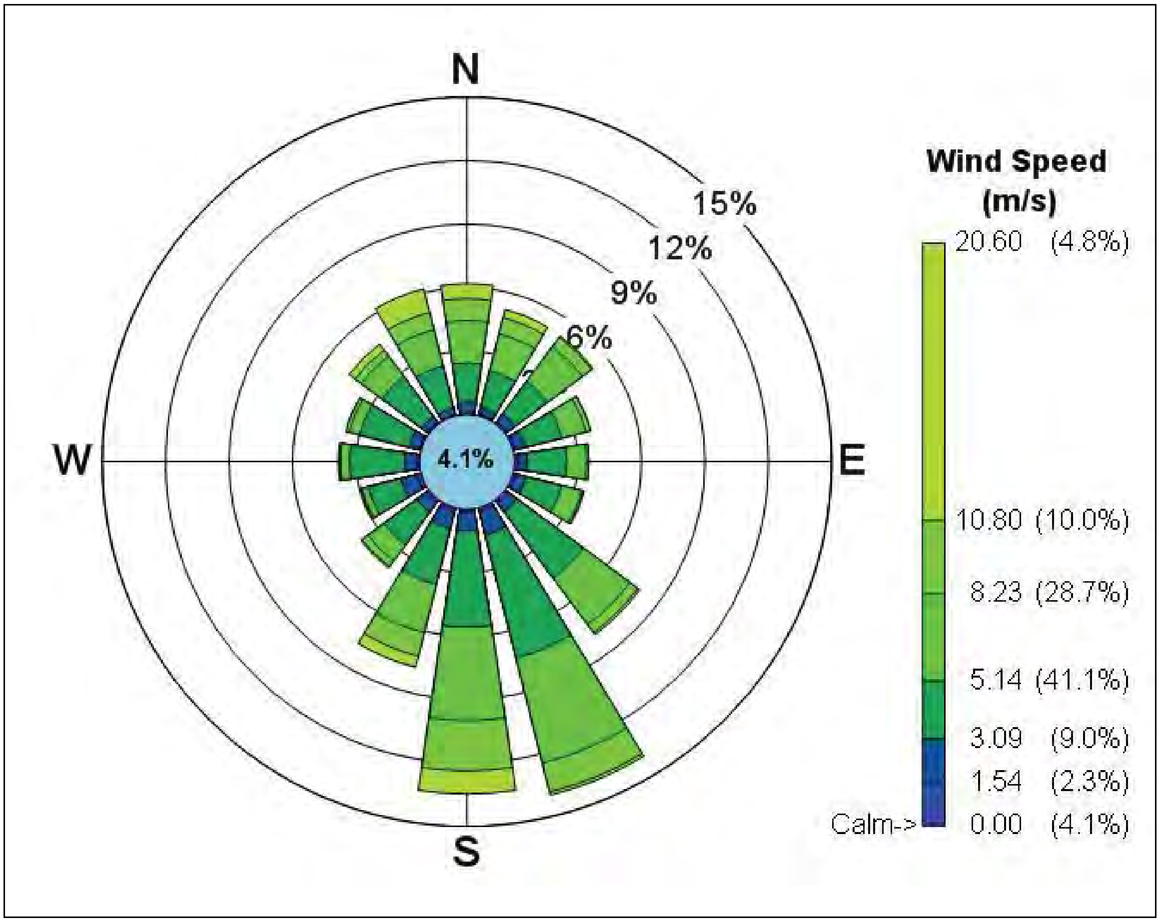

Figure A-6. 2005 Surface Wind Rose.

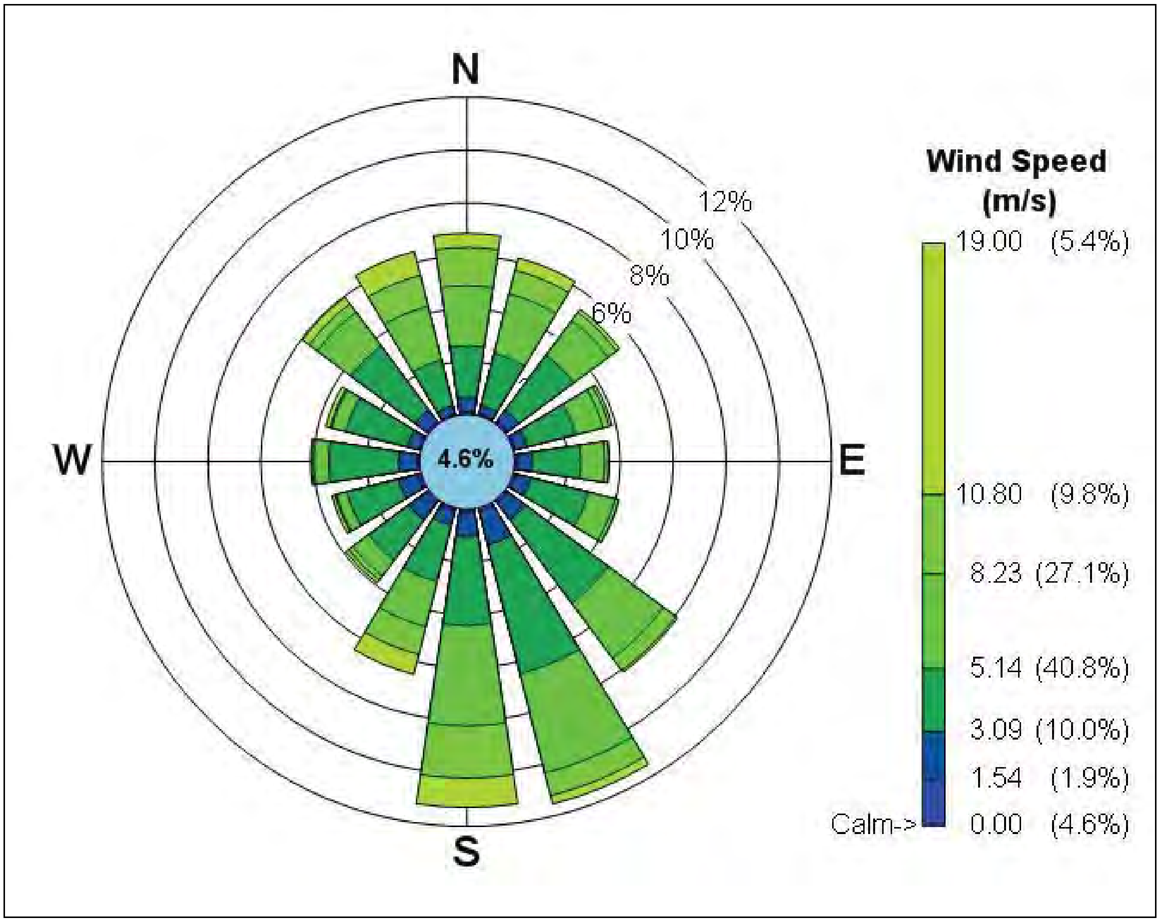

Figure A-7. 2006 Surface Wind Rose.

Attachment B –

Tables of Supporting Data for the Proposed Action

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table B1 - Proposed Action Modeling Potential to Emit

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
HAUL ROADS											
EP-01000FUG	Paved Plant Roads	2.11	25.32	3.21	--	--	--	--	--	--	Note 1
EP-01050FUG	Biomass Laydown Roads	0.64	7.72	1.33	--	--	--	--	--	--	
ENZYMATIC HYDROLYSIS PLANT											
EP-11134	Biomass Grinding DC #1	5.27	126.39	23.07	--	--	--	--	--	--	
EP-11135	Biomass Grinding DC #2	5.27	126.39	23.07	--	--	--	--	--	--	
EP-11235	Floor Sweep System DC	0.51	6.17	1.02	--	--	--	--	--	--	Note 2
EP-11601	Biomass Surge Bin #1 DC	0.34	8.23	0.68	--	--	--	--	--	--	
EP-11602	Biomass Surge Bin #2 DC	0.34	8.23	0.68	--	--	--	--	--	--	
EP-11603	Biomass Surge Bin #3 DC	0.34	8.23	0.68	--	--	--	--	--	--	
EP-12101	EH Metering Bin #1	0.55	13.17	2.40	--	--	--	--	--	--	
EP-11711	Boiler 1 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11721	Boiler 1 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11731	Boiler 1 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11712	Boiler 2 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11722	Boiler 2 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11732	Boiler 2 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11713	Boiler 3 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11723	Boiler 3 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11733	Boiler 3 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11714	Boiler 4 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11724	Boiler 4 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11734	Boiler 4 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11081	Dirt Load-Out Silo	0.02	0.48	0.09	--	--	--	--	--	--	
EP-11082	Dirt Load-Out Silo Spout	0.05	0.58	0.10	--	--	--	--	--	--	Note 1
EP-11001FUG	Raw Wood Residues Grinding and Handling	0.03	0.38	0.03	--	--	--	--	--	--	Note 1, 3
EP-11002FUG	Crop Residues and Energy Crops Grinding and Handling	0.03	0.83	0.11	--	--	--	--	--	--	
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.03	0.40	0.03	--	--	--	--	--	--	Note 1
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	0.30	7.21	1.32	--	--	--	--	--	--	
EP-11052FUG	Wood Residues (Hog Fuel) Storage Pile Loading	0.03	0.38	0.03	--	--	--	--	--	--	Note 1
EP-18185	EH Fermentation CO2 Scrubber	--	--	--	--	--	--	--	--	--	
EP-18180	EH Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	--	--	--	--	--	--	--	--	--	

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
ETHANOL FINISHING AND STORAGE											
EP-02000	Fugitive Leaks	--	--	--	--	--	--	--	--	--	
T-02107	EH Product Shift Tank #1	--	--	--	--	--	--	--	--	--	
T-02108	EH Product Shift Tank #2	--	--	--	--	--	--	--	--	--	
T-02101	EH Product Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-02102	EH Ethanol Product Storage Tank	--	--	--	--	--	--	--	--	--	
T-02105	EH Denaturant Storage Tank	--	--	--	--	--	--	--	--	--	
EP-02100	Vapor Recovery System	--	--	--	--	--	--	--	--	--	Note 1
EP-02100FUG	Loading Losses	--	--	--	--	--	--	--	--	--	Note 1

Source: Salter 2010b.

Table B1 - Proposed Action Modeling Potential to Emit

		PM10			NOx		SO2		CO		
Source No.	**Source Description**	**(lb/hr)**	**(lb/day)**	**(tons/yr)**	**(lb/hr)**	**(tons/yr)**	**(lb/hr)**	**(tons/yr)**	**(lb/hr)**	**(tons/yr)**	**Notes**
UTILITIES											
EP-02701	Ash Pelletizer Dryer DC	0.34	8.23	1.50	0.88	3.85	0.01	0.05	1.60	7.01	
EP-02702	Ash Pelletizer Cooler DC	0.17	4.11	0.75	--	--	--	--	--	--	
EP-02710	Ash Pellets Load-Out Silo	0.02	0.48	0.09	--	--	--	--	--	--	
EP-02711	Ash Pellets Load-Out Silo Spout	0.05	0.58	0.10	--	--	--	--	--	--	Note 1
EP-02710FUG	Ash Pellets Load-Out from Silo	0.07	0.79	0.05	--	--	--	--	--	--	Note 1
EP-04001	EH Cooling Water Tower	0.03	0.78	0.14	--	--	--	--	--	--	
EP-21001	CoGen Cooling Water Tower	0.16	3.83	0.70	--	--	--	--	--	--	
EP-20001	Biomass-Fired Boiler #1	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20002	Biomass-Fired Boiler #2	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20003	Biomass-Fired Boiler #3	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20004	Biomass-Fired Boiler #4	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20514	Boiler Bottoms Ash Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20524	Boiler Bottoms Ash Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20534	Boiler Bottoms Ash Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20544	Boiler Bottoms Ash Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20510	Boiler Fly Ash Handling DC #1	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20520	Boiler Fly Ash Handling DC #2	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20530	Boiler Fly Ash Handling DC #3	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20540	Boiler Fly Ash Handling DC #4	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20511	Bed Media Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20521	Bed Media Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20531	Bed Media Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20541	Bed Media Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20512	Trona Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20522	Trona Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20532	Trona Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20542	Trona Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20551FUG	Ash Pellets Storage Pit	0.03	0.63	0.11	--	--	--	--	--	--	
EP-20552FUG	Ash Pellets Storage Pit Loading & Load-Out	0.13	1.59	0.10	--	--	--	--	--	--	Note 1
EP-09001 (SSM)	Biogas Flare	--	--	--	--	--	--	--	--	--	Note 4
EP-06001 (EMG)	Firewater Pump Engine	0.15	0.30	0.01	3.03	0.15	0.94	0.05	2.65	0.13	Note 5

Note 1. The hourly and daily haul road, dirt/fines loadout, ethanol loadout, ash pellets loadout, and wood residues (hog fuel) loadout and processing emissions are based on the "typical scenario" for shipping and receiving, which assumes that all shipping and receiving will occur 6:00 AM to 6:00 PM only, or 12 hours per day.

Note 2. The floor sweep system will be operated intermittently. For the purposes of PTE calculations, the floor sweep system has been assumed to operate not more than 12 hours per days. 24-hour PM10 emissions were modeled using a variable emission rate scalar of 0.5.

Note 3. Conservative Scenario for energy crops (agricultural residues) processing assumes continuous processing for the 24-hour PM10 emissions.

Note 4. The biogas flare incorporated into the facility design does not operate during normal operating conditions at the facility; therefore, this source is not included in the modeling analysis.

Note 5. Emergency equipment will operate a maximum of 2 hours per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event.

Source: Salter 2010b.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table B2 - Proposed Action Modeled Source Parameters

AREA SOURCE PARAMETERS (1)

Source ID	Source Description	Actual Width (2) (m)	Adjusted Width (2) (m)	Maximum Length of Area Source (3) (m)	Average Height of Trucks (4) (m)	Area Source Release Height (5) (m)	Initial Vertical Dim. (6) (m)	Total Area of Roads Area Sources (m^2)
EP01000F	Paved Plant Roads	7.3	17.1	170.7	4.0	4.0	1.8	30,559.9

HAUL ROAD SEGMENTS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (m)	Width (Y) (m)	Area (m^2)	Angle	Segment No.
EP01000F	Paved Plant Roads								
PRDA01	Paved Road Area 1	288995.0	4117608.0	951.57	73.2	17.1	1,248.6	0	1
PRDA02	Paved Road Area 2	288921.8	4117608.0	951.94	73.2	17.1	1,248.6	0	1
PRDA03	Paved Road Area 3	288848.7	4117608.0	952.16	73.2	17.1	1,248.6	0	1
PRDA04	Paved Road Area 4	288775.5	4117608.0	952.70	73.2	17.1	1,248.6	0	1
PRDA05	Paved Road Area 5	288702.4	4117608.0	953.06	73.2	17.1	1,248.6	0	1
PRDA06	Paved Road Area 6	288629.2	4117608.0	953.42	73.2	17.1	1,248.6	0	1
PRDA07	Paved Road Area 7	288556.1	4117608.0	954.02	73.2	17.1	1,248.6	0	1
PRDA08	Paved Road Area 8	288482.9	4117608.0	954.19	73.2	17.1	1,248.6	0	1
PRDA09	Paved Road Area 9	288409.8	4117608.0	954.55	73.2	17.1	1,248.6	0	1
PRDA10	Paved Road Area 10	288336.6	4117608.0	954.78	73.2	17.1	1,248.6	0	2
PRDA11	Paved Road Area 11	288263.5	4117608.0	954.98	73.2	17.1	1,248.6	0	2
PRDA12	Paved Road Area 12	288190.3	4117608.0	955.24	73.2	17.1	1,248.6	0	2
PRDA13	Paved Road Area 13	288122.2	4117608.0	955.24	68.3	17.1	1,165.4	0	2
PRDA14	Paved Road Area 14	288122.2	4117625.1	955.29	80.5	17.1	1,373.5	270	2
PRDA15	Paved Road Area 15	288122.2	4117688.5	955.55	73.2	17.1	1,248.6	0	2
PRDA16	Paved Road Area 16	288195.3	4117688.5	955.55	38.7	17.1	660.7	0	2
PRDA17	Paved Road Area 17	288234.0	4117705.5	955.55	80.5	17.1	1,373.5	90	2
PRDA18	Paved Road Area 18	288105.1	4117625.1	955.42	73.2	17.1	1,248.6	90	3
PRDA19	Paved Road Area 19	288105.1	4117552.0	955.35	57.9	17.1	988.5	90	3
PRDA20	Paved Road Area 20	288105.2	4117476.9	955.24	90.2	17.1	1,540.0	0	3
PRDA21	Paved Road Area 21	288195.3	4117476.9	954.94	73.2	17.1	1,248.6	0	3
PRDA22	Paved Road Area 22	288268.5	4117476.9	954.64	73.2	17.1	1,248.6	0	3
PRDA23	Paved Road Area 23	288341.6	4117476.9	954.37	73.2	17.1	1,248.6	0	3
PRDA24	Paved Road Area 24	288431.8	4117476.9	954.07	73.2	17.1	1,248.6	270	3
PRDA25	Paved Road Area 25	288431.8	4117550.1	954.21	57.6	17.1	983.3	270	3

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, ***Modeling Fugitive Dust Sources with AERMOD***, revised January 2007; Trinity Consultants test data, ***Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling***, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), ***Utah Division of Air Quality Modeling Guidelines***, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and accounts for the vertical emission dilution from moving trucks.

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Table B2 - Proposed Action Modeled Source Parameters

AREA SOURCE PARAMETERS [1]								
Source ID	Source Description	Actual Width [2] (m)	Adjusted Width [2] (m)	Maximum Length of Area Source [3] (m)	Average Height of Trucks [4] (m)	Area Source Release Height [5] (m)	Initial Vertical Dim. [6] (m)	Total Area of Roads Area Sources (m^2)
EP01050F	Biomass Laydown Roads	7.3	17.1	170.7	4.0	4.0	1.8	30,017.9

HAUL ROAD SEGMENTS								
Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (m)	Width (Y) (m)	Area (m^2)	Angle
EP01050F	Biomass Laydown Roads							
BRDA01	Biomass Road Area 1	288451.8	4117571.1	954.13	73.2	17.1	1,248.6	0
BRDA02	Biomass Road Area 2	288525.0	4117571.1	953.93	73.2	17.1	1,248.6	0
BRDA03	Biomass Road Area 3	288598.1	4117571.1	953.55	73.2	17.1	1,248.6	0
BRDA04	Biomass Road Area 4	288630.3	4117571.1	953.41	73.2	17.1	1,248.6	90
BRDA05	Biomass Road Area 5	288630.3	4117497.9	953.11	73.2	17.1	1,248.6	90
BRDA06	Biomass Road Area 6	288439.3	4117407.7	954.02	85.6	17.1	1,461.9	0
BRDA07	Biomass Road Area 7	288525.0	4117407.7	953.57	73.2	17.1	1,248.6	0
BRDA08	Biomass Road Area 8	288598.1	4117407.7	953.13	73.2	17.1	1,248.6	0
BRDA09	Biomass Road Area 9	288566.3	4117571.1	953.83	73.2	17.1	1,248.6	90
BRDA10	Biomass Road Area 10	288566.3	4117497.9	953.45	73.2	17.1	1,248.6	90
BRDA11	Biomass Road Area 11	288501.8	4117571.1	954.02	73.2	17.1	1,248.6	90
BRDA12	Biomass Road Area 12	288501.8	4117497.9	953.80	73.2	17.1	1,248.6	90
BRDA13	Biomass Road Area 13	288439.3	4117571.1	954.21	73.2	17.1	1,248.6	90
BRDA14	Biomass Road Area 14	288439.3	4117497.9	954.13	73.2	17.1	1,248.6	90
BRDA15	Biomass Road Area 15	288431.8	4117571.1	954.25	19.8	17.1	338.2	0
BRDA16	Biomass Road Area 16	288599.0	4117571.1	953.54	73.2	17.1	1,248.6	90
BRDA17	Biomass Road Area 17	288599.0	4117497.9	953.39	73.2	17.1	1,248.6	90
BRDA18	Biomass Road Area 18	288535.0	4117571.1	953.86	73.2	17.1	1,248.6	90
BRDA19	Biomass Road Area 19	288535.0	4117497.9	953.72	73.2	17.1	1,248.6	90
BRDA20	Biomass Road Area 20	288470.5	4117571.1	954.06	73.2	17.1	1,248.6	90
BRDA21	Biomass Road Area 21	288470.5	4117497.9	954.02	73.2	17.1	1,248.6	90
BRDA22	Biomass Road Area 22	288385.0	4117605.0	954.63	49.7	29.9	1,484.0	90
BRDA23	Biomass Road Area 23	288359.5	4117498.5	954.33	54.9	54.9	3,010.1	0

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, ***Modeling Fugitive Dust Sources with AERMOD***, revised January 2007; Trinity Consultants test data, ***Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling***, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), ***Utah Division of Air Quality Modeling Guidelines***, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and accounts for the vertical emission dilution from moving trucks.

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Table B2 - Proposed Action Modeled Source Parameters

AREA SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (1) (m)	Width (Y) (m)	Area Source Release Height (2) (m)	Initial Vertical Dim. (3) (m)	Source Area (m^2)
EP-20551FUG	Ash Pellets Storage Pit	288357.5	4117626.5	954.72	45.7	45.7	0.46	0.21	2,090
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	288174.8	4117762.5	955.78	114.3	--	6.10	2.84	10,261

(1) Length of side for wood residues storage pile based on pile diameter.
(2) Release Height = Average Pile Height / 2
Ash pellet storage pit is a rectangular below grade pit. It is assumed the average pile height would be 3 feet (0.91 meters) above grade.
Wood residues storage pile is a conical pile with an average height of 40 feet (12 meters) and maximum height of 60 feet (18 meters).
(3) Initial Vertical Dimension = Average Pile Height / 4.3

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Release Height (1, 2) (m)	Length of Side (6) (m)	Initial Lateral Dim. (3) (m)	Height of Structure or Truck When Dumping (m)	Initial Vertical Dim. (4, 5) (m)
EP11001F	Wood Residues Receiving via Rail	288103.0	4117721.5	955.55	1.52	1.83	0.43	1.52	0.71
EP11002F	Crop Residues and Energy Crops Grinding and Handling								
EP11002A	Crop Residues Receiving via Truck Line #1	288386.0	4117599.7	954.63	1.52	3.05	0.71	7.62	3.54
EP11002B	Crop Residues Receiving via Truck Line #2	288386.0	4117590.5	954.63	1.52	3.05	0.71	7.62	3.54
EP11002C	Crop Residues Receiving via Truck Line #3	288386.0	4117581.3	954.56	1.52	3.05	0.71	7.62	3.54
EP11002D	Crop Residues Receiving via Truck Line #4	288386.0	4117572.0	954.48	1.52	3.05	0.71	7.62	3.54
EP11002E	Crop Residues Receiving via Truck Line #5	288386.0	4117562.8	954.39	1.52	3.05	0.71	7.62	3.54
EP11003F	Dirt/Fines Load-Out from Silo	288351.0	4117544.5	954.63	4.57	12.19	2.84	16.76	7.80
EP02710F	Ash Pellets Load-Out from Silo	288123.0	4117660.5	955.53	4.57	12.19	2.84	16.76	7.80
EP20552F	Ash Pellets Storage Pit Loading & Load-Out	288380.5	4117626.5	954.65	1.52	3.05	0.71	7.62	3.54
EP11052F	Wood Residues (Hog Fuel) Storage Pile Loading	288174.8	4117762.5	955.78	6.10	114.30	26.58	6.10	2.84
EP19001F	Lignin-Rich Stillage Storage and Loadout	288237.5	4117498.5	954.92	2.29	24.38	5.67	4.57	2.13
EP02000F	Fugitive Leaks	Emissions divided equally among storage tanks; as fugitive leaks occur throughout the facility.							
T02107F	EH Product Shift Tank #1	288189.0	4117426.5	954.85	3.05	6.10	1.42	6.10	2.84
T02108F	EH Product Shift Tank #2	288180.0	4117426.5	954.94	3.05	6.10	1.42	6.10	2.84
T02101F	EH Product Off-Spec Tank	288180.0	4117444.0	954.94	3.05	6.10	1.42	6.10	2.84
T02102F	EH Ethanol Product Storage Tank	288205.0	4117426.5	954.68	6.55	13.11	3.05	13.11	6.10
T02105F	EH Denaturant Storage Tank	288194.0	4117444.0	954.82	3.05	4.27	0.99	6.10	2.84
EP02100F	Loading Losses (6)	288084.0	4117468.0	955.24	2.35	17.41	4.05	4.70	2.19

(1) Release Height from Structure = Height of Structure / 2 [OR] Release Height from Truck/Rail Car Unloading = Height from Truck Bed/Rail Car to Ground or Feeder
Height from truck bed or rail car to ground or feeder assumed to be 1.5 meters (5 feet).
(2) Release Height from Silo = Average between height of silo loading chute and height of truck, or 15 feet (4.6 meters)
(3) Initial Lateral Dimension of Single Volume Source = Length of Side / 4.3
(4) Initial Vertical Dimension of Elevated Source on or Adjacent to a Building (Structure Based) = Structure Height (or Unloading Height) / 2.15

(5) For truck loading by material dropping from a silo, the initial depth of the plume from this drop equals the height of the silo (structure) / 2.15 to account for building wake effects.
(6) Length of side for silos and storage tanks based on silo/tank diameter.
(7) Release and structure height and length of side based on standard railcar tanker dimensions; 15'5" high x 57'1.5" long
(http://worldtraderef.com/WTR_site/Rail_Cars/Guide_to_Rail_Cars.asp).

Table B2 - Proposed Action Modeled Source Parameters

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (°K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
POINT SOURCE PARAMETERS									
ENZYMATIC HYDROLYSIS PLANT									
EP11134	Biomass Grinding DC #1	288336.0	4117552.0	954.63	22.86	2.44	Ambient	72.49	15.52
EP11135	Biomass Grinding DC #2	288326.0	4117552.0	954.63	22.86	2.44	Ambient	72.49	15.52
EP11601	Biomass Surge Bin #1 DC	288190.0	4117603.5	955.24	16.76	0.61	Ambient	4.72	16.17
EP11602	Biomass Surge Bin #2 DC	288207.0	4117603.5	955.24	16.76	0.61	Ambient	4.72	16.17
EP11603	Biomass Surge Bin #3 DC	288224.0	4117603.5	955.16	16.76	0.61	Ambient	4.72	16.17
EP12101	EH Metering Bin #1	288241.5	4117594.0	954.98	19.81	0.76	Ambient	7.55	16.56
EP11711	Boiler 1 Metering Bin DC #1	288161.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11721	Boiler 1 Metering Bin DC #2	288166.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11731	Boiler 1 Metering Bin DC #3	288172.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11712	Boiler 2 Metering Bin DC #1	288177.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11722	Boiler 2 Metering Bin DC #2	288183.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11732	Boiler 2 Metering Bin DC #3	288188.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11713	Boiler 3 Metering Bin DC #1	288194.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11723	Boiler 3 Metering Bin DC #2	288199.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11733	Boiler 3 Metering Bin DC #3	288205.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11714	Boiler 4 Metering Bin DC #1	288210.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11724	Boiler 4 Metering Bin DC #2	288216.0	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11734	Boiler 4 Metering Bin DC #3	288221.5	4117627.0	955.24	19.81	0.46	Ambient	2.08	12.65
EP11235	Floor Sweep System DC	288312.0	4117552.0	954.63	12.19	0.76	Ambient	7.08	15.52
EP11081	Dirt Load-Out Silo	288356.0	4117539.5	954.63	19.81	0.15	Ambient	0.28	15.24
EP11082	Dirt Load-Out Silo Spout	288344.0	4117544.5	954.63	12.19	0.25	Ambient	0.66	13.04
EP18185	EH Fermentation CO2 Scrubber	288226.0	4117546.5	954.94	21.34	0.61	294.11	8.12	27.81
EP18180	EH Distillation Vent Scrubber	288214.0	4117530.5	954.94	24.38	0.20	293.00	0.30	9.31
ETHANOL FINISHING AND STORAGE									
EP02100	Vapor Recovery System	288178.0	4117474.0	954.94	3.66	0.15	Ambient	0.47	25.87
UTILITIES									
EP02701	Ash Pelletizer Dryer DC	288146.0	4117645.0	955.28	22.86	0.61	422	4.72	16.17
EP02702	Ash Pelletizer Cooler DC	288136.0	4117645.0	955.36	19.81	0.46	305	2.36	14.37
EP02710	Ash Pellets Load-Out Silo	288128.0	4117655.5	955.48	19.81	0.15	Ambient	0.28	15.24
EP02711	Ash Pellets Load-Out Silo Spout	288116.0	4117660.5	955.55	12.19	0.25	Ambient	0.66	13.04
EP04001	EH Cooling Tower								
EP04001A	EH CWT Cell 1	288164.0	4117586.0	955.24	13.41	10.06	295	593.68	7.47
EP21001	CoGen Cooling Water Tower								
EP22001A	CoGen CWT Cell 1	288268.0	4117719.0	955.55	13.41	10.06	295	593.68	7.47
EP22001B	CoGen CWT Cell 2	288268.0	4117709.0	955.54	13.41	10.06	295	593.68	7.47
EP22001C	CoGen CWT Cell 3	288268.0	4117699.0	955.44	13.41	10.06	295	593.68	7.47
EP22001D	CoGen CWT Cell 4	288268.0	4117689.0	955.35	13.41	10.06	295	593.68	7.47
EP22001E	CoGen CWT Cell 5	288268.0	4117679.0	955.26	13.41	10.06	295	593.68	7.47
EP20001	Biomass-Fired Boiler #1	288169.0	4117681.0	955.55	36.58	3.05	466	103.82	14.23
EP20002	Biomass-Fired Boiler #2	288184.0	4117681.0	955.55	36.58	3.05	466	103.82	14.23
EP20003	Biomass-Fired Boiler #3	288199.0	4117681.0	955.55	36.58	3.05	466	103.82	14.23
EP20004	Biomass-Fired Boiler #4	288214.0	4117681.0	955.55	36.58	3.05	466	103.82	14.23
EP20514	Boiler Bottoms Ash Handling DC #1	288165.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20524	Boiler Bottoms Ash Handling DC #2	288180.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20534	Boiler Bottoms Ash Handling DC #3	288195.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20544	Boiler Bottoms Ash Handling DC #4	288210.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20510	Boiler Fly Ash Handling DC #1	288165.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20520	Boiler Fly Ash Handling DC #2	288180.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20530	Boiler Fly Ash Handling DC #3	288195.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20540	Boiler Fly Ash Handling DC #4	288210.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20511	Bed Media Handling DC #1	288127.5	4117623.0	955.27	16.76	0.46	Ambient	2.36	14.37
EP20521	Bed Media Handling DC #2	288135.0	4117623.0	955.26	16.76	0.46	Ambient	2.36	14.37
EP20531	Bed Media Handling DC #3	288142.5	4117623.0	955.25	16.76	0.46	Ambient	2.36	14.37
EP20541	Bed Media Handling DC #4	288150.0	4117623.0	955.24	16.76	0.46	Ambient	2.36	14.37
EP20512	Trona Handling DC #1	288127.5	4117627.0	955.30	16.76	0.46	Ambient	2.36	14.37
EP20522	Trona Handling DC #2	288135.0	4117627.0	955.28	16.76	0.46	Ambient	2.36	14.37
EP20532	Trona Handling DC #3	288142.5	4117627.0	955.26	16.76	0.46	Ambient	2.36	14.37
EP20542	Trona Handling DC #4	288150.0	4117627.0	955.24	16.76	0.46	Ambient	2.36	14.37
EP06001	Firewater Pump Engine	288288.0	4117627.0	954.63	4.27	0.30	683	0.83	11.32

Source: ABBK 2010a.

Table B2 - Proposed Action Modeled Source Parameters

BUILDING PARAMETERS									
ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Radius (m)	Angle
RECTANGULAR BUILDINGS									
BLD1	Administrative Bldg	288447.0	4117717.5	954.73	3.66	32.00	28.96	--	0
BLD13B	EH Distillation Area (Area 18000)	288219.5	4117506.0	954.94	27.43	30.48	27.43	--	0
BLD2	Maintenance Bldg	288279.0	4117510.0	954.70	8.53	30.48	30.48	--	0
BLD21	CoGen CWT (Area 21000)	288262.5	4117724.5	955.55	13.41	53.34	10.97	--	90
BLD22	Power House (Area 22000)	288251.0	4117667.0	955.35	18.29	39.62	33.53	--	90
BLD23A	EH Cooling Tower (Area 04000)	288158.5	4117602.0	955.24	13.41	21.34	10.97	--	90
BLD24A	Ash Pelletizing Bldg (Area 02700)	288129.5	4117648.0	955.44	18.29	24.38	24.38	--	0
BLD26A	Electrical Room #1 near Substation	288314.0	4117628.5	954.98	4.57	16.76	4.57	--	0
BLD26B	Electrical Room #2 near Biomass Unloading	288288.5	4117607.0	954.94	4.57	16.76	4.57	--	0
BLD26C	Electrical Room #3 near Biomass Wash	288260.0	4117606.5	954.99	4.57	16.76	4.57	--	90
BLD26D	Electrical Room #4 Near Chemical Storage	288143.0	4117524.0	955.24	4.57	16.76	4.57	--	90
BLD26E	Electrical Room #5 Near EH Process	288175.5	4117606.5	955.24	4.57	16.76	4.57	--	0
BLD26F	Electrical Room #6 near Biomass-Fired Boilers	288154.5	4117671.0	955.46	4.57	16.76	4.57	--	90
BLD28A	Fire Water Pump Bldg (Area 06000)	288287.0	4117497.0	954.63	3.66	15.24	6.10	--	0
BLD28B	Fire Foam Bldg (Area 07100)	288224.9	4117460.0	954.74	3.05	6.10	6.10	--	0
BLD3	Control Room and Laboratory	288279.0	4117540.5	954.85	3.66	30.48	13.72	--	0
BLD5	Scale House (Areas 1000 & 10000)	288715.5	4117627.5	953.12	7.32	18.29	7.62	--	0
BLD6A	Biomass Grinding Lines (Area 11000)	288279.0	4117555.0	954.85	9.14	59.44	51.82	--	0
BLD9	EH Process Bldg (Area 12000 and Mechanical Syste	288185.5	4117571.5	955.21	15.24	70.10	18.29	--	0
CIRCULAR BUILDINGS									
BLD10A	EH Fermentation Tank #1 (Area 16000)	288193.50	4117558.50	955.10	12.19	--	--	9.91	--
BLD10B	EH Fermentation Tank #2 (Area 16000)	288216.50	4117558.50	954.94	12.19	--	--	9.91	--
BLD10C	EH Beer Well T-18101 (Area 18000)	288244.00	4117558.50	954.94	12.19	--	--	9.91	--
BLD14A	EH Whole Stillage Tank T-19011 (Area 19000)	288137.00	4117602.00	955.24	15.85	--	--	6.17	--
BLD14B	EH Centrate Tank T-19012 (Area 19000)	288137.00	4117592.50	955.24	3.66	--	--	2.29	--
BLD18A	EH Ethanol Product Storage Tank T-02102 (Area 021	288205.00	4117426.50	954.68	13.11	--	--	6.55	--
BLD18B	EH Denaturant Storage Tank T-02105 (Area 02100)	288194.00	4117444.00	954.82	6.10	--	--	2.13	--
BLD18C	EH Product Shift Tank T-02107 (Area 02100)	288189.00	4117426.50	954.85	6.10	--	--	3.05	--
BLD18D	EH Product Shift Tank T-02108 (Area 02100)	288180.00	4117426.50	954.94	6.10	--	--	3.05	--
BLD18E	EH Product Off-Spec Tank T-02101 (Area 02100)	288180.00	4117444.00	954.94	6.10	--	--	3.05	--
BLD24B	Ash Pellet Silo (Area 02700)	288123.00	4117660.50	955.53	16.76	--	--	6.10	--
BLD27	Process / Firewater Tank (Area 07000)	288326.00	4117504.50	954.63	17.68	--	--	10.06	--
BLD29	Process Water Tank (Area 07300)	288170.50	4117559.50	955.24	17.68	--	--	6.10	--
BLD30A	Sulfuric Acid Tank T-1911 (Area 01900)	288136.50	4117543.00	955.24	6.10	--	--	3.05	--
BLD30B	Phosphoric Acid Tank T-1913 (Area 01900)	288136.50	4117535.00	955.24	3.96	--	--	1.52	--
BLD30C	Boiler Aqua-Ammonia Tank T-1910B (Area 01900)	288136.50	4117521.00	955.24	6.10	--	--	3.05	--
BLD30D	EH Aqua-Ammonia Tank T-01910A (Area 01900)	288136.50	4117511.00	955.24	10.06	--	--	3.81	--
BLD30E	Sodium Hydroxide (Caustic Tank T-01900 (Area 019	288136.50	4117528.50	955.24	4.88	--	--	1.98	--
BLD50A	Aerobic Digester (Area 09000)	288181.50	4117519.00	954.94	18.29	--	--	24.38	--
BLD50B	Anaerobic Digester #1 (Area 09000)	288134.50	4117558.50	955.24	9.14	--	--	5.79	--
BLD50C	Anaerobic Digester #2 (Area 09000)	288149.50	4117558.50	955.24	9.14	--	--	5.79	--
BLD50D	Equalization Tank (Area 09000)	288137.00	4117578.50	955.24	12.19	--	--	9.91	--
BLD6B	Dirt Load-Out Silo (Area 10000)	288351.00	4117544.50	954.63	16.76	--	--	6.10	--
BLD6C	Biomass Surge Bin #1	288229.00	4117598.50	955.10	12.19	--	--	6.10	--
BLD6D	Biomass Surge Bin #2	288212.00	4117598.50	955.23	12.19	--	--	6.10	--
BLD6E	Biomass Surge Bin #3	288195.00	4117598.50	955.24	12.19	--	--	6.10	--

Source: ABBK 2010a.

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Table B3 - Proposed Action Haul Road Traffic Distribution

Paved Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Ethanol (Denatured)	7460	11.30
Denaturant (Gasoline)	7460	4.24
Biomass Delivery	5080	204.93
Lignin-Rich/Lean Stillage	7460	42.39
Boiler Ash Waste (Ash Pellets)	7105	96.89
Dirt/Fines Waste From Dust Collectors	5080	28.86
Misc. Chemicals & Supplies	7460	4.24
	Facility -wide	392.85

Paved Haul Road Emissions	**25.32**	**lb/day**

Percentage of Truck Traffic Per Segment			Daily VMT Per Segment		
Segment 1	**Segment 2**	**Segment 3**	**Segment 1**	**Segment 2**	**Segment 3**
61.66%	13.94%	24.40%	6.97	1.58	2.76
61.66%	13.94%	24.40%	2.61	0.59	1.03
90.55%	0.00%	9.45%	185.57	0.00	19.36
61.66%	13.94%	24.40%	26.14	5.91	10.34
64.74%	35.26%	0.00%	62.73	34.16	0.00
90.55%	0.00%	9.45%	26.14	0.00	2.73
61.66%	13.94%	24.40%	2.61	0.59	1.03
Total Daily VMT Per Segment			**312.77**	**42.83**	**37.26**
Percentage of Facility-wide VMT			**79.61%**	**10.90%**	**9.48%**
Emissions Per Segment (lb/day)			**20.16**	**2.76**	**2.40**
Emissions Per Segment (g/s-m^2)			**1.8838E-05**	**3.0297E-06**	**2.5852E-06**

Annual VMT Calculations:	Total Feet Per Trip	Annual VMT
Ethanol (Denatured)	7460	3560.45
Denaturant (Gasoline)	7460	169.55
Biomass Delivery	5080	67381.20
Lignin-Rich/Lean Stillage	7460	9761.58
Boiler Ash Waste (Ash Pellets)	7105	12479.50
Dirt/Fines Waste From Dust Collectors	5080	4695.15
Misc. Chemicals & Supplies	7460	1405.81
	Facility -wide	99453

Paved Haul Road Emissions	**3.21**	**ton/yr**

Percentage of Truck Traffic Per Segment			Annual VMT Per Segment		
Segment 1	**Segment 2**	**Segment 3**	**Segment 1**	**Segment 2**	**Segment 3**
61.66%	13.94%	24.40%	2195.45	496.36	868.64
61.66%	13.94%	24.40%	104.55	23.64	41.36
90.55%	0.00%	9.45%	61014.47	0.00	6366.73
61.66%	13.94%	24.40%	6019.20	1360.86	2381.51
64.74%	35.26%	0.00%	8079.62	4399.88	0.00
90.55%	0.00%	9.45%	4251.52	0.00	443.64
61.66%	13.94%	24.40%	866.86	195.98	342.97
Total Annual VMT Per Segment			**82531.67**	**6476.73**	**10444.85**
Percentage of Facility-wide VMT			**82.99%**	**6.51%**	**10.50%**
Emissions Per Segment (ton/yr)			**2.66**	**0.21**	**0.34**
Emissions Per Segment (g/s-m^2)			**6.8096E-06**	**6.2767E-07**	**9.9279E-07**

Note 1: Percentage of truck traffic per segment based on the following main road segment lengths and areas:

	Segment 1	Segment 2	Segment 3
Segment Length (ft)	2300	2505	1820
Segment Areas (m^2)	11238	9568	9755

Note 2: Emissions per segment based on the following equation:
Emissions per Segment (lb/day or ton/yr) = [Total Paved Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]
Emissions per Segment (g/s-m2) = [Emissions per Segment] x [unit conversion factors for lb/day or ton/yr to g/s] / [Segment Area]

Table B3 - Proposed Action Haul Road Traffic Distribution

Biomass Unpaved Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Biomass Storage Field	1600	16.36
Biomass Staging Area	180	3.65
Facility -wide		20.01

Biomass Laydown Emissions	7.72 lb/day

	Percentage of Truck Traffic Per Segment		Daily VMT Per Segment	
	Segment 1	**Segment 2**	**Segment 1**	**Segment 2**
	100%	0%	16.36	0.00
	0%	100%	0.00	3.65
Total Daily VMT Per Segment			**16.36**	**3.65**
Percentage of Facility-wide VMT			**81.77%**	**18.23%**
Emissions Per Segment (lb/day)			**6.31**	**1.41**
Emissions Per Segment (g/s-m^2)			**1.2271E-06**	**2.4543E-06**

Annual VMT Calculations:	Total Feet Per Trip	Annual VMT
Biomass Storage Field	1600	4529
Biomass Staging Area	180	2388
Facility -wide		6918

Biomass Laydown Emissions	1.33 ton/yr

	Percentage of Truck Traffic Per Segment		Annual VMT Per Segment	
	Segment 1	**Segment 2**	**Segment 1**	**Segment 2**
	100%	0%	4529.09	0.00
	0%	100%	0.00	2388.41
Total Annual VMT Per Segment			**4529.09**	**2388.41**
Percentage of Facility-wide VMT			**65.47%**	**34.53%**
Emissions Per Segment (ton/yr)			**0.87**	**0.46**
Emissions Per Segment (g/s-m^2)			**9.3049E-07**	**4.4027E-06**

Note 1: Percentage of truck traffic per segment based on the following main road segment lengths and areas:

	Segment 1	Segment 2
Segment Length (ft)	1600	180
Segment Areas (m^2)	27008	3010

Note 2: Emissions per segment based on the following equation:

Emissions per Segment (lb/day or ton/yr) = [Total Paved Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]

Emissions per Segment (g/s-m2) = [Emissions per Segment] x [unit conversion factors for lb/day or ton/yr to g/s] / [Segment Area]

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Table B4 - Proposed Action PM_{10} Modeled Emission Rates

AREA SOURCE PM_{10} EMISSIONS

Source ID	Source Description			Total Area of Roads Area Sources (m^2)	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s-m^2)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s-m^2)	Notes:
EP01000F	Paved Plant Roads			See Distribution Calculations	25.32	See Distribution Calculations	3.21	See Distribution Calculations	Notes 1, 2
PRDA01	PRDA08	PRDA15	PRDA22	Emission rates for paved haul road segments calculated based on the percentage of truck traffic per segment. Please see the Paved Haul Roads Emissions Distribution Calculations provided in Table B3 of this Attachment.					
PRDA02	PRDA09	PRDA16	PRDA23						
PRDA03	PRDA10	PRDA17	PRDA24						
PRDA04	PRDA11	PRDA18	PRDA25						
PRDA05	PRDA12	PRDA19							
PRDA06	PRDA13	PRDA20							
PRDA07	PRDA14	PRDA21							
EP01050F	Biomass Laydown Roads			See Distribution Calculations	7.72	See Distribution Calculations	1.33	See Distribution Calculations	Notes 1, 2
BRDA01	BRDA07	BRDA13	BRDA19	Emission rates for biomass unpaved haul road segments calculated based on the percentage of truck traffic per segment. Please see the Biomass Unpaved Haul Roads Emissions Distribution Calculations provided in Table B3 of this Attachment.					
BRDA02	BRDA08	BRDA14	BRDA20						
BRDA03	BRDA09	BRDA15	BRDA21						
BRDA04	BRDA10	BRDA16	BRDA22						
BRDA05	BRDA11	BRDA17	BRDA23						
BRDA06	BRDA12	BRDA18							
EP20551F	Ash Pellets Storage Pit			2,090	0.63	1.5805E-06	0.11	1.5805E-06	Note 3
EP11051F	Wood Residues (Hog Fuel) Storage Pile			10,261	7.21	3.6868E-06	1.32	3.6868E-06	

(1) 24-hour PM_{10} emissions from paved haul roads were modeled based on a "typical scenario", which assumes all truck traffic associated with shipping and receiving will occur from 6:00 AM to 6:00 PM only. 24-hour PM_{10} emissions from biomass storage area roads and the biomass staging area were modeled based on the areas being active constantly.

(2) Annual PM_{10} emissions from haul roads were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) The ash pellet storage pit is an emergency overflow pit used only when ash pellets cannot be delivered by either truck or rail to the distributor. Operation of the ash pellet storage pit is not part of the normal facility operations. The conservative scenario assumes the pit is utilized and wind erosion emissions occur continuously.

Table B4 - Proposed Action PM_{10} Modeled Emission Rates

VOLUME SOURCE PM_{10} EMISSIONS							
		24-Hour Averaging Period		Annual Averaging Period			
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
EP11001F	Wood Residues Receiving via Rail	0.38	3.9742E-03	0.03	8.8215E-04	Notes 1, 2
EP11002A	Crop Residues Receiving via Truck Line #1	0.17	8.6670E-04	0.02	6.5454E-04	Note 3
EP11002B	Crop Residues Receiving via Truck Line #2	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002C	Crop Residues Receiving via Truck Line #3	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002D	Crop Residues Receiving via Truck Line #4	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002E	Crop Residues Receiving via Truck Line #5	0.17	8.6670E-04	0.02	6.5454E-04	
EP11003F	Dirt/Fines Load-Out from Silo	0.40	4.1610E-03	0.03	7.7262E-04	Notes 1, 2
EP02710F	Ash Pellets Load-Out from Silo	0.79	8.3221E-03	0.05	1.4684E-03	Notes 1, 2
EP20552F	Ash Pellets Storage Pit Loading & Load-Out	1.59	1.6644E-02	0.10	2.9369E-03	Notes 1, 2
EP11052F	Wood Residues (Hog Fuel) Storage Pile Loading	0.38	3.9742E-03	0.03	8.8215E-04	Notes 1, 2

(1) 24-hour PM_{10} emissions from wood residues, dirt/fines and ash pellets receiving and loadout were modeled based on a conservative scenario, which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(2) Annual PM_{10} emissions were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) Crop residues receiving emissions divided by the number of grinding lines to obtain an emission rate per line. 24-hour PM_{10} emissions are based on continuous operations.

Table B4 - Proposed Action PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS						
		24-Hour Averaging Period		Annual Averaging Period		
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
ENZYMATIC HYDROLYSIS PLANT						
EP11134	Biomass Grinding DC #1	126.39	6.6355E-01	23.07	6.6355E-01	
EP11135	Biomass Grinding DC #2	126.39	6.6355E-01	23.07	6.6355E-01	
EP11601	Biomass Surge Bin #1 DC	8.23	4.3200E-02	0.68	1.9529E-02	
EP11602	Biomass Surge Bin #2 DC	8.23	4.3200E-02	0.68	1.9529E-02	
EP11603	Biomass Surge Bin #3 DC	8.23	4.3200E-02	0.68	1.9529E-02	
EP12101	EH Metering Bin #1	13.17	6.9120E-02	2.40	6.9120E-02	
EP11711	Boiler 1 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11721	Boiler 1 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11731	Boiler 1 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11712	Boiler 2 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11722	Boiler 2 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11732	Boiler 2 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11713	Boiler 3 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11723	Boiler 3 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11733	Boiler 3 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11714	Boiler 4 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11724	Boiler 4 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11734	Boiler 4 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11235	Floor Sweep System DC	6.17	6.4800E-02	1.02	2.9293E-02	Note 1, 3
EP11081	Dirt Load-Out Silo	0.48	2.5445E-03	0.09	2.5445E-03	
EP11082	Dirt Load-Out Silo Spout	0.58	6.0480E-03	0.10	2.7340E-03	Note 2, 3

(1) 24-hour PM_{10} emissions from the intermittent source, floor sweep system, based on 12 hours per day operation and a variable emission rate scalar of 0.5.

(2) 24-hour PM_{10} emissions from dirt/fines receiving and loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(3) Annual PM_{10} emissions were modeled such that the emission rates were normalized over 8,760 hours per year.

Table B4 - Proposed Action PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS						
		24-Hour Averaging Period		Annual Averaging Period		
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
UTILITIES						
EP02701	Ash Pelletizer Dryer DC	8.23	8.2286E+00	1.50	4.3200E-02	
EP02702	Ash Pelletizer Cooler DC	4.11	2.1600E-02	0.75	2.1600E-02	
EP02710	Ash Pellets Load-Out Silo	0.48	2.5445E-03	0.09	2.5445E-03	
EP02711	Ash Pellets Load-Out Silo Spout	0.58	6.0480E-03	0.10	2.7340E-03	Notes 1, 2
EP04001A	EH CWT Cell 1	0.78	4.0945E-03	0.14	4.0945E-03	Note 3
EP22001A	CoGen CWT Cell 1	0.77	4.0257E-03	0.14	4.0257E-03	
EP22001B	CoGen CWT Cell 2	0.77	4.0257E-03	0.14	4.0257E-03	
EP22001C	CoGen CWT Cell 3	0.77	4.0257E-03	0.14	4.0257E-03	Note 3
EP22001D	CoGen CWT Cell 4	0.77	4.0257E-03	0.14	4.0257E-03	
EP22001E	CoGen CWT Cell 5	0.77	4.0257E-03	0.14	4.0257E-03	
EP20001	Biomass-Fired Boiler #1	355.01	1.8638E+00	64.79	1.8638E+00	
EP20002	Biomass-Fired Boiler #2	355.01	1.8638E+00	64.79	1.8638E+00	
EP20003	Biomass-Fired Boiler #3	355.01	1.8638E+00	64.79	1.8638E+00	
EP20004	Biomass-Fired Boiler #4	355.01	1.8638E+00	64.79	1.8638E+00	
EP20514	Boiler Bottoms Ash Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20524	Boiler Bottoms Ash Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20534	Boiler Bottoms Ash Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20544	Boiler Bottoms Ash Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP20510	Boiler Fly Ash Handling DC #1	16.46	8.6400E-02	3.00	8.6400E-02	
EP20520	Boiler Fly Ash Handling DC #2	16.46	8.6400E-02	3.00	8.6400E-02	
EP20530	Boiler Fly Ash Handling DC #3	16.46	8.6400E-02	3.00	8.6400E-02	
EP20540	Boiler Fly Ash Handling DC #4	16.46	8.6400E-02	3.00	8.6400E-02	
EP20511	Bed Media Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20521	Bed Media Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20531	Bed Media Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20541	Bed Media Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP20512	Trona Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20522	Trona Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20532	Trona Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20542	Trona Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP06001	Firewater Pump Engine	0.30	1.5884E-03	0.01	2.1758E-04	Note 4

(1) 24-hour PM_{10} emissions from ash pellets loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(2) Annual PM_{10} emissions were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) Cooling tower emissions divided by the number of cells to obtain an emission rate per cell.

(4) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, once per week and 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, 24-hour PM_{10} emissions from the emergency sources were modeled such that the emission rates were normalized over the 24-hour period. Annual emissions were normalized over 8,760 hours per year.

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Table B5 - Proposed Action NO_x, SO_2, and CO Modeled Emission Rates

POINT SOURCE NOx EMISSIONS

		Annual Averaging Period - Tier 1		
Source ID	Source Description	% Conversion as NO2 (%)	Tier 1 NOx Annual Emission Rate (tons/yr)	Tier 1 NO2 Modeled Annual Emission Rate (g/s)
UTILITIES				
EP02701	Ash Pelletizer Dryer DC	100%	3.85	1.1088E-01
EP20001	Biomass-Fired Boiler #1	100%	316.27	9.0981E+00
EP20002	Biomass-Fired Boiler #2	100%	316.27	9.0981E+00
EP20003	Biomass-Fired Boiler #3	100%	316.27	9.0981E+00
EP20004	Biomass-Fired Boiler #4	100%	316.27	9.0981E+00
EP06001	Firewater Pump Engine (1)	100%	0.15	4.3517E-03

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, once per week and 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

POINT SOURCE SO_2 EMISSIONS

		3-Hour Averaging Period		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	SO_2 Hourly Emission Rate (lb/hr)	SO_2 Modeled 3-Hour Emission Rate (g/s)	SO_2 24-Hour Emission Rate (lb/day)	SO_2 Modeled 24-Hour Emission Rate (g/s)	SO_2 Annual Emission Rate (tons/yr)	SO_2 Modeled Annual Emission Rate (g/s)
UTILITIES							
EP02701	Ash Pelletizer Dryer DC	0.01	1.4824E-03	0.28	1.4824E-03	0.05	1.4824E-03
EP20001	Biomass-Fired Boiler #1	14.66	1.8468E+00	351.77	1.8468E+00	64.20	1.8468E+00
EP20002	Biomass-Fired Boiler #2	14.66	1.8468E+00	351.77	1.8468E+00	64.20	1.8468E+00
EP20003	Biomass-Fired Boiler #3	14.66	1.8468E+00	351.77	1.8468E+00	64.20	1.8468E+00
EP20004	Biomass-Fired Boiler #4	14.66	1.8468E+00	351.77	1.8468E+00	64.20	1.8468E+00
EP06001	Firewater Pump Engine (1)	0.94	7.9212E-02	1.89	9.9015E-03	0.05	1.3564E-03

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, once per week and 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

POINT SOURCE CO EMISSIONS

			1-Hour Averaging Period	8-Hour Averaging Period
Source ID	Source Description	CO Hourly Emission Rate (lb/hr)	CO Modeled 1-Hour Emission Rate (g/s)	CO Modeled 8-Hour Emission Rate (g/s)
UTILITIES				
EP02701	Ash Pelletizer Dryer DC	1.60	2.0160E-01	2.0160E-01
EP20001	Biomass-Fired Boiler #1	68.52	8.6336E+00	8.6336E+00
EP20002	Biomass-Fired Boiler #2	68.52	8.6336E+00	8.6336E+00
EP20003	Biomass-Fired Boiler #3	68.52	8.6336E+00	8.6336E+00
EP20004	Biomass-Fired Boiler #4	68.52	8.6336E+00	8.6336E+00
EP06001	Firewater Pump Engine (1)	2.65	3.3356E-01	8.3389E-02

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, once per week and 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

Source: ABBK 2010a.

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TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

1,3 BUTADIENE EMISSIONS

Source ID	Source Description	1,3 Butadiene 1-Hour Emission Rate (lb/hr)	1,3 Butadiene Modeled 1-Hour Emission Rate (g/s)
EP-06001 (EMC	Firewater Pump Engine	1.26E-04	1.59E-05

ACETALDEHYDE EMISSIONS

Source ID	Source Description	Acetaldehyde 1-Hour Emission Rate (lb/hr)	Acetaldehyde Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH Fermentation CO2 Scrubber	5.16E-01	6.50E-02
EP-18180	EH Distillation Vent Scrubber	7.08E-02	8.92E-03
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	2.31E-03	2.91E-04
EP-02000	Fugitive Leaks	8.38E-05	1.06E-05
T-02107	EH Product Shift Tank #1	4.80E-02	6.04E-03
T-02108	EH Product Shift Tank #2	4.80E-02	6.04E-03
T-02101	EH Product Off-Spec Tank	2.99E-02	3.77E-03
T-02102	EH Ethanol Product Storage Tank	8.48E-02	1.07E-02
EP-02100	Vapor Recovery System	6.08E-05	7.66E-06
EP-02100FUG	Loading Losses	5.15E-05	6.49E-06
EP-20001	Biomass-Fired Boiler #1	4.15E-02	5.23E-03
EP-20002	Biomass-Fired Boiler #2	4.15E-02	5.23E-03
EP-20003	Biomass-Fired Boiler #3	4.15E-02	5.23E-03
EP-20004	Biomass-Fired Boiler #4	4.15E-02	5.23E-03
EP-06001 (EMC	Firewater Pump Engine	2.47E-03	3.11E-04

ACETONE EMISSIONS

Source ID	Source Description	Acetone 1-Hour Emission Rate (lb/hr)	Acetone Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.50E-03	1.20E-03
EP-20002	Biomass-Fired Boiler #2	9.50E-03	1.20E-03
EP-20003	Biomass-Fired Boiler #3	9.50E-03	1.20E-03
EP-20004	Biomass-Fired Boiler #4	9.50E-03	1.20E-03

ACROLEIN EMISSIONS

Source ID	Source Description	Acrolein 1-Hour Emission Rate (lb/hr)	Acrolein Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH Fermentation CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	3.48E-04	4.38E-05
EP-02000	Fugitive Leaks	8.38E-06	1.06E-06
T-02107	EH Product Shift Tank #1	4.80E-03	6.04E-04
T-02108	EH Product Shift Tank #2	4.80E-03	6.04E-04
T-02101	EH Product Off-Spec Tank	2.99E-03	3.77E-04
T-02102	EH Ethanol Product Storage Tank	8.48E-03	1.07E-03
EP-02100	Vapor Recovery System	6.08E-06	7.66E-07
EP-02100FUG	Loading Losses	5.15E-06	6.49E-07
EP-20001	Biomass-Fired Boiler #1	2.00E-01	2.52E-02
EP-20002	Biomass-Fired Boiler #2	2.00E-01	2.52E-02
EP-20003	Biomass-Fired Boiler #3	2.00E-01	2.52E-02
EP-20004	Biomass-Fired Boiler #4	2.00E-01	2.52E-02

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

AMMONIA EMISSIONS			
Source ID	Source Description	Ammonia 1-Hour Emission Rate (lb/hr)	Ammonia Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	2.38E+00	3.00E-01
EP-20002	Biomass-Fired Boiler #2	2.38E+00	3.00E-01
EP-20003	Biomass-Fired Boiler #3	2.38E+00	3.00E-01
EP-20004	Biomass-Fired Boiler #4	2.38E+00	3.00E-01

BENZENE EMISSIONS			
Source ID	Source Description	Benzene 1-Hour Emission Rate (lb/hr)	Benzene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	5.76E-06	7.25E-07
T-02105	EH Denaturant Storage Tank	6.48E-04	8.17E-05
EP-02100	Vapor Recovery System	4.36E-04	5.49E-05
EP-02100FUG	Loading Losses	3.69E-04	4.65E-05
EP-02701	Ash Pelletizer Dryer DC	4.12E-05	5.19E-06
EP-20001	Biomass-Fired Boiler #1	2.10E-01	2.65E-02
EP-20002	Biomass-Fired Boiler #2	2.10E-01	2.65E-02
EP-20003	Biomass-Fired Boiler #3	2.10E-01	2.65E-02
EP-20004	Biomass-Fired Boiler #4	2.10E-01	2.65E-02
EP-06001 (EMC	Firewater Pump Engine	3.00E-03	3.79E-04

BUTANE EMISSIONS			
Source ID	Source Description	Butane 1-Hour Emission Rate (lb/hr)	Butane Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	4.12E-02	5.19E-03

CARBON DISULFIDE EMISSIONS			
Source ID	Source Description	Carbon disulfide 1-Hour Emission Rate (lb/hr)	Carbon disulfide Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	4.61E-08	5.80E-09
T-02105	EH Denaturant Storage Tank	5.19E-06	6.53E-07
EP-02100	Vapor Recovery System	3.48E-06	4.39E-07
EP-02100FUG	Loading Losses	2.95E-06	3.72E-07

CARBON TETRACHLORIDE EMISSIONS			
Source ID	Source Description	Carbon tetrachloride 1-Hour Emission Rate (lb/hr)	Carbon tetrachloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	2.25E-03	2.84E-04
EP-20002	Biomass-Fired Boiler #2	2.25E-03	2.84E-04
EP-20003	Biomass-Fired Boiler #3	2.25E-03	2.84E-04
EP-20004	Biomass-Fired Boiler #4	2.25E-03	2.84E-04

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

CHLORINE EMISSIONS			
Source ID	Source Description	Chlorine 1-Hour Emission Rate (lb/hr)	Chlorine Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	3.95E-03	4.98E-04
EP-20002	Biomass-Fired Boiler #2	3.95E-03	4.98E-04
EP-20003	Biomass-Fired Boiler #3	3.95E-03	4.98E-04
EP-20004	Biomass-Fired Boiler #4	3.95E-03	4.98E-04

CHLOROBENZENE EMISSIONS			
Source ID	Source Description	Chlorobenzene 1-Hour Emission Rate (lb/hr)	Chlorobenzene Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.65E-03	2.08E-04
EP-20002	Biomass-Fired Boiler #2	1.65E-03	2.08E-04
EP-20003	Biomass-Fired Boiler #3	1.65E-03	2.08E-04
EP-20004	Biomass-Fired Boiler #4	1.65E-03	2.08E-04

CHLOROFORM EMISSIONS			
Source ID	Source Description	Chloroform 1-Hour Emission Rate (lb/hr)	Chloroform Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.40E-03	1.76E-04
EP-20002	Biomass-Fired Boiler #2	1.40E-03	1.76E-04
EP-20003	Biomass-Fired Boiler #3	1.40E-03	1.76E-04
EP-20004	Biomass-Fired Boiler #4	1.40E-03	1.76E-04

CUMENE EMISSIONS			
Source ID	Source Description	Cumene 1-Hour Emission Rate (lb/hr)	Cumene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	2.30E-07	2.90E-08
T-02105	EH Denaturant Storage Tank	2.59E-05	3.27E-06
EP-02100	Vapor Recovery System	1.74E-05	2.20E-06
EP-02100FUG	Loading Losses	1.48E-05	1.86E-06

DICHLOROBENZENE EMISSIONS			
Source ID	Source Description	Dichlorobenzene 1-Hour Emission Rate (lb/hr)	Dichlorobenzene Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	2.35E-05	2.96E-06

DICHLOROMETHANE EMISSIONS			
Source ID	Source Description	Dichloromethane 1-Hour Emission Rate (lb/hr)	Dichloromethane Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.45E-02	1.83E-03
EP-20002	Biomass-Fired Boiler #2	1.45E-02	1.83E-03
EP-20003	Biomass-Fired Boiler #3	1.45E-02	1.83E-03
EP-20004	Biomass-Fired Boiler #4	1.45E-02	1.83E-03

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

ETHANE EMISSIONS			
Source ID	Source Description	Ethane 1-Hour Emission Rate (lb/hr)	Ethane Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	6.08E-02	7.66E-03

ETHANOL EMISSIONS			
Source ID	Source Description	Ethanol 1-Hour Emission Rate (lb/hr)	Ethanol Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH Fermentation CO2 Scrubber	1.71E+01	2.15E+00
EP-18180	EH Distillation Vent Scrubber	3.85E-01	4.85E-02
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	1.73E-01	2.18E-02
EP-02000	Fugitive Leaks	4.19E-01	5.28E-02
T-02107	EH Product Shift Tank #1	1.32E-01	1.66E-02
T-02108	EH Product Shift Tank #2	1.32E-01	1.66E-02
T-02101	EH Product Off-Spec Tank	1.22E-01	1.54E-02
T-02102	EH Ethanol Product Storage Tank	1.53E-01	1.93E-02
EP-02100	Vapor Recovery System	3.04E-01	3.83E-02
EP-02100FUG	Loading Losses	2.58E-01	3.25E-02

ETHYLBENZENE EMISSIONS			
Source ID	Source Description	Ethylbenzene 1-Hour Emission Rate (lb/hr)	Ethylbenzene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	1.15E-07	1.45E-08
T-02105	EH Denaturant Storage Tank	1.30E-05	1.63E-06
EP-02100	Vapor Recovery System	8.71E-06	1.10E-06
EP-02100FUG	Loading Losses	7.38E-06	9.30E-07
EP-20001	Biomass-Fired Boiler #1	1.55E-03	1.95E-04
EP-20002	Biomass-Fired Boiler #2	1.55E-03	1.95E-04
EP-20003	Biomass-Fired Boiler #3	1.55E-03	1.95E-04
EP-20004	Biomass-Fired Boiler #4	1.55E-03	1.95E-04

ETHYLENE DICHLORIDE EMISSIONS			
Source ID	Source Description	Ethylene dichloride 1-Hour Emission Rate (lb/hr)	Ethylene dichloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.45E-03	1.83E-04
EP-20002	Biomass-Fired Boiler #2	1.45E-03	1.83E-04
EP-20003	Biomass-Fired Boiler #3	1.45E-03	1.83E-04
EP-20004	Biomass-Fired Boiler #4	1.45E-03	1.83E-04

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

FORMALDEHYDE EMISSIONS

Source ID	Source Description	Formaldehyde 1-Hour Emission Rate (lb/hr)	Formaldehyde Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH Fermentation CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	4.63E-03	5.83E-04
EP-02000	Fugitive Leaks	4.19E-05	5.28E-06
T-02107	EH Product Shift Tank #1	2.40E-02	3.02E-03
T-02108	EH Product Shift Tank #2	2.40E-02	3.02E-03
T-02101	EH Product Off-Spec Tank	1.50E-02	1.89E-03
T-02102	EH Ethanol Product Storage Tank	4.24E-02	5.35E-03
EP-02100	Vapor Recovery System	3.04E-05	3.83E-06
EP-02100FUG	Loading Losses	2.58E-05	3.25E-06
EP-02701	Ash Pelletizer Dryer DC	1.47E-03	1.85E-04
EP-20001	Biomass-Fired Boiler #1	2.20E-01	2.77E-02
EP-20002	Biomass-Fired Boiler #2	2.20E-01	2.77E-02
EP-20003	Biomass-Fired Boiler #3	2.20E-01	2.77E-02
EP-20004	Biomass-Fired Boiler #4	2.20E-01	2.77E-02
EP-06001 (EMG	Firewater Pump Engine	3.80E-03	4.79E-04

HEXANE EMISSIONS

Source ID	Source Description	Hexane 1-Hour Emission Rate (lb/hr)	Hexane Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	3.53E-02	4.45E-03

HYDROGEN CHLORIDE EMISSIONS

Source ID	Source Description	Hydrogen chloride 1-Hour Emission Rate (lb/hr)	Hydrogen chloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	7.10E+00	8.94E-01
EP-20002	Biomass-Fired Boiler #2	7.10E+00	8.94E-01
EP-20003	Biomass-Fired Boiler #3	7.10E+00	8.94E-01
EP-20004	Biomass-Fired Boiler #4	7.10E+00	8.94E-01

METHANOL EMISSIONS

Source ID	Source Description	Methanol 1-Hour Emission Rate (lb/hr)	Methanol Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH Fermentation CO2 Scrubber	3.60E-03	4.54E-04
EP-18180	EH Distillation Vent Scrubber	1.81E-03	2.28E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	9.25E-04	1.17E-04
EP-02000	Fugitive Leaks	8.38E-05	1.06E-05
T-02107	EH Product Shift Tank #1	4.80E-02	6.04E-03
T-02108	EH Product Shift Tank #2	4.80E-02	6.04E-03
T-02101	EH Product Off-Spec Tank	2.99E-02	3.77E-03
T-02102	EH Ethanol Product Storage Tank	8.48E-02	1.07E-02
EP-02100	Vapor Recovery System	6.08E-05	7.66E-06
EP-02100FUG	Loading Losses	5.15E-05	6.49E-06

METHYL CHLOROFORM EMISSIONS

Source ID	Source Description	Methyl chloroform 1-Hour Emission Rate (lb/hr)	Methyl chloroform Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.55E-03	1.95E-04
EP-20002	Biomass-Fired Boiler #2	1.55E-03	1.95E-04
EP-20003	Biomass-Fired Boiler #3	1.55E-03	1.95E-04
EP-20004	Biomass-Fired Boiler #4	1.55E-03	1.95E-04

Source: Salter 2010b.

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

NAPHTHALENE EMISSIONS

Source ID	Source Description	Naphthalene 1-Hour Emission Rate (lb/hr)	Naphthalene Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	1.20E-05	1.51E-06
EP-20001	Biomass-Fired Boiler #1	4.85E-03	6.11E-04
EP-20002	Biomass-Fired Boiler #2	4.85E-03	6.11E-04
EP-20003	Biomass-Fired Boiler #3	4.85E-03	6.11E-04
EP-20004	Biomass-Fired Boiler #4	4.85E-03	6.11E-04
EP-06001 (EMO	Firewater Pump Engine	2.73E-04	3.44E-05

NITROGEN DIOXIDE EMISSIONS

Source ID	Source Description	Nitrogen Dioxide 1-Hour Emission Rate (lb/hr)	Nitrogen Dioxide Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	8.80E-01	1.11E-01
EP-20001	Biomass-Fired Boiler #1	7.22E+01	9.10E+00
EP-20002	Biomass-Fired Boiler #2	7.22E+01	9.10E+00
EP-20003	Biomass-Fired Boiler #3	7.22E+01	9.10E+00
EP-20004	Biomass-Fired Boiler #4	7.22E+01	9.10E+00
EP-06001 (EMO	Firewater Pump Engine	3.03E+00	3.81E-01

PENTANE EMISSIONS

Source ID	Source Description	Pentane 1-Hour Emission Rate (lb/hr)	Pentane Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	5.10E-02	6.42E-03

PHENOL EMISSIONS

Source ID	Source Description	Phenol 1-Hour Emission Rate (lb/hr)	Phenol Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	2.55E-03	3.21E-04
EP-20002	Biomass-Fired Boiler #2	2.55E-03	3.21E-04
EP-20003	Biomass-Fired Boiler #3	2.55E-03	3.21E-04
EP-20004	Biomass-Fired Boiler #4	2.55E-03	3.21E-04

PROPANE EMISSIONS

Source ID	Source Description	Propane 1-Hour Emission Rate (lb/hr)	Propane Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	3.14E-02	3.95E-03

PROPYLENE EMISSIONS

Source ID	Source Description	Propylene 1-Hour Emission Rate (lb/hr)	Propylene Modeled 1-Hour Emission Rate (g/s)
EP-06001 (EMO	Firewater Pump Engine	8.31E-03	1.05E-03

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

PROPYLENE DICHLORIDE EMISSIONS

Source ID	Source Description	Propylene dichloride 1-Hour Emission Rate (lb/hr)	Propylene dichloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.65E-03	2.08E-04
EP-20002	Biomass-Fired Boiler #2	1.65E-03	2.08E-04
EP-20003	Biomass-Fired Boiler #3	1.65E-03	2.08E-04
EP-20004	Biomass-Fired Boiler #4	1.65E-03	2.08E-04

STYRENE EMISSIONS

Source ID	Source Description	Styrene 1-Hour Emission Rate (lb/hr)	Styrene Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.50E-02	1.20E-02
EP-20002	Biomass-Fired Boiler #2	9.50E-02	1.20E-02
EP-20003	Biomass-Fired Boiler #3	9.50E-02	1.20E-02
EP-20004	Biomass-Fired Boiler #4	9.50E-02	1.20E-02

SULFUR DIOXIDE EMISSIONS

Source ID	Source Description	Sulfur Dioxide 1-Hour Emission Rate (lb/hr)	Sulfur Dioxide Modeled 1-Hour Emission Rate (g/s)
EP-02701	Ash Pelletizer Dryer DC	1.18E-02	1.48E-03
EP-20001	Biomass-Fired Boiler #1	1.47E+01	1.85E+00
EP-20002	Biomass-Fired Boiler #2	1.47E+01	1.85E+00
EP-20003	Biomass-Fired Boiler #3	1.47E+01	1.85E+00
EP-20004	Biomass-Fired Boiler #4	1.47E+01	1.85E+00
EP-06001 (EMC	Firewater Pump Engine	9.43E-01	1.19E-01

TOLUENE EMISSIONS

Source ID	Source Description	Toluene 1-Hour Emission Rate (lb/hr)	Toluene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	1.15E-05	1.45E-06
T-02105	EH Denaturant Storage Tank	1.30E-03	1.63E-04
EP-02100	Vapor Recovery System	8.71E-04	1.10E-04
EP-02100FUG	Loading Losses	7.38E-04	9.30E-05
EP-02701	Ash Pelletizer Dryer DC	6.67E-05	8.40E-06
EP-20001	Biomass-Fired Boiler #1	4.60E-02	5.80E-03
EP-20002	Biomass-Fired Boiler #2	4.60E-02	5.80E-03
EP-20003	Biomass-Fired Boiler #3	4.60E-02	5.80E-03
EP-20004	Biomass-Fired Boiler #4	4.60E-02	5.80E-03
EP-06001 (EMC	Firewater Pump Engine	1.32E-03	1.66E-04

TABLE B6 - Proposed Action Odorous Compound Modeled Emissions

VINYL CHLORIDE EMISSIONS

Source ID	Source Description	Vinyl chloride 1-Hour Emission Rate (lb/hr)	Vinyl chloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.00E-04	1.13E-04
EP-20002	Biomass-Fired Boiler #2	9.00E-04	1.13E-04
EP-20003	Biomass-Fired Boiler #3	9.00E-04	1.13E-04
EP-20004	Biomass-Fired Boiler #4	9.00E-04	1.13E-04

XYLENE EMISSIONS

Source ID	Source Description	Xylene 1-Hour Emission Rate (lb/hr)	Xylene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	1.15E-06	1.45E-07
T-02105	EH Denaturant Storage Tank	1.30E-04	1.63E-05
EP-02100	Vapor Recovery System	8.71E-05	1.10E-05
EP-02100FUG	Loading Losses	7.38E-05	9.30E-06
EP-20001	Biomass-Fired Boiler #1	1.25E-03	1.58E-04
EP-20002	Biomass-Fired Boiler #2	1.25E-03	1.58E-04
EP-20003	Biomass-Fired Boiler #3	1.25E-03	1.58E-04
EP-20004	Biomass-Fired Boiler #4	1.25E-03	1.58E-04
EP-06001 (EMC	Firewater Pump Engine	9.18E-04	1.16E-04

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TABLE B7 - Proposed Action Air Quality Model Results

Criteria Pollutant	Averaging Period		Maximum Modeled Facility Impacts 2002	2003	2004	2005	2006
PM10	24 Hour	1st high	31.32248	32.66325	37.99073	38.98403	35.17752
		date	9/6/2002	7/4/2003	1/19/2004	1/17/2005	12/27/2006
		X	287970.50	288070.40	288070.40	288070.40	288070.40
		Y	4118025.50	4118021.70	4118021.70	4118021.70	4118021.70
	Annual	1st high	8.32252	7.25646	7.53342	7.6051	6.35947
		X	288070.40	288070.40	288070.40	288070.40	288070.40
		Y	4118021.70	4118021.70	4118021.70	4118021.70	4118021.70
NO_2 (Tier 1 NO_x)	Annual	1st high	4.13234	3.2152	3.41082	3.96068	3.36856
		X	288130.00	288180.00	288180.00	288230.00	288230.00
		Y	4118249.00	4118199.00	4118249.00	4118249.00	4118249.00
SO_2	3 Hour	1st high	17.48918	19.22435	18.65694	22.78992	22.43016
		date	2/26/2002	8/24/2003	2/1/2004	10/14/2005	10/10/2006
		X	288430.00	288520.10	288512.50	288512.50	288412.60
		Y	4117199.00	4118004.90	4117209.60	4117209.60	4117213.50
	24 Hour	1st high	6.74952	5.37752	6.06776	6.33686	6.61303
		date	5/5/2002	6/20/2003	5/16/2004	11/28/2005	6/15/2006
		X	288230.00	287980.00	288180.00	288730.00	288130.00
		Y	4118349.00	4118099.00	4118249.00	4116749.00	4118249.00
	Annual	1st high	0.81647	0.63183	0.6703	0.78285	0.66617
		X	288130.00	288180.00	288180.00	288230.00	288230.00
		Y	4118249.00	4118249.00	4118249.00	4118249.00	4118249.00
CO	1 Hour	1st high	136.98835	151.10008	162.48088	140.09962	159.06175
		date	1/2/2002	2/12/2003	2/2/2004	2/14/2005	12/24/2006
		X	288462.60	288430.00	288462.60	287545.40	288612.50
		Y	4117211.50	4117199.00	4117211.50	4117243.60	4117205.70
	8 Hour	1st high	61.72894	58.46396	55.7446	51.4099	59.94848
		date	6/8/2002	6/20/2003	5/6/2004	6/18/2005	6/13/2006
		X	288130.00	287980.00	288520.10	287930.00	287930.00
		Y	4118149.00	4118099.00	4118004.90	4118199.00	4118099.00

Attachment C –

Tables of Supporting Data for the Action Alternative

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
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Table C1 -Action Alternative Modeling Potential to Emit

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		Notes
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
HAUL ROADS											
EP-1000 (Fugitive)	Paved Plant Roads	0.34	5.49	0.91	--	--	--	--	--	--	Note 1
EP-1050 (Fugitive)	Biomass Laydown Roads	0.26	4.09	0.68	--	--	--	--	--	--	Note 1

Note 1. Hourly and daily haul road sources assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day. 24-hour PM_{10} emissions from haul road sources were modeled based on this scenario.

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		Notes
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
ENZYMATIC HYDROLYSIS PLANT											
EP-11025	Gasification Metering Bin #1 (GMB1) DC-11139	0.25	5.94	1.08	--	--	--	--	--	--	
EP-11026	Gasification Metering Bin #2 (GMB2) DC-11239	0.25	5.94	1.08	--	--	--	--	--	--	
EP-11027	EH Metering Bin #1 (EMB1) DC-11339	0.55	13.17	2.40	--	--	--	--	--	--	
EP-11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11037	Gasification Day Bin #1 (GB1) DC-11172	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11039	Gasification Day Bin #2 (GB2) DC-11272	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11041	EH Day Bin (EDB1) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11044	EH Day Bin (EDB1) DC-11372	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11071	Biomass Grinding Line DC #1	5.27	126.39	23.07	--	--	--	--	--	--	
EP-11080	Floor Sweep System DC-11234	0.51	8.23	1.36	--	--	--	--	--	--	Note 1
EP-11081	Dirt Load-Out Silo DC-11190	0.02	0.32	0.05	--	--	--	--	--	--	Note 1
EP-11082	Dirt Load-Out Silo Spout DC-11168	0.05	0.77	0.13	--	--	--	--	--	--	Note 1
EP-11000 (Fugitive)	Biomass Receiving, Handling and Grinding	0.16	2.63	0.43	--	--	--	--	--	--	Note 1
EP-18185	EH CO2 Scrubber	--	--	--	--	--	--	--	--	--	
EP-18180	EH Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-19001FUG (Fugitive)	Lignin-Rich Stillage Storage and Loadout	--	--	--	--	--	--	--	--	--	

Note 1. Hourly and daily biomass receiving, day bins, dirt loadout and lignin loadout emissions assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions were modeled based on this scenario.

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		Notes
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
ETHANOL FINISHING AND STORAGE											
EP-2000 (Fugitive)	Fugitive Leaks	--	--	--	--	--	--	--	--	--	
T-2100A	T-2100A Shift Tank	--	--	--	--	--	--	--	--	--	
T-2100B	T-2100B Shift Tank	--	--	--	--	--	--	--	--	--	
T-2100C	T-2100C EH Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-2101	T-2101 Denatured Ethanol	--	--	--	--	--	--	--	--	--	
T-2102	T-2102 Denaturant	--	--	--	--	--	--	--	--	--	
EP-2150	Vapor Recovery System	--	--	--	--	--	--	--	--	--	Note 1
EP-2150FUG (Fugitive)	Loading Losses	--	--	--	--	--	--	--	--	--	Note 1

Note 1. Hourly and daily ethanol loadout emissions assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions were modeled based on this scenario.

Table C1 -Action Alternative Modeling Potential to Emit

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		Notes
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
UTILITIES											
EP-4001	EH Cooling Tower	0.03	0.78	0.14	--	--	--	--	--	--	
EP-5101	Synthesis Gas-Fired Boiler #1 (SGFB1)	See Note 1									
EP-5102	Synthesis Gas-Fired Boiler #2 (SGFB2)	See Note 1									
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.71	137.03	25.01	71.44	312.90	10.60	46.42	49.35	216.14	
EP-20020	Char Combustor	See Note 2									
EP-20501	Boiler Ash Handling Dust Collector #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20502	Boiler Ash Handling Dust Collector #2	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20510	Sand Handling Dust Collector #1	0.34	5.49	0.91	--	--	--	--	--	--	Note 3
EP-20520	Char Ash Handling Dust Collector #1	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1901	Lime Storage Silo #1 Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-1902	Lime Storage Silo #2 Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-1903	Lime Day Silo Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-20115 (SSM)	Syngas Flare	See Note 4									
EP-9001 (SSM)	Biogas Flare	See Note 4									
EP-6001 (Emergency)	Firewater Pump Engine	0.15	0.30	0.008	3.03	0.15	0.94	0.05	2.65	0.13	Note 5
EP-6051 (Emergency)	Power Back-up Generator	0.49	0.98	0.02	15.73	0.79	0.60	0.03	8.60	0.43	Note 5

Note 1. Syngas may be combusted in the Mixed Fuel-Fired Boiler #1, MFFB1, or the Synthesis Gas-Fired Boilers #1 and #2, SGFB1 and SGFB2. The combustion option for syngas is not final, therefore, both scenarios have been included in the potential to emit calculations. For modeling purposes, syngas has been assumed to be combusted in the MFFB1, as this is the conservative scenario.

Note 2. The gasification system, including the Char Combustor, are not exhausted directly to the atmosphere. The Char Combustor's flue gas is combined with the Mixed Fuel-Fired Boiler #1 flue gas for control.

Note 3. Hourly and daily material handling emissions (excluding ash handling) assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions were modeled based on this scenario.

Note 4. The syngas and biogas flares incorporated into the facility design are not operated under normal operating conditions at the facility; therefore, these sources are not included in the modeling analysis.

Note 5. Emergency equipment will operate a maximum of 2 hours per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event.

Abengoa Bioenergy Biomass of Kansas, LLC
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Table C2 - Action Alternative Modeled Source Parameters

AREA SOURCE PARAMETERS [1]

Source ID	Source Description	Actual Width [2] (m)	Adjusted Width [2] (m)	Maximum Length of Area Source [3] (m)	Average Height of Trucks [4] (m)	Area Source Release Height [5] (m)	Initial Vertical Dim. [6] (m)	Total Area of Roads Area Sources (m^2)
EP01000F	Paved Plant Roads	7.3	17.1	171	4.0	4.0	1.8	34055
EP1050F	Biomass Laydown Roads	7.3	17.1	171	4.0	4.0	1.8	7199
Source ID	**Source Description**	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**	**Length (X) (m)**	**Width (Y) (m)**	**Area (m^2)**	**Angle**
EP1000F	Paved Plant Roads							
PRDA01	Paved Road Area 1	288962.0	4117846.0	952.50	130.0	17.1	2,223	0
PRDA02	Paved Road Area 2	288832.0	4117846.0	953.11	130.0	17.1	2,223	0
PRDA03	Paved Road Area 3	288702.0	4117846.0	953.51	130.0	17.1	2,223	0
PRDA04	Paved Road Area 4	288572.0	4117846.0	954.02	130.0	17.1	2,223	0
PRDA05	Paved Road Area 5	288448.5	4117898.5	955.26	128.0	17.1	2,189	23
PRDA06	Paved Road Area 6	288318.5	4117898.5	955.66	130.0	17.1	2,223	0
PRDA07	Paved Road Area 7	288205.0	4117865.5	955.85	118.0	17.1	2,018	344
PRDA08	Paved Road Area 8	288201.0	4117866.0	955.85	130.0	17.1	2,223	90
PRDA09	Paved Road Area 9	288201.0	4117736.0	955.55	144.5	17.1	2,471	90
PRDA10	Paved Road Area 10	288219.0	4117591.5	955.16	105.0	17.1	1,796	0
PRDA11	Paved Road Area 11	288341.0	4117591.0	954.64	131.0	17.1	2,240	0
PRDA12	Paved Road Area 12	288341.0	4117674.0	955.09	131.0	17.1	2,240	0
PRDA13	Paved Road Area 13	288324.0	4117692.0	955.24	100.0	17.1	1,710	90
PRDA14	Paved Road Area 14	288472.0	4117748.0	954.71	70.0	17.1	1,197	90
PRDA15	Paved Road Area 15	288480.0	4117748.0	954.63	130.0	17.1	2,223	332
PRDA16	Paved Road Area 16	288588.5	4117825.0	954.02	17.1	67.0	1,146	72
PRDA17	Paved Road Area 17	288472.0	4117678.0	954.41	87.0	17.1	1,488	90
EP1050F	Biomass Laydown Roads							
BRD01	Biomass Road Area 1	288489.0	4117701.0	954.48	130.0	17.1	2,223	0
BRD02	Biomass Road Area 2	288619.0	4117701.0	953.83	113.0	17.1	1,932	0
BRD03	Biomass Road Area 3	288600.0	4117701.0	954.02	98.0	17.1	1,676	90
BRD04	Biomass Road Area 4	288617.0	4117718.5	953.85	80.0	17.1	1,368	270

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, ***Modeling Fugitive Dust Sources with AERMOD***, revised January 2007; Trinity Consultants test data, ***Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling***, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), ***Utah Division of Air Quality Modeling Guidelines***, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and accounts for the vertical emission dilution from moving trucks.

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Table C2 - Action Alternative Modeled Source Parameters

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Release Height (1) (m)	Length of Side (m)	Initial Lateral Dimension (2) (m)	Structure Height (m)	Initial Vertical Dimension (3) (m)
EP11000F	Biomass Receiving, Handling and Grinding Area	288438.1	4117640.6	954.58	6.86	65.53	15.24	13.72	6.38
EP19001F	Lignin-Rich Stillage Storage and Loadout (4)	288292.5	4117625.0	954.99	2.14	18.29	4.25	4.27	1.99
EP2000F	Fugitive Leaks	Emissions divided equally among storage tanks; as fugitive leaks occur throughout the facility.							
T2100AF	T-2100A Shift Tank (5)	288158.5	4117676.0	955.51	2.29	6.10	1.42	4.57	2.13
T2100BF	T-2100B Shift Tank (5)	288150.5	4117676.0	955.51	2.29	6.10	1.42	4.57	2.13
T2100CF	T-2100C Off-Spec (5)	288141.4	4117676.0	955.52	2.29	6.10	1.42	4.57	2.13
T2101F	T-2101 Denatured Ethanol (5)	288152.5	4117704.0	955.55	5.49	13.72	3.19	10.97	5.10
T2102F	T-2102 Denaturant (5)	288134.0	4117694.5	955.55	2.13	4.57	1.06	4.27	1.98
EP2150F	Loading Losses (6)	288116.5	4117584.0	955.28	2.35	17.41	4.05	4.70	2.19

(1) Release height = height of structure / 2
(2) Initial lateral dimension of volume source = length of side / 4.3
(3) Initial vertical dimension of elevated source on or adjacent to a building = structure height / 2.15
(4) Peak pile height of stillage used as structure height.
(5) Length of side for storage tanks based on tank diameter.

(6) Release and structure height and length of side based on standard railcar tanker dimensions; 15'5" high x 57'1.5" long (http://worldtraderef.com/WTR_site/Rail_Cars/Guide_to_Rail_Cars.asp).

POINT SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
ENZYMATIC HYDROLYSIS PLANT									
EP11025	Gasification Metering Bin #1 (GMB1) DC-11139	288408.0	4117709.5	954.94	32.00	0.41	Ambient	3.41	26.25
EP11026	Gasification Metering Bin #2 (GMB2) DC-11239	288408.0	4117697.5	954.86	32.00	0.41	Ambient	3.41	26.25
EP11027	EH Metering Bin #1 (EMB1) DC-11339	288301.0	4117715.0	955.29	19.81	0.76	Ambient	7.55	16.56
EP11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent	288398.5	4117710.0	954.94	1.83	0.08	Ambient	0.12	25.87
EP11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent	288379.5	4117710.0	955.05	1.83	0.08	Ambient	0.12	25.87
EP11037	Gasification Day Bin #1 (GB1) DC-11172	288398.5	4117706.5	954.93	36.58	0.41	Ambient	3.41	26.25
EP11039	Gasification Day Bin #2 (GB2) DC-11272	288379.5	4117706.5	955.03	36.58	0.41	Ambient	3.41	26.25
EP11041	EH Day Bin (EDB1) Rotary Valve Vent	288360.5	4117710.0	955.24	1.83	0.08	Ambient	0.12	25.87
EP11044	EH Day Bin (EDB1) DC-11372	288360.5	4117706.5	955.20	36.58	0.41	Ambient	3.41	26.25
EP11071	Biomass Grinding Line DC #1	288375.6	4117615.6	954.63	22.86	2.44	Ambient	72.49	15.52
EP11080	Floor Sweep System DC-11234	288351.6	4117615.6	954.71	12.19	0.76	Ambient	7.08	15.52
EP11081	Dirt Load-Out Silo DC-11190	288343.1	4117628.1	954.84	19.81	0.15	Ambient	0.28	15.24
EP11082	Dirt Load-Out Silo Spout SP-11168	288340.1	4117628.1	954.86	12.19	0.25	Ambient	0.66	13.04
EP18185	EH CO2 Scrubber	288244.0	4117653.5	955.27	21.34	0.61	294.11	8.12	27.81
EP18180	EH Distillation Scrubber	288225.0	4117692.0	955.55	24.38	0.20	293.00	0.30	9.31
ETHANOL FINISHING AND STORAGE									
EP2150	Vapor Recovery System	288116.5	4117584.0	955.28	3.66	0.15	Ambient	0.47	25.87
UTILITIES									
EP4001A	EH Cooling Tower Cell 1	288229.5	4117779.0	955.58	13.41	10.06	295	593.68	7.47
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	288369.5	4117758.0	955.24	36.58	1.22	466	56.63	48.51
EP20501	Boiler Ash Handling Dust Collector #1	288357.0	4117805.0	955.55	19.81	0.46	Ambient	2.36	14.37
EP20502	Boiler Ash Handling Dust Collector #2	288383.5	4117805.0	955.55	19.81	0.91	Ambient	9.44	14.37
EP20510	Sand Handling Dust Collector #1	288429.5	4117700.5	954.78	32.00	0.51	Ambient	4.72	23.28
EP20520	Char Ash Handling Dust Collector #1	288429.5	4117716.5	954.86	13.72	0.15	Ambient	0.47	25.87
EP1901	Lime Storage Silo #1 Dust Collector	288228.5	4117619.5	955.24	13.72	0.15	Ambient	0.35	19.40
EP1902	Lime Storage Silo #2 Dust Collector	288232.5	4117619.5	955.24	13.72	0.15	Ambient	0.35	19.40
EP1903	Lime Day Silo Dust Collector	288293.0	4117637.0	955.11	13.72	0.15	Ambient	0.35	19.40
EP6001	Firewater Pump Engine	288182.1	4117650.0	955.24	4.27	0.30	683	0.83	11.32
EP6051	Power Back-up Generator	288282.5	4117812.5	955.62	3.66	0.20	683	1.51	46.57

Source: Salter 2009, modified.

Table C2 - Action Alternative Modeled Source Parameters

BUILDING PARAMETERS

ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Radius (m)	Angle
RECTANGULAR BUILDINGS									
BLD1	Administrative Bldg	288175.50	4117847.50	955.85	3.66	27.43	24.38	--	90
BLD10	Biomass Fermentation Area (Areas 16000 & 17000)	288219.50	4117643.50	955.24	12.19	70.10	15.24	--	0
BLD11	Gasification Area (Area 20000)	288411.00	4117765.50	955.21	30.48	70.10	19.81	--	90
BLD12	Pilot Plant Building (Area 21000)	288440.00	4117703.50	954.71	7.32	15.24	15.24	--	0
BLD13B	EH Distillation Area (Areas 18050 and 19000)	288219.50	4117689.50	955.55	27.43	21.34	21.34	--	0
BLD16A	EH Decanters Bldg (Area 19000)	288295.40	4117726.00	955.43	11.28	19.81	6.10	--	0
BLD17	EH Finish Evaporation Area (Area 19000)	288252.00	4117686.00	955.45	18.29	12.19	9.14	--	0
BLD2	Maintenance Bldg	288153.00	4117761.00	955.76	8.53	45.72	36.58	--	0
BLD22A	EH Energy Center	288244.00	4117802.50	955.57	18.29	45.72	39.62	--	90
BLD23A	EH Cooling Tower (Area 04000)	288221.00	4117804.00	955.76	15.54	48.77	16.46	--	90
BLD24	Ash Storage Area (Area 05200)	288408.50	4117838.50	955.55	18.29	60.96	60.96	--	90
BLD26A	Electrical Room near Biomass Unloading	288292.00	4117576.00	954.83	4.57	18.29	12.19	--	0
BLD26B	Electrical Room near Biomass Wash	288270.00	4117700.50	955.45	4.57	21.95	12.19	--	90
BLD28A	Fire Water Pump Bldg (Area 07100)	288181.00	4117647.00	955.24	3.66	15.24	6.10	--	0
BLD28B	Fire Foam Bldg (Area 07100)	288150.80	4117646.50	955.24	3.05	6.10	6.10	--	0
BLD5	Scale House (Areas 1000 & 10000)	288606.00	4117837.00	953.96	7.32	18.29	7.62	--	0
BLD6A	Biomass Receiving Barn (Area 11000)	288409.00	4117673.50	954.72	13.72	65.53	48.77	--	90
BLD6B	Biomass Grinding Lines (Area 11000)	288346.60	4117618.60	954.76	9.14	60.96	45.11	--	0
BLD9	Biomass Process Bldg (Areas 12000 to 14000)	288290.00	4117712.00	955.36	24.38	68.58	30.48	--	90
BLD3	Control Room and Laboratory	288180.63	4117608.54	955.24	3.66	16.15	22.56	--	0
CIRCULAR BUILDINGS									
BLD14A	EH Thin Stillage Tank T-19001 (Area 19000)	288231.00	4117726.00	955.55	17.68	--	--	6.71	--
BLD14B	EH Whole Stillage Tank T-18000 (Area 18000)	288253.00	4117726.00	955.55	17.68	--	--	7.92	--
BLD15A	Biomass Syrup Tank T-19002 (Area 19000)	288282.50	4117726.00	955.49	15.24	--	--	4.57	--
BLD18A	Denatured Ethanol Storage Tank T-2101 (Area 02100)	288152.50	4117704.00	955.55	10.97	--	--	6.86	--
BLD18B	EH Denaturant Tank T-2102 (Area 2100)	288134.00	4117694.50	955.55	2.29	--	--	1.83	--
BLD18C	EH Shift Tank T-2100A (Area 02100)	288158.50	4117676.00	955.51	4.57	--	--	3.05	--
BLD18D	EH Shift Tank T-2100B (Area 02100)	288150.50	4117676.00	955.51	4.57	--	--	3.05	--
BLD18E	EH Off-Spec Tank T-2100C (Area 02100)	288141.40	4117676.00	955.52	4.57	--	--	3.05	--
BLD27	Process / Firewater Tank T-7003 (Area 07000)	288190.00	4117667.00	955.42	17.68	--	--	9.14	--
BLD29	Process Water Tank T-7004 (Area 07000)	288191.00	4117712.00	955.55	17.68	--	--	6.10	--
BLD7A	Gasification Day Bin #1 (GB1) (Area 11000)	288392.00	4117701.50	954.93	30.48	--	--	9.14	--
BLD7B	Gasification Day Bin #2 (GB2) (Area 11000)	288373.00	4117701.50	955.06	30.48	--	--	9.14	--
BLD7C	EH Day Bin (EDB1) (Area 11000)	288354.00	4117701.50	955.17	30.48	--	--	9.14	--

Source: Salter 2009, modified.

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Table C3 - Action Alternative PM_{10} Modeled Source Emissions

AREA SOURCE PM_{10} EMISSIONS

Source ID	Source Description	Total Area of Roads Area Sources (m^2)	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s-m^2)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s-m^2)
EP1000F	Paved Plant Roads [1, 2]	34,055	5.49	1.2696E-06	0.91	7.6522E-07
EP1050F	Biomass Laydown Roads [1, 2]	7,199	4.09	4.4781E-06	0.68	2.6991E-06

(1) 24-hour PM_{10} emissions from haul roads were modeled based on a scenario which assumes all truck traffic associated with shipping and receiving will occur from 5:00 AM to 9:00 PM only.
(2) Annual PM_{10} emissions from haul roads were modeled such that the emission rates were normalized over 8,760 hours per year.

VOLUME SOURCE PM_{10} EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s)
EP11000F	Biomass Receiving, Handling and Grinding Area [1, 2]	2.63	2.0685E-02	0.43	1.2467E-02

(1) 24-hour PM_{10} emissions from fugitive receiving and loadout sources were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.
(2) Annual PM_{10} emissions from fugitive receiving and loadout sources were modeled such that the emission rates were normalized over 8,760 hours per

Table C3 - Action Alternative PM_{10} Modeled Source Emissions

POINT SOURCE PM_{10} EMISSIONS		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)
EP11025	Gasification Metering Bin #1 (GMB1) DC-11139	5.94	3.1173E-02	1.08	3.1173E-02
EP11026	Gasification Metering Bin #2 (GMB2) DC-11239	5.94	3.1173E-02	1.08	3.1173E-02
EP11027	EH Metering Bin #1 (EMB1) DC-11339	13.17	6.9120E-02	2.40	6.9120E-02
EP11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent (1,2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent (1,2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11037	Gasification Day Bin #1 (GB1) DC-11172 (1,2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11039	Gasification Day Bin #2 (GB2) DC-11272 (1,2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11041	EH Day Bin (EDB1) Rotary Valve Vent (1,2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11044	EH Day Bin (EDB1) DC-11372 (1,2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11071	Biomass Grinding Line DC #1	126.39	6.6355E-01	23.07	6.6355E-01
EP11080	Floor Sweep System DC-11234 (1,2)	8.23	6.4800E-02	1.36	3.9058E-02
EP11081	Dirt Load-Out Silo DC-11190 (1,2)	0.32	2.5445E-03	0.05	1.5337E-03
EP11082	Dirt Load-Out Silo Spout DC-11168 (1,2)	0.77	6.0480E-03	0.13	3.6454E-03
EP4001A	EH Cooling Tower Cell 1(3)	0.78	4.0945E-03	0.14	4.0945E-03
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	137.03	7.1941E-01	25.01	7.1941E-01
EP20501	Boiler Ash Handling Dust Collector #1	4.11	2.1600E-02	0.75	2.1600E-02
EP20502	Boiler Ash Handling Dust Collector #2	16.46	8.6400E-02	3.00	8.6400E-02
EP20510	Sand Handling Dust Collector #1 (4,5)	5.49	4.3200E-02	0.91	2.6038E-02
EP20520	Char Ash Handling Dust Collector #1	0.82	4.3200E-03	0.15	4.3200E-03
EP1901	Lime Storage Silo #1 Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP1902	Lime Storage Silo #2 Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP1903	Lime Day Silo Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP6001	Firewater Pump Engine (6)	0.30	1.5884E-03	0.008	2.1758E-04
EP6051	Power Back-up Generator (6)	0.98	5.1622E-03	0.025	7.0715E-04

(1) 24-hour PM_{10} emissions from fugitive receiving and loadout sources were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.

(2) Annual PM_{10} emissions from fugitive receiving and loadout sources were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) Cooling tower and air condenser emissions divided by the number of cells to obtain an emission rate per cell.

(4) 24-hour PM_{10} emissions from materials and chemical storage sources (excluding ash handling) were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.

(5) Annual PM_{10} emissions from materials and chemical storage sources (excluding ash handling) were modeled such that the emission rates were normalized over 8,760 hours per year.

(6) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 24-hour PM_{10} emissions from the emergency sources were modeled such that the emission rates were normalized over the 24-hour period. Annual emissions were normalized over 8,760 hours per year.

Source: Salter 2009, modified.

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Hugoton, Kansas

Table C4 - Action Alternative NO_x, SO_2, and CO Modeled Source Emissions

POINT SOURCE NO_x EMISSIONS

		Annual Averaging Period - Tier 1		
Source ID	Source Description	% Conversion as NO_2 (%)	Tier 1 NO_x Annual Emission Rate (tons/yr)	Tier 1 NO_2 Modeled Annual Emission Rate (g/s)
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	100%	312.90	9.00E+00
EP6001	Firewater Pump Engine (1)	100%	0.15	4.35E-03
EP6051	Power Back-up Generator (1)	100%	0.79	2.26E-02

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, annual emissions were normalized over 8,760 hours per year.

POINT SOURCE SO_2 EMISSIONS

		3-Hour Averaging Period		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	SO_2 Hourly Emission Rate (lb/hr)	SO_2 Modeled 3-Hour Emission Rate (g/s)	SO_2 24-Hour Emission Rate (lb/day)	SO_2 Modeled 24-Hour Emission Rate (g/s)	SO_2 Annual Emission Rate (tons/yr)	SO_2 Modeled Annual Emission Rate (g/s)
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	10.60	1.34E+00	254.37	1.34E+00	46.42	1.34E+00
EP6001	Firewater Pump Engine (1)	0.94	7.92E-02	1.89	9.90E-03	0.05	1.36E-03
EP6051	Power Back-up Generator (1)	0.60	5.08E-02	1.21	6.35E-03	0.03	8.70E-04

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 3-hour and 24-hour SO_2 emissions from the emergency sources were modeled such that the emission rates were normalized over the averaging periods. Annual emissions were normalized over 8,760 hours per year.

POINT SOURCE CO EMISSIONS

			1-Hour Averaging Period	8-Hour Averaging Period
Source ID	Source Description	CO Hourly Emission Rate (lb/hr)	CO Modeled 1-Hour Emission Rate (g/s)	CO Modeled 8-Hour Emission Rate (g/s)
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	49.35	6.22E+00	6.22E+00
EP6001	Firewater Pump Engine (1)	2.65	3.34E-01	8.34E-02
EP6051	Power Back-up Generator (1)	8.60	1.08E+00	2.71E-01

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 1-hour and 8-hour CO emissions from the emergency sources were modeled such that the emission rates were normalized over the averaging hour periods.

Source: Salter 2009, modified.

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Hugoton, Kansas

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

1,3 BUTADIENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: 1,3 Butadiene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: 1,3 Butadiene Modeled 1-Hour Emission Rate (g/s)
EP-6001 (Emer	Firewater Pump Engine	1.26E-04	1.59E-05

ACETALDEHYDE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Acetaldehyde 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Acetaldehyde Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH CO2 Scrubber	5.16E-01	6.50E-02
EP-18180	EH Distillation Vent Scrubber	7.08E-02	8.92E-03
EP-19001FUG (	Lignin-Rich Stillage Storage and Loadout	9.69E-04	1.22E-04
EP-2000 (Fugiti	Fugitive Leaks	7.68E-05	9.68E-06
T-2100A	T-2100A Shift Tank	4.35E-02	5.48E-03
T-2100B	T-2100B Shift Tank	4.35E-02	5.48E-03
T-2100C	T-2100C EH Off-Spec Tank	2.95E-02	3.71E-03
T-2101	T-2101 Denatured Ethanol	8.18E-02	1.03E-02
EP-2150	Vapor Recovery System	3.25E-05	4.10E-06
EP-2150FUG (F	Loading Losses	2.75E-05	3.47E-06
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.58E-02	1.99E-03
EP-6001 (Emer	Firewater Pump Engine	2.47E-03	3.11E-04
EP-6051 (Emer	Power Back-up Generator	2.64E-04	3.32E-05

ACETONE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Acetone 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Acetone Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	3.61E-03	4.55E-04

ACROLEIN EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Acrolein 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Acrolein Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG (	Lignin-Rich Stillage Storage and Loadout	1.46E-04	1.84E-05
EP-2000 (Fugiti	Fugitive Leaks	7.68E-06	9.68E-07
T-2100A	T-2100A Shift Tank	4.35E-03	5.48E-04
T-2100B	T-2100B Shift Tank	4.35E-03	5.48E-04
T-2100C	T-2100C EH Off-Spec Tank	2.95E-03	3.71E-04
T-2101	T-2101 Denatured Ethanol	8.18E-03	1.03E-03
EP-2150	Vapor Recovery System	3.25E-06	4.10E-07
EP-2150FUG (F	Loading Losses	2.75E-06	3.47E-07
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	7.60E-02	9.58E-03
EP-6051 (Emer	Power Back-up Generator	8.25E-05	1.04E-05

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

AMMONIA EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Ammonia 1-Hour Emission Rate (lb/hr)	Ammonia Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.32E+00	6.70E-01

BENZENE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Benzene 1-Hour Emission Rate (lb/hr)	Benzene Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	5.72E-06	7.20E-07
T-2102	T-2102 Denaturant	6.67E-04	8.41E-05
EP-2150	Vapor Recovery System	2.49E-04	3.14E-05
EP-2150FUG (F	Loading Losses	2.11E-04	2.66E-05
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	7.99E-02	1.01E-02
EP-6001 (Emer	Firewater Pump Engine	3.00E-03	3.79E-04
EP-6051 (Emer	Power Back-up Generator	8.12E-03	1.02E-03

BIPHENYL EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Biphenyl 1-Hour Emission Rate (lb/hr)	Biphenyl Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	8.48E-02	1.07E-02

BUTANE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Butane 1-Hour Emission Rate (lb/hr)	Butane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.37E+00	1.73E-01

CARBON DISULFIDE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Carbon disulfide 1-Hour Emission Rate (lb/hr)	Carbon disulfide Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	4.57E-08	5.76E-09
T-2102	T-2102 Denaturant	1.07E-05	1.35E-06
EP-2150	Vapor Recovery System	1.99E-06	2.51E-07
EP-2150FUG (F	Loading Losses	1.69E-06	2.13E-07

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

CARBON TETRACHLORIDE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Carbon tetrachloride 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Carbon tetrachloride Modeled 1-Hour (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	8.55E-04	1.08E-04

CHLORINE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Chlorine 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Chlorine Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.50E-03	1.89E-04

CHLOROBENZENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Chlorobenzene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Chlorobenzene Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	6.27E-04	7.90E-05

CHLOROFORM EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Chloroform 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Chloroform Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.32E-04	6.70E-05

CUMENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Cumene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Cumene Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	2.29E-07	2.88E-08
T-2102	T-2102 Denaturant	2.67E-05	3.36E-06
EP-2150	Vapor Recovery System	9.96E-06	1.25E-06
EP-2150FUG (F	Loading Losses	8.44E-06	1.06E-06

DICHLOROBENZENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Dichlorobenzene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Dichlorobenzene Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	2.98E-05	3.75E-06

DICHLOROMETHANE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Dichloromethane 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Dichloromethane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.51E-03	6.94E-04

Source: Salter 2009, modified.

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

ETHANE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Ethane 1-Hour Emission Rate (lb/hr)	Ethane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	2.03E+00	2.55E-01

ETHANOL EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Ethanol 1-Hour Emission Rate (lb/hr)	Ethanol Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH CO2 Scrubber	1.71E+01	2.15E+00
EP-18180	EH Distillation Vent Scrubber	3.85E-01	4.85E-02
EP-19001FUG (	Lignin-Rich Stillage Storage and Loadout	7.24E-02	9.13E-03
EP-2000 (Fugiti	Fugitive Leaks	3.84E-01	4.84E-02
T-2100A	T-2100A Shift Tank	1.21E-01	1.52E-02
T-2100B	T-2100B Shift Tank	1.21E-01	1.52E-02
T-2100C	T-2100C EH Off-Spec Tank	1.13E-01	1.42E-02
T-2101	T-2101 Denatured Ethanol	1.43E-01	1.80E-02
EP-2150	Vapor Recovery System	1.63E-01	2.05E-02
EP-2150FUG (F	Loading Losses	1.38E-01	1.74E-02

ETHYLBENZENE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Ethylbenzene 1-Hour Emission Rate (lb/hr)	Ethylbenzene Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	1.14E-07	1.44E-08
T-2102	T-2102 Denaturant	1.33E-05	1.68E-06
EP-2150	Vapor Recovery System	4.98E-06	6.27E-07
EP-2150FUG (F	Loading Losses	4.22E-06	5.32E-07
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.89E-04	7.42E-05

ETHYLENE DICHLORIDE			
		1-Hour Averaging Period	
Source ID	Source Description	Ethane 1-Hour Emission Rate (lb/hr)	Ethane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.51E-04	6.94E-05

FORMALDEHYDE EMISSIONS			
		1-Hour Averaging Period	
Source ID	Source Description	Formaldehyde 1-Hour Emission Rate (lb/hr)	Formaldehyde Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG (	Lignin-Rich Stillage Storage and Loadout	1.94E-03	2.44E-04
EP-2000 (Fugiti	Fugitive Leaks	3.84E-05	4.84E-06
T-2100A	T-2100A Shift Tank	2.18E-02	2.74E-03
T-2100B	T-2100B Shift Tank	2.18E-02	2.74E-03
T-2100C	T-2100C EH Off-Spec Tank	1.47E-02	1.86E-03
T-2101	T-2101 Denatured Ethanol	4.09E-02	5.15E-03
EP-2150	Vapor Recovery System	1.63E-05	2.05E-06
EP-2150FUG (F	Loading Losses	1.38E-05	1.74E-06
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	8.55E-02	1.08E-02
EP-6001 (Emer	Firewater Pump Engine	3.80E-03	4.79E-04
EP-6051 (Emer	Power Back-up Generator	8.26E-04	1.04E-04

Source: Salter 2009, modified.

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

HEXANE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Hexane 1-Hour Emission Rate (lb/hr)	Hexane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	8.88E-02	1.12E-02

HYDROGEN CHLORIDE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Hydrogen chloride 1-Hour Emission Rate (lb/hr)	Hydrogen chloride Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	2.67E+00	3.36E-01

METHANOL EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Methanol 1-Hour Emission Rate (lb/hr)	Methanol Modeled 1-Hour Emission Rate (g/s)
EP-18185	EH CO2 Scrubber	3.60E-03	4.54E-04
EP-18180	EH Distillation Vent Scrubber	1.81E-03	2.28E-04
EP-19001FUG (	Lignin-Rich Stillage Storage and Loadout	3.87E-04	4.88E-05
EP-2000 (Fugiti	Fugitive Leaks	7.68E-05	9.68E-06
T-2100A	T-2100A Shift Tank	4.35E-02	5.48E-03
T-2100B	T-2100B Shift Tank	4.35E-02	5.48E-03
T-2100C	T-2100C EH Off-Spec Tank	2.95E-02	3.71E-03
T-2101	T-2101 Denatured Ethanol	8.18E-02	1.03E-02
EP-2150	Vapor Recovery System	3.25E-05	4.10E-06
EP-2150FUG (F	Loading Losses	2.75E-05	3.47E-06

METHYL CHLOROFORM EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Pentane 1-Hour Emission Rate (lb/hr)	Pentane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.89E-04	7.42E-05

NAPHTHALENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Naphthalene 1-Hour Emission Rate (lb/hr)	Naphthalene Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	4.59E-02	5.79E-03
EP-6001 (Emer	Firewater Pump Engine	2.73E-04	3.44E-05
EP-6051 (Emer	Power Back-up Generator	1.36E-03	1.71E-04

NITROGEN DIOXIDE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period Nitrogen Dioxide 1-Hour Emission Rate (lb/hr)	Nitrogen Dioxide Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	7.14E+01	9.00E+00
EP-6001 (Emer	Firewater Pump Engine	3.03E+00	3.81E-01
EP-6051 (Emer	Power Back-up Generator	1.57E+01	1.98E+00

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

PENTANE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Pentane 1-Hour Emission Rate (lb/hr)	Pentane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.70E+00	2.14E-01

PHENOL EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Phenol 1-Hour Emission Rate (lb/hr)	Phenol Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	9.69E-04	1.22E-04

PROPANE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Propane 1-Hour Emission Rate (lb/hr)	Propane Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.05E+00	1.32E-01

PROPYLENE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Propylene 1-Hour Emission Rate (lb/hr)	Propylene Modeled 1-Hour Emission Rate (g/s)
EP-6001 (Emer	Firewater Pump Engine	8.31E-03	1.05E-03
EP-6051 (Emer	Power Back-up Generator	2.92E-02	3.68E-03

PROPYLENE DICHLORIDE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Phenol 1-Hour Emission Rate (lb/hr)	Phenol Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	6.27E-04	7.90E-05

STYRENE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Styrene 1-Hour Emission Rate (lb/hr)	Styrene Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	3.61E-02	4.55E-03

SULFUR DIOXIDE EMISSIONS

		1-Hour Averaging Period	
Source ID	Source Description	Sulfur Dioxide 1-Hour Emission Rate (lb/hr)	Sulfur Dioxide Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.06E+01	1.34E+00
EP-6001 (Emer	Firewater Pump Engine	9.43E-01	1.19E-01
EP-6051 (Emer	Power Back-up Generator	6.05E-01	7.62E-02

Source: Salter 2009, modified.

TABLE C5- Action Alternative Odorous Compound Modeled Emissions

TOLUENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Toluene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Toluene Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	1.14E-05	1.44E-06
T-2102	T-2102 Denaturant	1.33E-03	1.68E-04
EP-2150	Vapor Recovery System	4.98E-04	6.27E-05
EP-2150FUG (F	Loading Losses	4.22E-04	5.32E-05
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	1.76E-02	2.21E-03
EP-6001 (Emer	Firewater Pump Engine	1.32E-03	1.66E-04
EP-6051 (Emer	Power Back-up Generator	2.94E-03	3.71E-04

VINYL CHLORIDE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Vinyl chloride 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Vinyl chloride Modeled 1-Hour Emission Rate (g/s)
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	3.42E-04	4.31E-05

XYLENE EMISSIONS

Source ID	Source Description	1-Hour Averaging Period: Xylene 1-Hour Emission Rate (lb/hr)	1-Hour Averaging Period: Xylene Modeled 1-Hour Emission Rate (g/s)
T-2101	T-2101 Denatured Ethanol	1.14E-06	1.44E-07
T-2102	T-2102 Denaturant	1.33E-04	1.68E-05
EP-2150	Vapor Recovery System	4.98E-05	6.27E-06
EP-2150FUG (F	Loading Losses	4.22E-05	5.32E-06
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	4.75E-04	5.99E-05
EP-6001 (Emer	Firewater Pump Engine	9.18E-04	1.16E-04
EP-6051 (Emer	Power Back-up Generator	2.02E-03	2.54E-04

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

TABLE C6 - Action Alternative Air Quality Model Results

Criteria Pollutant	Averaging Period		Maximum Modeled Facility Impacts				
			2002	2003	2004	2005	2006
PM10	24 Hour	1st high	17.68809	16.95114	18.83251	18.74561	16.17631
		date	1/3/2002	10/9/2003	1/19/2004	1/17/2005	12/27/2006
		X	288408.00	288287.20	288308.00	288287.20	288308.00
		Y	4117998.00	4117988.90	4117998.00	4117988.90	4118048.00
	Annual	1st high	4.55144	4.09000	4.24473	4.33563	3.67984
		X	288287.20	288287.20	288308.00	288337.20	288287.20
		Y	4117988.90	4117998.90	4117998.00	4117988.10	4117988.90
NO_2 (Tier 1 NO_x)	Annual	1st high	4.84607	3.83737	4.19708	4.22968	3.68047
		X	288258.00	288258.00	288258.00	288258.00	288308.00
		Y	4118148.00	4118198.00	4118198.00	4118198.00	4118098.00
SO_2	3 Hour	1st high	25.70163	33.93228	25.0362	27.85296	23.39013
		date	12/1/2002	1/19/2003	3/17/2004	11/9/2005	9/6/2006
		X	288337.20	288379.80	288408.00	288358.00	287987.30
		Y	4117988.10	4117994.30	4117998.00	4118148.00	4117993.70
	24 Hour	1st high	5.28745	5.33934	6.67266	5.20558	5.10363
		date	6/30/2002	11/13/2003	9/20/2004	10/4/2005	4/10/2006
		X	288258.00	288458.00	288308.00	288358.00	288346.80
		Y	4118048.00	4118048.00	4117998.00	4118048.00	4117995.50
	Annual	1st high	0.70733	0.56169	0.6312	0.61823	0.53407
		X	288258.00	288258.00	288258.00	288258.00	288308.00
		Y	4118148.00	4118198.00	4118198.00	4118198.00	4118148.00
CO	1 Hour	1st high	759.98623	816.35463	733.13156	686.9913	628.76653
		date	12/1/2002	1/19/2003	12/3/2004	10/31/2005	12/11/2006
		X	288408.00	288379.80	288337.19	288408.00	287987.31
		Y	4117998.00	4117994.30	4117988.00	4118098.00	4117993.75
	8 Hour	1st high	62.05525	65.40798	81.05864	63.22396	65.86936
		date	9/4/2002	8/16/2003	11/24/2004	10/13/2005	1/22/2006
		X	288137.30	288379.80	288408.00	288208.00	288258.00
		Y	4117991.30	4117994.30	4117998.00	4118048.00	4117998.00

Attachment D –

Tables of Supporting Data for the Proposed Action with the Grain-to-Ethanol Facility

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table D1 - Proposed Action with Grain-to-Ethanol Facility Modeling Potential to Emit

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
HAUL ROADS											
EP-01000FUG	Paved Plant Roads (50% DDGS)	2.72	32.69	4.22	--	--	--	--	--	--	Note 1
EP-01000FUG	Paved Plant Roads (100% WDGS)	2.70	32.41	4.04	--	--	--	--	--	--	Note 1
EP-01050FUG	Biomass Laydown Roads	0.35	4.21	0.90	--	--	--	--	--	--	
STARCH PLANT											
EP-01101A	Grain Receiving Dust Collector #1	0.82	9.87	1.63	--	--	--	--	--	--	Note 1
EP-01101B	Grain Receiving Dust Collector #2	0.82	9.87	1.63	--	--	--	--	--	--	Note 1
EP-01101FUG	Grain Receiving	0.32	3.81	0.23	--	--	--	--	--	--	Note 1
EP-01102	Grain Handling Dust Collector	0.34	8.23	1.50	--	--	--	--	--	--	
EP-01102FUG	Grain Conveyors & Storage	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01110A	Bin Baghouse #1	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01110B	Bin Baghouse #2	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01110FUG	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01120A	Bin Baghouse #3	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01120B	Bin Baghouse #4	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01120FUG	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01130A	Bin Baghouse #5	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01130B	Bin Baghouse #6	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01130FUG	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01150	Surge Bin Baghouse	0.03	0.82	0.15	--	--	--	--	--	--	
EP-01150FUG	Surge Bin	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01201	Grain Mill Dust Collector #1	0.51	12.34	2.25	--	--	--	--	--	--	
EP-01201FUG	Grain Mill #1	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01202	Grain Mill Dust Collector #2	0.51	12.34	2.25	--	--	--	--	--	--	
EP-01202FUG	Grain Mill #2	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01203	Grain Mill Dust Collector #3	0.51	12.34	2.25	--	--	--	--	--	--	
EP-01203FUG	Grain Mill #3	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01204	Grain Mill Dust Collector #4	0.51	12.34	2.25	--	--	--	--	--	--	
EP-01204FUG	Grain Mill #4	0.00	0.00	0.00	--	--	--	--	--	--	
EP-01400	Grain Pre-Fermentation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-01401	Grain Main Fermentation Vent Scrubber	0.25	6.00	1.10	--	--	--	--	--	--	
EP-01500	Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-01610	First Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-01620	Second Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-01630	Third Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-01651	Finish Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-01801	DDGS Indirect Dryer #1	3.78	90.82	16.58	3.61	15.80	0.05	0.21	6.56	28.73	
EP-02200	DDGS Loadout Dust Collector #1	0.51	6.17	1.02	--	--	--	--	--	--	Note 1
EP-02200FUG	DDGS Shipping	0.12	1.44	0.09	--	--	--	--	--	--	Note 1
EP-02250FUG	Wet Cake Storage and Loadout (with DDGS)	--	--	--	--	--	--	--	--	--	
EP-02250FUG	Wet Cake Storage and Loadout (100% WDGS)	--	--	--	--	--	--	--	--	--	

Source: Salter 2010b.

Table D1 - Proposed Action with Grain-to-Ethanol Facility Modeling Potential to Emit

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
ENZYMATIC HYDROLYSIS PLANT											
EP-11134	Biomass Grinding DC #1	2.63	63.20	11.53	--	--	--	--	--	--	Note 2
EP-11135	Biomass Grinding DC #2	2.63	63.20	11.53	--	--	--	--	--	--	Note 2
EP-11235	Floor Sweep System DC	0.51	6.17	1.02	--	--	--	--	--	--	Note 3
EP-11601	Biomass Surge Bin #1 DC	0.34	8.23	1.50	--	--	--	--	--	--	
EP-11602	Biomass Surge Bin #2 DC	0.34	8.23	1.50	--	--	--	--	--	--	
EP-11603	Biomass Surge Bin #3 DC	0.34	8.23	1.50	--	--	--	--	--	--	
EP-12101	EH Metering Bin #1	0.55	13.17	2.40	--	--	--	--	--	--	
EP-11711	Boiler 1 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11721	Boiler 1 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11731	Boiler 1 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11712	Boiler 2 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11722	Boiler 2 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11732	Boiler 2 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11713	Boiler 3 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11723	Boiler 3 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11733	Boiler 3 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11714	Boiler 4 Metering Bin DC #1	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11724	Boiler 4 Metering Bin DC #2	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11734	Boiler 4 Metering Bin DC #3	0.15	3.62	0.66	--	--	--	--	--	--	
EP-11081	Dirt Load-Out Silo	0.02	0.48	0.09	--	--	--	--	--	--	
EP-11082	Dirt Load-Out Silo Spout	0.05	0.58	0.10	--	--	--	--	--	--	Note 1
EP-11001FUG	Raw Wood Residues Grinding and Handling	0.03	0.38	0.03	--	--	--	--	--	--	Note 1
EP-11002FUG	Crop Residues and Energy Crops Grinding and Handling	0.03	0.83	0.11	--	--	--	--	--	--	Note 4
EP-11003FUG	Dirt/Fines Load-Out from Silo	0.03	0.40	0.03	--	--	--	--	--	--	Note 1
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	0.30	7.21	1.32	--	--	--	--	--	--	
EP-11052FUG	Wood Residues (Hog Fuel) Storage Pile Loading	0.03	0.38	0.03	--	--	--	--	--	--	Note 1
EP-18185	EH Fermentation CO2 Scrubber	--	--	--	--	--	--	--	--	--	
EP-18180	EH Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	--	--	--	--	--	--	--	--	--	
ETHANOL FINISHING AND STORAGE											
EP-02000	Fugitive Leaks	--	--	--	--	--	--	--	--	--	
T-02107	EH Product Shift Tank #1	--	--	--	--	--	--	--	--	--	
T-02108	EH Product Shift Tank #2	--	--	--	--	--	--	--	--	--	
T-02101	EH Product Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-02117	Grain Product Shift Tank #1	--	--	--	--	--	--	--	--	--	
T-02118	Grain Product Shift Tank #2	--	--	--	--	--	--	--	--	--	
T-02111	Grain Product Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-02102	EH Product Storage Tank	--	--	--	--	--	--	--	--	--	
T-02112	Grain Product Storage Tank #1	--	--	--	--	--	--	--	--	--	
T-02113	Grain Product Storage Tank #2	--	--	--	--	--	--	--	--	--	
T-02114	Grain Product Storage Tank #3	--	--	--	--	--	--	--	--	--	
T-02105	EH Denaturant Storage Tank	--	--	--	--	--	--	--	--	--	
T-02115	Grain Denaturant Storage Tank	--	--	--	--	--	--	--	--	--	
EP-02100	Vapor Recovery System	--	--	--	--	--	--	--	--	--	Note 1
EP-02100FUG	Loading Losses	--	--	--	--	--	--	--	--	--	Note 1

Table D1 - Proposed Action with Grain-to-Ethanol Facility Modeling Potential to Emit

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
UTILITIES											
EP-02701	Ash Pelletizer Dryer DC	0.34	8.23	1.50	0.88	3.85	0.01	0.05	1.60	7.01	
EP-02702	Ash Pelletizer Cooler DC	0.17	4.11	0.75	--	--	--	--	--	--	
EP-02710	Ash Pellets Load-Out Silo	0.02	0.48	0.09	--	--	--	--	--	--	
EP-02711	Ash Pellets Load-Out Silo Spout	0.05	0.58	0.10	--	--	--	--	--	--	Note 1
EP-02710FUG	Ash Pellets Load-Out from Silo	0.07	0.79	0.05	--	--	--	--	--	--	Note 1
EP-04001	EH Cooling Water Tower	0.03	0.72	0.13	--	--	--	--	--	--	
EP-04002	Starch Cooling Water Tower	0.09	2.16	0.39	--	--	--	--	--	--	
EP-21001	CoGen Cooling Water Tower	0.16	3.83	0.70	--	--	--	--	--	--	
EP-20001	Biomass-Fired Boiler #1	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20002	Biomass-Fired Boiler #2	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20003	Biomass-Fired Boiler #3	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-20004	Biomass-Fired Boiler #4	14.79	355.01	64.79	72.21	316.27	14.66	64.20	68.52	300.12	
EP-05001	Natural Gas-Fired Boiler #1	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-05002	Natural Gas-Fired Boiler #2	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-05003	Natural Gas-Fired Boiler #3	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-05004	Natural Gas-Fired Boiler #4	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-20514	Boiler Bottoms Ash Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20524	Boiler Bottoms Ash Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20534	Boiler Bottoms Ash Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20544	Boiler Bottoms Ash Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20510	Boiler Fly Ash Handling DC #1	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20520	Boiler Fly Ash Handling DC #2	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20530	Boiler Fly Ash Handling DC #3	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20540	Boiler Fly Ash Handling DC #4	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20511	Bed Media Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20521	Bed Media Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20531	Bed Media Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20541	Bed Media Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20512	Trona Handling DC #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20522	Trona Handling DC #2	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20532	Trona Handling DC #3	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20542	Trona Handling DC #4	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20551FUG	Ash Pellets Storage Pit	0.03	0.63	0.11	--	--	--	--	--	--	
EP-20552FUG	Ash Pellets Storage Pit Loading & Load-Out	0.04	0.53	0.10							Note 1
EP-09001 (SSM	Biogas Flare	--	--	--	--	--	--	--	--	--	Note 5
EP-06001 (EMG	Firewater Pump Engine	0.15	0.30	0.01	3.03	0.15	0.94	0.05	2.65	0.13	Note 6

Note 1. The hourly and daily haul road, dirt/fines loadout, ethanol loadout, ash pellets loadout, and wood residues (hog fuel) loadout and processing emissions are based on the "typical scenario" for shipping and receiving, which assumes that all shipping and receiving will occur 6:00 AM to 6:00 PM only, or 12 hours per day.
Note 2. The lowest achievable emission rate (LAER) that is guaranteed by the vendor is required to ensure compliance with PSD increment. LAER is more stringent than BACT and is generally only required in non-attainment areas.
Note 3. The floor sweep system will be operated intermittently. For the purposes of PTE calculations, the floor sweep system has been assumed to operate not more than 12 hours per days. 24-hour PM10 emissions were modeled using a variable emission rate scalar of 0.5.
Note 4. Conservative scenario for energy crops (agricultural residues) processing assumes continuous processing for the 24-hour PM_{10} emissions.
Note 5. The biogas flare incorporated into the facility design does not operate during normal operating conditions at the facility; therefore, this source is not included in the modeling analysis.
Note 6. Emergency equipment will operate a maximum of 2 hours per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

AREA SOURCE PARAMETERS (1)

Source No.	Source Description	Actual Width (2) (m)	Adjusted Width (2) (m)	Maximum Length of Area Source (3) (m)	Average Height of Trucks (4) (m)	Area Source Release Height (5) (m)	Initial Vertical Dimension (6) (m)	Total Area of Roads Area Sources (m^2)
EP01000F	Paved Plant Roads	7.3	17.1	170.7	4.0	4.0	1.8	40799

HAUL ROAD SEGMENTS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (m)	Width (Y) (m)	Area (m^2)	Angle	Segment Association
EP01000F	Paved Plant Roads								
PRDA01	Paved Road Area 1	288995.0	4117608.0	951.57	73.2	17.1	1248.6	0	1
PRDA02	Paved Road Area 2	288921.8	4117608.0	951.94	73.2	17.1	1248.6	0	1
PRDA03	Paved Road Area 3	288848.7	4117608.0	952.16	73.2	17.1	1248.6	0	1
PRDA04	Paved Road Area 4	288775.5	4117608.0	952.70	73.2	17.1	1248.6	0	1
PRDA05	Paved Road Area 5	288702.4	4117608.0	953.06	73.2	17.1	1248.6	0	1
PRDA06	Paved Road Area 6	288629.2	4117608.0	953.42	73.2	17.1	1248.6	0	1
PRDA07	Paved Road Area 7	288556.1	4117608.0	954.02	73.2	17.1	1248.6	0	1
PRDA08	Paved Road Area 8	288482.9	4117608.0	954.19	73.2	17.1	1248.6	0	1
PRDA09	Paved Road Area 9	288409.8	4117608.0	954.55	73.2	17.1	1248.6	0	1
PRDA10	Paved Road Area 10	288336.6	4117608.0	954.78	73.2	17.1	1248.6	0	2
PRDA11	Paved Road Area 11	288263.5	4117608.0	954.98	73.2	17.1	1248.6	0	2
PRDA12	Paved Road Area 12	288190.3	4117608.0	955.24	73.2	17.1	1248.6	0	2
PRDA13	Paved Road Area 13	288122.2	4117608.0	955.24	68.3	17.1	1165.4	0	2
PRDA14	Paved Road Area 14	288122.2	4117625.1	955.29	80.5	17.1	1373.5	270	2
PRDA15	Paved Road Area 15	288122.2	4117688.5	955.55	73.2	17.1	1248.6	0	2
PRDA16	Paved Road Area 16	288195.3	4117688.5	955.55	38.7	17.1	660.7	0	2
PRDA17	Paved Road Area 17	288234.0	4117705.5	955.55	80.5	17.1	1373.5	90	2
PRDA18	Paved Road Area 18	288105.1	4117625.1	955.42	73.2	17.1	1248.6	90	3
PRDA19	Paved Road Area 19	288105.1	4117552.0	955.35	57.9	17.1	988.5	90	3
PRDA20	Paved Road Area 20	288105.2	4117476.9	955.24	90.2	17.1	1540.0	0	3
PRDA21	Paved Road Area 21	288195.3	4117476.9	954.94	73.2	17.1	1248.6	0	3
PRDA22	Paved Road Area 22	288268.5	4117476.9	954.64	73.2	17.1	1248.6	0	3
PRDA23	Paved Road Area 23	288341.6	4117476.9	954.37	73.2	17.1	1248.6	0	3
PRDA24	Paved Road Area 24	288431.8	4117476.9	954.07	73.2	17.1	1248.6	270	3
PRDA25	Paved Road Area 25	288431.8	4117550.1	954.21	57.6	17.1	983.3	270	3
PRDA26	Paved Road Area 26	288414.8	4117477.9	954.14	73.2	17.1	1248.6	90	5
PRDA27	Paved Road Area 27	288414.8	4117404.8	954.07	57.9	17.1	988.5	90	5
PRDA28	Paved Road Area 28	288369.7	4117346.9	954.02	45.1	17.1	770.0	0	5
PRDA29	Paved Road Area 29	288296.6	4117346.9	954.33	73.2	17.1	1248.6	0	5
PRDA30	Paved Road Area 30	288279.6	4117477.9	954.63	73.2	17.1	1248.6	90	5
PRDA31	Paved Road Area 31	288279.6	4117404.8	954.50	57.9	17.1	988.5	90	5
PRDA32	Paved Road Area 32	288105.1	4117494.1	955.24	73.2	17.1	1248.6	90	4
PRDA33	Paved Road Area 33	288105.1	4117420.9	954.99	73.2	17.1	1248.6	90	4
PRDA34	Paved Road Area 34	288105.1	4117347.7	954.93	73.2	17.1	1248.6	90	4

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, Modeling Fugitive Dust Sources with AERMOD, revised January 2007; Trinity Consultants test data, Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), Utah Division of Air Quality Modeling Guidelines, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and accounts for the vertical emission dilution from moving trucks.

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

AREA SOURCE PARAMETERS (1)

Source No.	Source Description	Actual Width (2) (m)	Adjusted Width (2) (m)	Maximum Length of Area Source (3) (m)	Average Height of Trucks (4) (m)	Area Source Release Height (5) (m)	Initial Vertical Dimension (6) (m)	Total Area of Roads Area Sources (m^2)
EP01050F	Biomass Laydown Roads	7.3	17.1	170.7	4.0	4.0	1.8	30018

HAUL ROAD SEGMENTS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (m)	Width (Y) (m)	Area (m^2)	Angle
EP01050F	Biomass Laydown Roads							
BRDA01	Biomass Road Area 1	288451.8	4117571.1	954.13	73.2	17.1	1248.6	0
BRDA02	Biomass Road Area 2	288525.0	4117571.1	953.93	73.2	17.1	1248.6	0
BRDA03	Biomass Road Area 3	288598.1	4117571.1	953.55	73.2	17.1	1248.6	0
BRDA04	Biomass Road Area 4	288630.3	4117571.1	953.41	73.2	17.1	1248.6	90
BRDA05	Biomass Road Area 5	288630.3	4117497.9	953.11	73.2	17.1	1248.6	90
BRDA06	Biomass Road Area 6	288439.3	4117407.7	954.02	85.6	17.1	1461.9	0
BRDA07	Biomass Road Area 7	288525.0	4117407.7	953.57	73.2	17.1	1248.6	0
BRDA08	Biomass Road Area 8	288598.1	4117407.7	953.13	73.2	17.1	1248.6	0
BRDA09	Biomass Road Area 9	288566.3	4117571.1	953.83	73.2	17.1	1248.6	90
BRDA10	Biomass Road Area 10	288566.3	4117497.9	953.45	73.2	17.1	1248.6	90
BRDA11	Biomass Road Area 11	288501.8	4117571.1	954.02	73.2	17.1	1248.6	90
BRDA12	Biomass Road Area 12	288501.8	4117497.9	953.80	73.2	17.1	1248.6	90
BRDA13	Biomass Road Area 13	288439.3	4117571.1	954.21	73.2	17.1	1248.6	90
BRDA14	Biomass Road Area 14	288439.3	4117497.9	954.13	73.2	17.1	1248.6	90
BRDA15	Biomass Road Area 15	288431.8	4117571.1	954.25	19.8	17.1	338.2	0
BRDA16	Biomass Road Area 16	288599.0	4117571.1	953.54	73.2	17.1	1248.6	90
BRDA17	Biomass Road Area 17	288599.0	4117497.9	953.39	73.2	17.1	1248.6	90
BRDA18	Biomass Road Area 18	288535.0	4117571.1	953.86	73.2	17.1	1248.6	90
BRDA19	Biomass Road Area 19	288535.0	4117497.9	953.72	73.2	17.1	1248.6	90
BRDA20	Biomass Road Area 20	288470.5	4117571.1	954.06	73.2	17.1	1248.6	90
BRDA21	Biomass Road Area 21	288470.5	4117497.9	954.02	73.2	17.1	1248.6	90
BRDA22	Biomass Road Area 22	288385.0	4117605.0	954.63	49.7	29.9	1484.0	90
BRDA23	Biomass Road Area 23	288359.5	4117498.5	954.33	54.9	54.9	3010.1	0

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, Modeling Fugitive Dust Sources with AERMOD, revised January 2007; Trinity Consultants test data, Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), Utah Division of Air Quality Modeling Guidelines, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

AREA SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (1) (m)	Width (Y) (m)	Area Source Release Height (2) (m)	Initial Vertical Dimension (3) (m)	Source Area (m^2)
EP-20551FUG	Ash Pellets Storage Pit	288357.5	4117626.5	954.72	45.7	45.7	0.46	0.21	2,090
EP-11051FUG	Wood Residues (Hog Fuel) Storage Pile	288174.8	4117762.5	955.78	114.3	--	6.10	2.84	10,261

(1) Length of side for wood residues storage pile based on pile diameter.
(2) Release Height = Average Pile Height / 2
Ash pellet storage pit is a rectangular below grade pit. It is assumed the average pile height would be 3 feet (0.91 meters) above grade.
Wood residues storage pile is a conical pile with an average height of 40 feet (12 meters) and maximum height of 60 feet (18 meters).
(3) Initial Vertical Dimension = Average Pile Height / 4.3

VOLUME SOURCE PARAMETERS

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Release Height (1,2) (m)	Length of Side (6) (m)	Initial Lateral Dim. (3) (m)	Height of Structure or Truck When Dumping (m)	Initial Vertical Dim. (4,5) (m)
EP01101F	Grain Receiving Building	288097.5	4117373.5	954.94	4.57	30.48	7.09	9.14	4.25
EP02200F	DDGS Storage Building (50% DDGS)	288398.0	4117378.0	954.02	5.33	42.67	9.92	10.67	4.96
EP11001F	Wood Residues Receiving via Rail	288103.0	4117721.5	955.55	1.52	1.83	0.43	1.52	0.71
EP11002F	Crop Residues and Energy Crops Grinding and Handling								
EP11002A	Crop Residues Receiving via Truck Line #1	288386.0	4117599.7	954.63	1.52	3.05	0.71	7.62	3.54
EP11002B	Crop Residues Receiving via Truck Line #2	288386.0	4117590.5	954.63	1.52	3.05	0.71	7.62	3.54
EP11002C	Crop Residues Receiving via Truck Line #3	288386.0	4117581.3	954.56	1.52	3.05	0.71	7.62	3.54
EP11002D	Crop Residues Receiving via Truck Line #4	288386.0	4117572.0	954.48	1.52	3.05	0.71	7.62	3.54
EP11002E	Crop Residues Receiving via Truck Line #5	288386.0	4117562.8	954.39	1.52	3.05	0.71	7.62	3.54
EP11003F	Dirt/Fines Load-Out from Silo	288351.0	4117544.5	954.63	4.57	12.19	2.84	16.76	7.80
EP02710F	Ash Pellets Load-Out from Silo	288123.0	4117660.5	955.53	4.57	12.19	2.84	16.76	7.80
EP20552F	Ash Pellets Storage Pit Loading & Load-Out	288380.4	4117626.5	954.65	1.52	3.05	0.71	7.62	3.54
EP11052F	Wood Residues (Hog Fuel) Storage Pile Loading	288174.8	4117762.5	955.78	6.10	114.30	26.58	6.10	2.84
EP02250F	Wet Cake Storage and Loadout	288372.0	4117429.0	954.33	0.46	76.20	17.72	0.91	0.43
EP19001F	Lignin-Rich Stillage Storage and Loadout	288237.5	4117498.5	954.92	2.29	24.38	5.67	4.57	2.13
EP02000F	Fugitive Leaks	Emissions divided equally among storage tanks; as fugitive leaks occur throughout the facility.							
T02107F	EH Product Shift Tank #1	288149.0	4117426.5	954.94	3.05	6.10	1.42	6.10	2.84
T02108F	EH Product Shift Tank #2	288140.0	4117426.5	954.94	3.05	6.10	1.42	6.10	2.84
T02101F	EH Product Off-Spec Tank	288140.0	4117444.0	954.95	3.05	6.10	1.42	6.10	2.84
T02117F	Grain Product Shift Tank #1	288204.0	4117424.5	954.69	6.25	7.62	1.77	12.50	5.81
T02118F	Grain Product Shift Tank #2	288219.0	4117424.5	954.63	6.25	7.62	1.77	12.50	5.81
T02111F	Grain Product Off-Spec Tank	288230.0	4117424.5	954.63	6.25	7.62	1.77	12.50	5.81
T02102F	EH Ethanol Product Storage Tank	288165.0	4117426.5	954.94	6.55	13.11	3.05	13.11	6.10
T02112F	Grain Ethanol Product Storage Tank #1	288204.0	4117444.0	954.73	7.32	18.29	4.25	14.63	6.80
T02113F	Grain Ethanol Product Storage Tank #2	288259.0	4117444.0	954.63	7.32	18.29	4.25	14.63	6.80
T02114F	Grain Ethanol Product Storage Tank #3	288231.5	4117444.0	954.65	7.32	18.29	4.25	14.63	6.80
T02105F	EH Denaturant Storage Tank	288154.0	4117444.0	954.94	3.05	4.27	0.99	6.10	2.84
T02115F	Grain Denaturant Storage Tank	288240.0	4117424.5	954.63	6.25	7.62	1.77	12.50	5.81
EP02100F	Loading Losses (7)	288084.0	4117468.0	955.24	2.35	17.41	4.05	4.70	2.19

(1) Release Height from Structure (Building Vents) = Height of Structure / 2 [OR] Release Height from Truck/Rail Car Unloading = Height from Truck Bed/Rail Car to Ground or Feeder Height from truck bed or rail car to ground or feeder assumed to be 1.5 meters (5 feet).
(2) Release Height from Silo = Average between height of silo loading chute and height of truck, or 15 feet (4.6 meters)
(3) Initial Lateral Dimension of Single Volume Source = Length of Side / 4.3
(4) Initial Vertical Dimension of Elevated Source on or Adjacent to a Building (Structure Based) = Structure Height / 2.15
(5) For truck loading by material dropping from a silo, the initial depth of the plume from this drop equals the height of the silo (structure) / 2.15 to account for building wake effects.
(6) Length of side for silos and storage tanks based on silo/tank diameter.
(7) Release and structure height and length of side based on standard railcar tanker dimensions; 15'5" high x 57'1.5" long
(http://worldtraderef.com/WTR_site/Rail_Cars/Guide_to_Rail_Cars.asp).

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

POINT SOURCE PARAMETERS									
Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
STARCH PLANT									
EP01101A	Grain Receiving DC #1	288088.0	4117369.5	954.94	12.19	0.91	Ambient	11.33	17.25
EP01101B	Grain Receiving DC #2	288088.0	4117379.5	954.94	12.19	0.91	Ambient	11.33	17.25
EP01102	Grain Handling DC	288172.0	4117352.5	954.64	21.34	0.61	Ambient	4.72	16.17
EP01110A	Bin Baghouse #1	288151.0	4117390.5	954.93	19.81	0.20	Ambient	0.47	14.55
EP01110B	Bin Baghouse #2	288151.0	4117358.5	954.72	19.81	0.20	Ambient	0.47	14.55
EP01120A	Bin Baghouse #3	288186.5	4117390.5	954.72	19.81	0.20	Ambient	0.47	14.55
EP01120B	Bin Baghouse #4	288186.5	4117358.5	954.63	19.81	0.20	Ambient	0.47	14.55
EP01130A	Bin Baghouse #5	288151.0	4117355.0	954.68	19.81	0.20	Ambient	0.47	14.55
EP01130B	Bin Baghouse #6	288151.0	4117323.0	954.63	19.81	0.20	Ambient	0.47	14.55
EP01150	Surge Bin Baghouse	288172.0	4117308.5	954.63	19.81	0.20	Ambient	0.47	14.55
EP01201	Grain Mill DC #1	288183.5	4117316.0	954.63	16.76	0.76	Ambient	7.08	15.52
EP01202	Grain Mill DC #2	288183.5	4117311.0	954.62	16.76	0.76	Ambient	7.08	15.52
EP01203	Grain Mill DC #3	288183.5	4117306.5	954.62	16.76	0.76	Ambient	7.08	15.52
EP01204	Grain Mill DC #4	288183.5	4117302.0	954.61	16.76	0.76	Ambient	7.08	15.52
EP01400	Grain Pre-Fermentation Vent Scrubber	288238.0	4117278.5	954.33	21.34	0.30	288.15	1.37	18.76
EP01401	Grain Main Fermentation Vent Scrubber	288284.5	4117300.0	954.23	21.34	0.46	288.71	4.13	25.18
EP01500	Distillation Vent Scrubber	288347.0	4117390.5	954.33	24.38	0.10	287.04	0.12	14.55
EP01610	First Effect Evaporator Vent Condenser	288242.5	4117363.0	954.45	9.14	0.05	322.04	0.01	5.59
EP01620	Second Effect Evaporator Vent Condenser	288226.5	4117363.0	954.54	9.14	0.05	322.04	0.01	5.59
EP01630	Third Effect Evaporator Vent Condenser	288221.5	4117377.0	954.62	9.14	0.05	322.04	0.01	5.59
EP01651	Finish Evaporator Vent Condenser	288359.5	4117370.0	954.23	9.14	0.05	322.04	0.01	5.59
EP01801	DDGS Indirect Dryer #1	288347.0	4117390.5	954.33	22.86	1.83	422.04	35.40	13.48
EP02200	DDGS Loadout DC #1	288408.5	4117359.5	954.02	12.19	0.76	305.37	7.08	15.52
ENZYMATIC HYDROLYSIS PLANT									
EP11134	Biomass Grinding DC #1	288336.0	4117552.0	954.63	19.81	2.4384	Ambient	72.49	15.52
EP11135	Biomass Grinding DC #2	288326.0	4117552.0	954.63	19.81	2.4384	Ambient	72.49	15.52
EP11601	Biomass Surge Bin #1 DC	288190.0	4117603.5	955.24	13.72	0.6096	Ambient	4.72	16.17
EP11602	Biomass Surge Bin #2 DC	288207.0	4117603.5	955.24	13.72	0.6096	Ambient	4.72	16.17
EP11603	Biomass Surge Bin #3 DC	288224.0	4117603.5	955.16	13.72	0.6096	Ambient	4.72	16.17
EP12101	EH Metering Bin #1	288241.5	4117594.0	954.98	16.76	0.7620	Ambient	7.55	16.56
EP11711	Boiler 1 Metering Bin DC #1	288161.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11721	Boiler 1 Metering Bin DC #2	288166.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11731	Boiler 1 Metering Bin DC #3	288172.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11712	Boiler 2 Metering Bin DC #1	288177.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11722	Boiler 2 Metering Bin DC #2	288183.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11732	Boiler 2 Metering Bin DC #3	288188.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11713	Boiler 3 Metering Bin DC #1	288194.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11723	Boiler 3 Metering Bin DC #2	288199.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11733	Boiler 3 Metering Bin DC #3	288205.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11714	Boiler 4 Metering Bin DC #1	288210.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11724	Boiler 4 Metering Bin DC #2	288216.0	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11734	Boiler 4 Metering Bin DC #3	288221.5	4117627.0	955.24	18.29	0.4572	Ambient	2.08	12.65
EP11235	Floor Sweep System DC	288312.0	4117552.0	954.63	12.19	0.76	Ambient	7.08	15.52
EP11081	Dirt Load-Out Silo	288356.0	4117539.5	954.63	19.81	0.15	Ambient	0.28	15.24
EP11082	Dirt Load-Out Silo Spout	288344.0	4117544.5	954.63	12.19	0.25	Ambient	0.66	13.04
EP18185	EH Fermentation CO2 Scrubber	288226.0	4117546.5	954.94	21.34	0.61	294.26	8.12	27.81
EP18180	EH Distillation Vent Scrubber	288214.0	4117530.5	954.94	24.38	0.20	293.15	0.30	9.31

Source: Salter 2010a.

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

POINT SOURCE PARAMETERS									
Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height (m)	Stack Diameter (m)	Stack Temp. (K)	Flow Rate (m^3/s)	Stack Velocity (m/s)
ETHANOL FINISHING AND STORAGE									
EP02100	Vapor Recovery System	288178.0	4117474.0	954.94	3.66	0.15	Ambient	0.47	25.87
UTILITIES									
EP02701	Ash Pelletizer Dryer DC	288146.0	4117645.0	955.28	22.86	0.61	422.04	4.72	16.17
EP02702	Ash Pelletizer Cooler DC	288136.0	4117645.0	955.36	19.81	0.46	305.37	2.36	14.37
EP02710	Ash Pellets Load-Out Silo	288128.0	4117655.5	955.48	19.81	0.15	Ambient	0.28	15.24
EP02711	Ash Pellets Load-Out Silo Spout	288116.0	4117660.5	955.55	12.19	0.25	Ambient	0.66	13.04
EP04001	EH Cooling Tower								
EP04001A	EH CWT Cell 1	288164.0	4117586.0	955.24	13.41	10.06	295.37	548.87	6.91
EP04002	Starch Cooling Tower				0.00	0.00			
EP04002A	Grain Ethanol CWT Cell 1	288371.0	4117315.5	954.02	13.41	10.06	295.37	548.87	6.91
EP04002B	Grain Ethanol CWT Cell 2	288371.0	4117304.5	954.02	13.41	10.06	295.37	548.87	6.91
EP04002C	Grain Ethanol CWT Cell 3	288371.0	4117293.5	954.02	13.41	10.06	295.37	548.87	6.91
EP21001	CoGen Cooling Water Tower								
EP22001A	CoGen CWT Cell 1	288268.0	4117719.0	955.55	13.41	10.06	295.37	593.71	7.47
EP22001B	CoGen CWT Cell 2	288268.0	4117709.0	955.54	13.41	10.06	295.37	593.71	7.47
EP22001C	CoGen CWT Cell 3	288268.0	4117699.0	955.44	13.41	10.06	295.37	593.71	7.47
EP22001D	CoGen CWT Cell 4	288268.0	4117689.0	955.35	13.41	10.06	295.37	593.71	7.47
EP22001E	CoGen CWT Cell 5	288268.0	4117679.0	955.26	13.41	10.06	295.37	593.71	7.47
EP20001	Biomass-Fired Boiler #1	288169.0	4117681.0	955.55	36.58	3.05	466.48	103.83	14.23
EP20002	Biomass-Fired Boiler #2	288184.0	4117681.0	955.55	36.58	3.05	466.48	103.83	14.23
EP20003	Biomass-Fired Boiler #3	288199.0	4117681.0	955.55	36.58	3.05	466.48	103.83	14.23
EP20004	Biomass-Fired Boiler #4	288214.0	4117681.0	955.55	36.58	3.05	466.48	103.83	14.23
EP05001	Natural Gas-Fired Boiler #1	288316.5	4117285.5	954.02	36.58	1.22	399.82	15.57	13.34
EP05002	Natural Gas-Fired Boiler #2	288324.5	4117285.5	954.02	36.58	1.22	399.82	15.57	13.34
EP05003	Natural Gas-Fired Boiler #3	288332.5	4117285.5	954.02	36.58	1.22	399.82	15.57	13.34
EP05004	Natural Gas-Fired Boiler #4	288340.5	4117285.5	954.02	36.58	1.22	399.82	15.57	13.34
EP20514	Boiler Bottoms Ash Handling DC #1	288165.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20524	Boiler Bottoms Ash Handling DC #2	288180.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20534	Boiler Bottoms Ash Handling DC #3	288195.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20544	Boiler Bottoms Ash Handling DC #4	288210.0	4117649.0	955.24	19.81	0.46	Ambient	2.36	14.37
EP20510	Boiler Fly Ash Handling DC #1	288165.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20520	Boiler Fly Ash Handling DC #2	288180.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20530	Boiler Fly Ash Handling DC #3	288195.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20540	Boiler Fly Ash Handling DC #4	288210.0	4117645.0	955.24	19.81	0.91	Ambient	9.44	14.37
EP20511	Bed Media Handling DC #1	288127.5	4117623.0	955.27	16.76	0.46	Ambient	2.36	14.37
EP20521	Bed Media Handling DC #2	288135.0	4117623.0	955.26	16.76	0.46	Ambient	2.36	14.37
EP20531	Bed Media Handling DC #3	288142.5	4117623.0	955.25	16.76	0.46	Ambient	2.36	14.37
EP20541	Bed Media Handling DC #4	288150.0	4117623.0	955.24	16.76	0.46	Ambient	2.36	14.37
EP20512	Trona Handling DC #1	288127.5	4117627.0	955.30	16.76	0.46	Ambient	2.36	14.37
EP20522	Trona Handling DC #2	288135.0	4117627.0	955.28	16.76	0.46	Ambient	2.36	14.37
EP20532	Trona Handling DC #3	288142.5	4117627.0	955.26	16.76	0.46	Ambient	2.36	14.37
EP20542	Trona Handling DC #4	288150.0	4117627.0	955.24	16.76	0.46	Ambient	2.36	14.37
EP06001	Firewater Pump Engine	288288.0	4117500.0	954.63	4.27	0.30	683.15	0.83	11.32

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Radius (m)	Angle
BUILDING PARAMETERS									
RECTANGULAR BUILDINGS									
BLD1	Administrative Bldg	288447.0	4117717.5	954.73	3.66	32.00	28.96	--	0
BLD13B	EH Distillation Area (Area 18000)	288219.5	4117506.0	954.94	27.43	30.48	27.43	--	0
BLD2	Maintenance Bldg	288279.0	4117510.0	954.70	8.53	30.48	30.48	--	0
BLD21	CoGen CWT (Area 21000)	288262.5	4117724.5	955.55	13.41	53.34	10.97	--	90
BLD22	Power House (Area 22000)	288251.0	4117667.0	955.35	18.29	39.62	33.53	--	90
BLD23A	EH Cooling Tower (Area 04000)	288158.5	4117602.0	955.24	13.41	21.34	10.97	--	90
BLD24A	Ash Pelletizing Bldg (Area 02700)	288129.5	4117648.0	955.44	18.29	24.38	24.38	--	0
BLD26A	Electrical Room #1 near Substation	288314.0	4117628.5	954.98	4.57	16.76	4.57	--	0
BLD26B	Electrical Room #2 near Biomass Unloading	288288.5	4117607.0	954.94	4.57	16.76	4.57	--	0
BLD26C	Electrical Room #3 near Biomass Wash	288260.0	4117606.5	954.99	4.57	16.76	4.57	--	90
BLD26D	Electrical Room #4 Near Chemical Storage	288143.0	4117524.0	955.24	4.57	16.76	4.57	--	90
BLD26E	Electrical Room #5 Near EH Process	288175.5	4117606.5	955.24	4.57	16.76	4.57	--	90
BLD26F	Electrical Room #6 near Biomass-Fired Boilers	288154.5	4117671.0	955.46	4.57	16.76	4.57	--	90
BLD28A	Fire Water Pump Bldg (Area 06000)	288287.0	4117497.0	954.63	3.66	15.24	6.10	--	0
BLD28B	Fire Foam Bldg (Area 07100)	288224.9	4117460.0	954.74	3.05	6.10	6.10	--	0
BLD3	Control Room and Laboratory	288279.0	4117540.5	954.85	3.66	30.48	13.72	--	0
BLD5	Scale House (Areas 1000 & 10000)	288715.5	4117627.5	953.12	7.32	18.29	7.62		0
BLD6A	Biomass Grinding Lines (Area 11000)	288279.0	4117555.0	954.85	9.14	59.44	51.82	--	0
BLD9	EH Process Bldg	288185.5	4117571.5	955.21	15.24	70.10	18.29	--	0
BLD13A	Starch Distillation Area (Area 01500 to 01600)	288222.0	4117363.5	954.57	27.43	40.23	38.10	--	0
BLD16B	Grain Ethanol Decanters Bldg (Area 01700)	288318.5	4117448.5	954.45	11.28	24.38	9.14	--	90
BLD22B	Starch Energy Center (Area 05000)	288308.5	4117322.5	954.25	18.29	45.72	39.62	--	90
BLD23B	Starch Cooling Tower (Area 04000)	288365.5	4117321.0	954.02	13.41	32.00	10.97	--	90
BLD34	Grain Receiving / Loadout Bldg (Area 01100)	288084.0	4117387.5	954.95	9.14	30.48	24.38	--	90
BLD36	Grain Milling Bldg (Area 01200)	288177.0	4117320.5	954.63	15.24	22.86	12.80	--	90
BLD37	Mash Prep Bldg (Area 01300)	288195.5	4117282.0	954.44	15.85	38.10	38.10	--	0
BLD39	Grain Ethanol Finish Evaporation Area	288347.0	4117365.5	954.25	18.29	12.19	9.14	--	0
BLD40	DDGS Storage & Loadout Bldg (Area 02200)	288379.5	4117399.5	954.26	10.67	42.67	36.58	--	90

Source: Salter 2010a.

Table D2 - Proposed Action with Grain-to-Ethanol Facility Modeled Source Parameters

ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Radius (m)	Angle
BUILDING PARAMETERS									
CIRCULAR BUILDINGS									
BLD10A	EH Fermentation Tank #1 (Area 16000)	288193.5	4117558.5	955.10	12.19	--	--	9.91	--
BLD10B	EH Fermentation Tank #2 (Area 16000)	288216.5	4117558.5	954.94	12.19	--	--	9.91	--
BLD10C	EH Beer Well T-18101 (Area 18000)	288244.0	4117558.5	954.94	12.19	--	--	9.91	--
BLD14A	EH Whole Stillage Tank T-19011 (Area 19000)	288137.0	4117602.0	955.24	15.85	--	--	6.17	--
BLD14B	EH Centrate Tank T-19012 (Area 19000)	288137.0	4117592.5	955.24	3.66	--	--	2.29	--
BLD18A	EH Ethanol Product Storage Tank T-02102	288165.0	4117426.5	954.94	13.11	--	--	6.55	--
BLD18B	EH Denaturant Storage Tank T-02105	288154.0	4117444.0	954.94	6.10	--	--	2.13	--
BLD18C	EH Product Shift Tank T-02107 (Area 02100)	288149.0	4117426.5	954.94	6.10	--	--	3.05	--
BLD18D	EH Product Shift Tank T-02108 (Area 02100)	288140.0	4117426.5	954.94	6.10	--	--	3.05	--
BLD18E	EH Product Off-Spec Tank T-02101 (Area 02100)	288140.0	4117444.0	954.95	6.10	--	--	3.05	--
BLD24B	Ash Pellet Silo (Area 02700)	288123.0	4117660.5	955.53	16.76	--	--	6.10	--
BLD27	Process / Firewater Tank (Area 07000)	288326.0	4117504.5	954.63	17.68	--	--	10.06	--
BLD29	Process Water Tank (Area 07300)	288170.5	4117559.5	955.24	17.68	--	--	6.10	--
BLD30A	Sulfuric Acid Tank T-1911 (Area 01900)	288136.5	4117543.0	955.24	6.10	--	--	3.05	--
BLD30B	Phosphoric Acid Tank T-1913 (Area 01900)	288136.5	4117535.0	955.24	3.96	--	--	1.52	--
BLD30C	Boiler Aqua-Ammonia Tank T-1910B	288136.5	4117521.0	955.24	6.10	--	--	3.05	--
BLD30D	EH Aqua-Ammonia Tank T-01910A	288136.5	4117511.0	955.24	10.06	--	--	3.81	--
BLD30E	Sodium Hydroxide (Caustic Tank T-01900	288136.5	4117528.5	955.24	4.88	--	--	1.98	--
BLD50A	Aerobic Digester (Area 09000)	288181.5	4117519.0	954.94	18.29	--	--	24.38	--
BLD50B	Anaerobic Digester #1 (Area 09000)	288134.5	4117558.5	955.24	9.14	--	--	5.79	--
BLD50C	Anaerobic Digester #2 (Area 09000)	288149.5	4117558.5	955.24	9.14	--	--	5.79	--
BLD50D	Equalization Tank (Area 09000)	288137.0	4117578.5	955.24	12.19	--	--	9.91	--
BLD6B	Dirt Load-Out Silo (Area 10000)	288351.0	4117544.5	954.63	16.76	--	--	6.10	--
BLD6C	Biomass Surge Bin #1	288229.0	4117598.5	955.10	12.19	--	--	6.10	--
BLD6D	Biomass Surge Bin #2	288212.0	4117598.5	955.23	12.19	--	--	6.10	--
BLD6E	Biomass Surge Bin #3	288195.0	4117598.5	955.24	12.19	--	--	6.10	--
BLD14C	Grain Ethanol Whole Stillage Tank T-01700	288304.5	4117439.5	954.58	16.46	--	--	7.92	--
BLD14D	Grain Ethanol Intermediate Stillage Tank T-01601	288304.5	4117421.5	954.43	12.80	--	--	5.79	--
BLD14E	Grain Ethanol Thin Stillage Tank T-01600	288304.5	4117404.0	954.33	16.46	--	--	6.71	--
BLD15B	Grain Ethanol Syrup Tank T-01650 (Area 01650)	288303.5	4117388.0	954.33	10.36	--	--	4.27	--
BLD18F	Grain Ethanol Product Storage Tank T-02112	288204.0	4117444.0	954.73	14.63	--	--	9.14	--
BLD18G	Grain Ethanol Product Storage Tank T-02113	288259.0	4117444.0	954.63	14.63	--	--	9.14	--
BLD18H	Grain Ethanol Product Storage Tank T-02114	288231.5	4117444.0	954.65	14.63	--	--	9.14	--
BLD18I	Grain Denaturant Storage Tank T-02115	288240.0	4117424.5	954.63	12.50	--	--	3.81	--
BLD18J	Grain Product Shift Tank T-02117 (Area 02100)	288204.0	4117424.5	954.69	12.50	--	--	3.81	--
BLD18K	Grain Product Shift Tank T-02118 (Area 02100)	288219.0	4117424.5	954.63	12.50	--	--	3.81	--
BLD18L	Grain Product Off-Spec Tank T-02111	288230.0	4117424.5	954.63	12.50	--	--	3.81	--
BLD35A	Grain Storage T-2001 (Area 02000)	288151.0	4117374.5	954.87	18.29	--	--	16.00	--
BLD35B	Grain Storage T-2002 (Area 02000)	288186.5	4117374.5	954.63	18.29	--	--	16.00	--
BLD35C	Grain Storage T-2003 (Area 02000)	288151.0	4117339.0	954.63	18.29	--	--	16.00	--
BLD38A	Starch Pre-fermentation Tank T-01400	288269.5	4117290.0	954.33	17.68	--	--	6.10	--
BLD38B	Starch Fermentation Tank T-01401 (Area 01400)	288269.5	4117309.0	954.33	17.68	--	--	8.23	--
BLD38C	Starch Fermentation Tank T-01402 (Area 01400)	288269.5	4117329.0	954.33	17.68	--	--	8.23	--
BLD38D	Starch Fermentation Tank T-01403 (Area 01400)	288269.5	4117348.0	954.33	17.68	--	--	8.23	--
BLD38E	Starch Fermentation Tank T-01404 (Area 01400)	288242.5	4117348.0	954.33	17.68	--	--	8.23	--
BLD38F	Starch Fermentation Tank T-01405 (Area 01400)	288242.5	4117329.0	954.33	17.68	--	--	8.23	--
BLD38G	Starch Fermentation Tank T-01406 (Area 01400)	288242.5	4117309.0	954.33	17.68	--	--	8.23	--
BLD38H	Starch Beerwell T-01407 (Area 01400)	288242.5	4117290.0	954.33	17.68	--	--	6.10	--

Source: Salter 2010a.

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Table D3 - Proposed Action with Grain-to-Ethanol Facility Haul Road Traffic Distribution

Paved Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Ethanol (Denatured)	7460	11.30
Denaturant (Gasoline)	7460	4.24
Grain Delivery	8800	56.67
Biomass Delivery	5080	204.93
DDGS	7270	39.93
WDGS	6030	54.82
Lignin-Rich/Lean Stillage	7460	42.39
Boiler Ash Waste (Ash Pellets)	7105	39.02
Dirt/Fines Waste From Dust Collectors	5080	28.86
Misc. Chemicals & Supplies	7460	5.65
Facility-wide		**487.81**

Paved Haul Road Emissions	**32.69**	**lb/day**

	Percentage of Truck Traffic Per Segment					Daily VMT Per Segment				
	Segment 1	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**	**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**
Ethanol (Denatured)	61.66%	13.94%	24.40%	0.00%	0.00%	6.97	1.58	2.76	0.00	0.00
Denaturant (Gasoline)	61.66%	13.94%	24.40%	0.00%	0.00%	2.61	0.59	1.03	0.00	0.00
Grain Delivery	52.27%	11.82%	21.82%	14.09%	0.00%	29.62	6.70	12.36	7.98	0.00
Biomass Delivery	90.55%	0.00%	9.45%	0.00%	0.00%	185.57	0.00	19.36	0.00	0.00
DDGS	63.27%	0.00%	18.16%	0.00%	18.57%	25.27	0.00	7.25	0.00	7.41
WDGS	76.29%	0.00%	14.59%	0.00%	9.12%	41.82	0.00	8.00	0.00	5.00
Lignin-Rich/Lean Stillage	61.66%	13.94%	24.40%	0.00%	0.00%	26.14	5.91	10.34	0.00	0.00
Boiler Ash Waste (Ash Pellets)	64.74%	35.26%	0.00%	0.00%	0.00%	25.27	13.76	0.00	0.00	0.00
Dirt/Fines Waste From Dust Collectors	90.55%	0.00%	9.45%	0.00%	0.00%	26.14	0.00	2.73	0.00	0.00
Misc. Chemicals & Supplies	61.66%	13.94%	24.40%	0.00%	0.00%	3.48	0.79	1.38	0.00	0.00
Total Daily VMT Per Segment						**372.88**	**29.32**	**65.22**	**7.98**	**12.41**
Percentage of Facility-wide VMT						**76.44%**	**6.01%**	**13.37%**	**1.64%**	**2.54%**
Emissions Per Segment (lb/day)						**24.98**	**1.96**	**4.37**	**0.54**	**0.83**
Emissions Per Segment (g/s-m2)						**2.3345E-05**	**2.1560E-06**	**4.7036E-06**	**1.4997E-06**	**1.3452E-06**

Daily VMT Calculations:	Total Feet Per Trip	Annual VMT
Ethanol (Denatured)	7460	3380
Denaturant (Gasoline)	7460	1053
Grain Delivery	8800	6760
Biomass Delivery	5080	67381
DDGS	7270	5089
WDGS	6030	21036
Lignin-Rich/Lean Stillage	7460	9762
Boiler Ash Waste (Ash Pellets)	7105	4992
Dirt/Fines Waste From Dust Collectors	5080	4695
Misc. Chemicals & Supplies	7460	1680
Facility-wide		**125,828**

Paved Haul Road Emissions	**4.22**	**ton/yr**

	Percentage of Truck Traffic Per Segment					Annual VMT Per Segment				
	Segment 1	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**	**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**
Ethanol (Denatured)	61.66%	13.94%	24.40%	0.00%	0.00%	2083.94	471.15	824.52	0.00	0.00
Denaturant (Gasoline)	61.66%	13.94%	24.40%	0.00%	0.00%	649.05	146.74	256.80	0.00	0.00
Grain Delivery	52.27%	23.64%	10.00%	14.09%	0.00%	3533.64	1597.82	676.00	952.55	0.00
Biomass Delivery	90.55%	0.00%	9.45%	0.00%	0.00%	61014.47	0.00	6366.73	0.00	0.00
DDGS	63.27%	0.00%	18.16%	0.00%	18.57%	3220.00	0.00	924.00	0.00	945.00
WDGS	76.29%	0.00%	14.59%	0.00%	9.12%	16047.73	0.00	3070.00	0.00	1918.75
Lignin-Rich/Lean Stillage	61.66%	13.94%	24.40%	0.00%	0.00%	6019.20	1360.86	2381.51	0.00	0.00
Boiler Ash Waste (Ash Pellets)	64.74%	35.26%	0.00%	0.00%	0.00%	3232.20	1760.14	0.00	0.00	0.00
Dirt/Fines Waste From Dust Collectors	90.55%	0.00%	9.45%	0.00%	0.00%	4251.52	0.00	443.64	0.00	0.00
Misc. Chemicals & Supplies	61.66%	13.94%	24.40%	0.00%	0.00%	1035.87	234.20	409.84	0.00	0.00
Total Annual VMT Per Segment						**101087.61**	**5570.91**	**15353.03**	**952.55**	**2863.75**
Percentage of Facility-wide VMT						**80.34%**	**4.43%**	**12.20%**	**0.76%**	**2.28%**
Emissions Per Segment (ton/yr)						**3.39**	**0.19**	**0.51**	**0.03**	**0.10**
Emissions Per Segment (g/s-m2)						**8.6696E-06**	**5.6118E-07**	**1.5169E-06**	**2.4508E-07**	**4.2508E-07**

Note 1: Percentage of truck traffic per segment based on the following main road segment lenths and areas:

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
Segment Length (ft)	2300	2505	1820	620	1350
Segment Areas (m^2)	11,238	9,568	9,755	3,746	6,493

Note 2: Emissions per segment based on the following equation:

Emissions per Segment (lb/day or ton/yr) = [Total Paved Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]

Emissions per Segment (g/s-m^2) = [Emissions per Segment] x [unit conversion factors for lb/day or ton/yr to g/s] / [Segment Area]

Source: Salter 2010a.

Table D3 - Proposed Action with Grain-to-Ethanol Facility Haul Road Traffic Distribution

Biomass Unpaved Haul Roads Emissions Distribution Calculations

Daily VMT Calculations:	Total Feet Per Trip	Daily VMT
Biomass Storage Field	1600	6.06
Biomass Staging Area	180	4.84
Facility-wide		**10.90**

Biomass Laydown Emissions	**4.21**	**lb/day**

	Percentage of Truck Traffic Per Segment		Daily VMT Per Segment	
	Segment 1	**Segment 2**	**Segment 1**	**Segment 2**
	100.00%	0.00%	6.06	0.00
	0.00%	100.00%	0.00	4.84
Total Daily VMT Per Segment			**6.06**	**4.84**
Percentage of Facility-wide VMT			**55.59%**	**44.41%**
Emissions Per Segment (lb/day)			**2.34**	**1.87**
Emissions Per Segment (g/s-m2)			**4.5447E-07**	**3.2571E-06**

Annual VMT Calculations:	Total Feet Per Trip	Annual VMT
Biomass Storage Field	1600	2264.85
Biomass Staging Area	180	2388.41
Facility-wide		**4653.26**

Biomass Laydown Emissions	**0.90**	**ton/yr**

	Percentage of Truck Traffic Per Segment		Annual VMT Per Segment	
	Segment 1	**Segment 2**	**Segment 1**	**Segment 2**
	100.00%	0.00%	2264.85	0.00
	0.00%	100.00%	0.00	2388.41
Total Annual VMT Per Segment			**2264.85**	**2388.41**
Percentage of Facility-wide VMT			**48.67%**	**51.33%**
Emissions Per Segment (ton/yr)			**0.44**	**0.46**
Emissions Per Segment (g/s-m2)			**4.6531E-07**	**4.4027E-06**

Note 1: Percentage of truck traffic per segment based on the following main road segment lenths and areas:

	Segment 1	Segment 2
Segment Length (ft)	1600	180
Segment Areas (m^2)	27,008	3,010

Note 2: Emissions per segment based on the following equation:

Emissions per Segment (lb/day or ton/yr) = [Total Paved Haul Road Emissions (lb/day or ton/yr)] x [Percentage of Facility-wide VMT]

Emissions per Segment (g/s-m^2) = [Emissions per Segment] x [unit conversion factors for lb/day or ton/yr to g/s] / [Segment Area]

Source: Salter 2010a.

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Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

AREA SOURCE PM_{10} EMISSIONS										
					24-Hour Averaging Period		Annual Averaging Period			
Source ID	Source Description			Total Area of Roads Area Sources (m2)	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s-m^2)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s-m^2)	Notes:
EP01000F	Paved Plant Roads (50% DDGS)			See Distribution Calculations	32.69	See Distribution Calculations	4.22	See Distribution Calculations	Notes 1, 2
EP01000F	Paved Plant Roads (100% WDGS)				32.41		4.04		Notes 1, 2
PRDA01	PRDA10	PRDA19	PRDA28	Emission rates for paved haul road segments calculated based on the percentage of truck traffic per segment. Please see the Paved Haul Roads Emissions Distribution Calculations provided in Table D3 in this Attachment.					
PRDA02	PRDA11	PRDA20	PRDA29						
PRDA03	PRDA12	PRDA21	PRDA30						
PRDA04	PRDA13	PRDA22	PRDA31						
PRDA05	PRDA14	PRDA23	PRDA32						
PRDA06	PRDA15	PRDA24	PRDA33						
PRDA07	PRDA16	PRDA25	PRDA34						
PRDA08	PRDA17	PRDA26							
PRDA09	PRDA18	PRDA27							
EP01050F	Biomass Laydown Roads			See Distribution Calculations	4.21	See Distribution Calculations	0.90	See Distribution Calculations	Notes 1, 2
BRDA01	BRDA07	BRDA13	BRDA19	Emission rates for biomass unpaved haul road segments calculated based on the percentage of truck traffic per segment. Please see the Biomass Unpaved Haul Roads Emissions Distribution Calculations provided in Table D3 in this Attachment.					
BRDA02	BRDA08	BRDA14	BRDA20						
BRDA03	BRDA09	BRDA15	BRDA21						
BRDA04	BRDA10	BRDA16	BRDA22						
BRDA05	BRDA11	BRDA17	BRDA23						
BRDA06	BRDA12	BRDA18							
EP20551F	Ash Pellets Storage Pit			2,090	0.63	1.5805E-06	0.11	1.5805E-06	Note 3
EP11051F	Wood Residues (Hog Fuel) Storage Pile			10,261	7.21	3.6868E-06	1.32	3.6868E-06	

(1) 24-hour PM_{10} emissions from paved haul roads were modeled based on a "typical scenario", which assumes all truck traffic associated with shipping and receiving will occur from 6:00 AM to 6:00 PM only. 24-hour PM_{10} emissions from biomass storage area roads and the biomass staging area were modeled based on the areas being active constantly.

(2) Annual PM_{10} emissions from haul roads were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) The ash pellet storage pit is an emergency overflow pit used only when ash pellets cannot be delivered by either truck or rail to the distributor. Operation of the ash pellet storage pit is not part of the normal facility operations. The conservative scenario assumes the pit is utilized and wind erosion emissions occur continuously.

Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

VOLUME SOURCE PM_{10} EMISSIONS							
		24-Hour Averaging Period		Annual Averaging Period			
Source ID	**Source Description**	**PM_{10} 24-Hour Emission Rate (lb/day)**	**PM_{10} Modeled 24-Hour Emission Rate (g/s)**	**PM_{10} Annual Emission Rate (tons/yr)**	**PM_{10} Modeled Annual Emission Rate (g/s)**	**Notes:**
EP01101FUG	Grain Receiving	3.81	4.0043E-02	0.23	6.6216E-03	Notes 1, 2
EP02200FUG	DDGS Shipping	1.44	1.5120E-02	0.09	2.6581E-03	Notes 1, 2
EP11001F	Wood Residues Receiving via Rail	0.38	3.9742E-03	0.03	8.8215E-04	Notes 1, 2
EP11002A	Crop Residues Receiving via Truck Line #1	0.17	8.6670E-04	0.02	6.5454E-04	Note 3
EP11002B	Crop Residues Receiving via Truck Line #2	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002C	Crop Residues Receiving via Truck Line #3	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002D	Crop Residues Receiving via Truck Line #4	0.17	8.6670E-04	0.02	6.5454E-04	
EP11002E	Crop Residues Receiving via Truck Line #5	0.17	8.6670E-04	0.02	6.5454E-04	
EP11003F	Dirt/Fines Load-Out from Silo	0.40	4.1610E-03	0.03	7.7262E-04	Notes 1, 2
EP02710F	Ash Pellets Load-Out from Silo	0.48	5.0890E-03	0.09	2.5445E-03	Notes 1, 2
EP20552F	Ash Pellets Storage Pit Loading & Load-Out	0.53	5.5481E-03	0.10	2.9369E-03	Notes 1, 2
EP11052F	Wood Residues (Hog Fuel) Storage Pile Loading	0.38	3.9742E-03	0.03	8.8215E-04	Notes 1, 2

(1) 24-hour PM_{10} emissions from fugitive grain, DDGS, wood residues, dirt/fines and ash pellets receiving and loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(2) Annual PM_{10} emissions were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) Crop residues receiving emissions divided by the number of grinding lines to obtain an emission rate per line. 24-hour PM_{10} emissions are based on continuous

Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS						
		24-Hour Averaging Period		Annual Averaging Period		
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
STARCH PLANT						
EP01101A	Grain Receiving DC #1	9.87	1.0368E-01	1.63	4.6869E-02	Notes 1, 2
EP01101B	Grain Receiving DC #2	9.87	1.0368E-01	1.63	4.6869E-02	Notes 1, 2
EP01102	Grain Handling DC	8.23	4.3200E-02	1.50	4.3200E-02	
EP01110A	Bin Baghouse #1	0.82	4.3200E-03	0.15	4.3200E-03	
EP01110B	Bin Baghouse #2	0.82	4.3200E-03	0.15	4.3200E-03	
EP01120A	Bin Baghouse #3	0.82	4.3200E-03	0.15	4.3200E-03	
EP01120B	Bin Baghouse #4	0.82	4.3200E-03	0.15	4.3200E-03	
EP01130A	Bin Baghouse #5	0.82	4.3200E-03	0.15	4.3200E-03	
EP01130B	Bin Baghouse #6	0.82	4.3200E-03	0.15	4.3200E-03	
EP01150	Surge Bin Baghouse	0.82	4.3200E-03	0.15	4.3200E-03	
EP01201	Grain Mill DC #1	12.34	6.4800E-02	2.25	6.4800E-02	
EP01202	Grain Mill DC #2	12.34	6.4800E-02	2.25	6.4800E-02	
EP01203	Grain Mill DC #3	12.34	6.4800E-02	2.25	6.4800E-02	
EP01204	Grain Mill DC #4	12.34	6.4800E-02	2.25	6.4800E-02	
EP01401	Grain Main Fermentation Vent Scrubber	6.00	3.1500E-02	1.10	3.1500E-02	
EP01801	DDGS Indirect Dryer #1	90.82	4.7679E-01	16.58	4.7690E-01	
EP02200	DDGS Loadout DC #1	6.17	6.4800E-02	1.02	2.9293E-02	Notes 1, 2

(1) 24-hour PM_{10} emissions from grain receiving and DDGS loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(2) Annual PM_{10} emissions from fugitive receiving and loadout sources were modeled such that the emission rates were normalized over 8,760 hours per year.

Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS						
		24-Hour Averaging Period		Annual Averaging Period		
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
ENZYMATIC HYDROLYSIS PLANT						
EP11134	Biomass Grinding DC #1	63.20	3.3178E-01	11.53	3.3178E-01	Note 1
EP11135	Biomass Grinding DC #2	63.20	3.3178E-01	11.53	3.3178E-01	Note 1
EP11601	Biomass Surge Bin #1 DC	8.23	4.3200E-02	1.50	4.3200E-02	
EP11602	Biomass Surge Bin #2 DC	8.23	4.3200E-02	1.50	4.3200E-02	
EP11603	Biomass Surge Bin #3 DC	8.23	4.3200E-02	1.50	4.3200E-02	
EP12101	EH Metering Bin #1	13.17	6.9120E-02	2.40	6.9120E-02	
EP11711	Boiler 1 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11721	Boiler 1 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11731	Boiler 1 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11712	Boiler 2 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11722	Boiler 2 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11732	Boiler 2 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11713	Boiler 3 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11723	Boiler 3 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11733	Boiler 3 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11714	Boiler 4 Metering Bin DC #1	3.62	1.9008E-02	0.66	1.9008E-02	
EP11724	Boiler 4 Metering Bin DC #2	3.62	1.9008E-02	0.66	1.9008E-02	
EP11734	Boiler 4 Metering Bin DC #3	3.62	1.9008E-02	0.66	1.9008E-02	
EP11235	Floor Sweep System DC	6.17	6.4800E-02	1.02	2.9293E-02	Notes 2, 4
EP11081	Dirt Load-Out Silo	0.48	2.5445E-03	0.09	2.5445E-03	
EP11082	Dirt Load-Out Silo Spout	0.58	6.0480E-03	0.10	2.7340E-03	Notes 3, 4

(1) The lowest achievable emission rate (LAER) that is guaranteed by the vendor is required to ensure compliance with PSD increment. LAER is more stringent than BACT and is generally only required in non-attainment areas.

(2) 24-hour PM_{10} emissions from the intermittent source, floor sweep system, based on 12 hours per day operation and a variable emission rate scalar of 0.5.

(3) 24-hour PM_{10} emissions from dirt/fines receiving and loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(4) Annual PM_{10} emissions from the floor sweep system and dirt/fines receiving and loadout sources were modeled such that the emission rates were normalized over 8,760

Source: Salter 2010b.

Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS						
		24-Hour Averaging Period		Annual Averaging Period		
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
UTILITIES						
EP02701	Ash Pelletizer Dryer DC	8.23	4.3200E-02	1.50	4.3200E-02	
EP02702	Ash Pelletizer Cooler DC	4.11	2.1600E-02	0.75	2.1600E-02	
EP02710	Ash Pellets Load-Out Silo	0.48	2.5445E-03	0.09	2.5445E-03	
EP02711	Ash Pellets Load-Out Silo Spout	0.58	6.0480E-03	0.10	2.7340E-03	Notes 1, 2
EP04001A	EH CWT Cell 1	0.72	3.7873E-03	0.13	3.7874E-03	Note 3
EP04002A	Grain Ethanol CWT Cell 1	0.72	3.7873E-03	0.13	3.7874E-03	
EP04002B	Grain Ethanol CWT Cell 2	0.72	3.7873E-03	0.13	3.7874E-03	Note 3
EP04002C	Grain Ethanol CWT Cell 3	0.72	3.7873E-03	0.13	3.7874E-03	
EP22001A	CoGen CWT Cell 1	0.77	4.0256E-03	0.14	4.0257E-03	
EP22001B	CoGen CWT Cell 2	0.77	4.0256E-03	0.14	4.0257E-03	
EP22001C	CoGen CWT Cell 3	0.77	4.0256E-03	0.14	4.0257E-03	Note 3
EP22001D	CoGen CWT Cell 4	0.77	4.0256E-03	0.14	4.0257E-03	
EP22001E	CoGen CWT Cell 5	0.77	4.0256E-03	0.14	4.0257E-03	
EP20001	Biomass-Fired Boiler #1	355.01	1.8638E+00	64.79	1.8638E+00	
EP20002	Biomass-Fired Boiler #2	355.01	1.8638E+00	64.79	1.8638E+00	
EP20003	Biomass-Fired Boiler #3	355.01	1.8638E+00	64.79	1.8638E+00	
EP20004	Biomass-Fired Boiler #4	355.01	1.8638E+00	64.79	1.8638E+00	
EP05001	Natural Gas-Fired Boiler #1	16.52	8.6747E-02	3.02	8.6747E-02	
EP05002	Natural Gas-Fired Boiler #2	16.52	8.6747E-02	3.02	8.6747E-02	
EP05003	Natural Gas-Fired Boiler #3	16.52	8.6747E-02	3.02	8.6747E-02	
EP05004	Natural Gas-Fired Boiler #4	16.52	8.6747E-02	3.02	8.6747E-02	

(1) 24-hour PM_{10} emissions from ash pellets loadout were modeled based on a scenario which assumes all shipping and receiving will occur from 6:00 AM to 6:00 PM only.

(2) Annual PM_{10} emissions were modeled such that the emission rates were normalized over 8,760 hours per year.

(3) Cooling tower emissions divided by the number of cells to obtain an emission rate per cell.

Table D4 - Proposed Action with Grain-to-Ethanol Facility PM_{10} Modeled Emission Rates

POINT SOURCE PM_{10} EMISSIONS							
		24-Hour Averaging Period		Annual Averaging Period			
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)	Notes:
UTILITIES						
EP20514	Boiler Bottoms Ash Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20524	Boiler Bottoms Ash Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20534	Boiler Bottoms Ash Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20544	Boiler Bottoms Ash Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP20510	Boiler Fly Ash Handling DC #1	16.46	8.6400E-02	3.00	8.6400E-02	
EP20520	Boiler Fly Ash Handling DC #2	16.46	8.6400E-02	3.00	8.6400E-02	
EP20530	Boiler Fly Ash Handling DC #3	16.46	8.6400E-02	3.00	8.6400E-02	
EP20540	Boiler Fly Ash Handling DC #4	16.46	8.6400E-02	3.00	8.6400E-02	
EP20511	Bed Media Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20521	Bed Media Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20531	Bed Media Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20541	Bed Media Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP20512	Trona Handling DC #1	4.11	2.1600E-02	0.75	2.1600E-02	
EP20522	Trona Handling DC #2	4.11	2.1600E-02	0.75	2.1600E-02	
EP20532	Trona Handling DC #3	4.11	2.1600E-02	0.75	2.1600E-02	
EP20542	Trona Handling DC #4	4.11	2.1600E-02	0.75	2.1600E-02	
EP06001	Firewater Pump Engine	0.30	1.5884E-03	0.01	2.1758E-04	Note 1

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, 24-hour PM_{10} emissions from the emergency sources were modeled such that the emission rates were normalized over the 24-hour period. Annual emissions were normalized over 8,760 hours per year.

Source: Salter 2010b.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table D5 - Proposed Action with Grain-to-Ethanol Facility NO_x, SO_2, and CO Modeled Emission Rates

POINT SOURCE NO_x EMISSIONS		Annual Averaging Period - Tier 1		
Source ID	Source Description	% Conversion as NO_2 (%)	Tier 1 NO_x Annual Emission Rate (tons/yr)	Tier 1 NO_2 Modeled Annual Emission Rate (g/s)
STARCH PLANT				
EP01801	DDGS Indirect Dryer #1	100%	15.80	4.5461E-01
UTILITIES				
EP02701	Ash Pelletizer Dryer DC	100%	3.85	1.1088E-01
EP20001	Biomass-Fired Boiler #1	100%	316.27	9.0981E+00
EP20002	Biomass-Fired Boiler #2	100%	316.27	9.0981E+00
EP20003	Biomass-Fired Boiler #3	100%	316.27	9.0981E+00
EP20004	Biomass-Fired Boiler #4	100%	316.27	9.0981E+00
EP05001	Natural Gas-Fired Boiler #1	100%	16.19	4.6570E-01
EP05002	Natural Gas-Fired Boiler #2	100%	16.19	4.6570E-01
EP05003	Natural Gas-Fired Boiler #3	100%	16.19	4.6570E-01
EP05004	Natural Gas-Fired Boiler #4	100%	16.19	4.6570E-01
EP06001	Firewater Pump Engine (1)	100%	0.15	4.3517E-03

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

POINT SOURCE SO_2 EMISSIONS		3-Hour Averaging Period		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	SO_2 Hourly Emission Rate (lb/hr)	SO_2 Modeled 3-Hour Emission Rate (g/s)	SO_2 24-Hour Emission Rate (lb/day)	SO_2 Modeled 24-Hour Emission Rate (g/s)	SO_2 Annual Emission Rate (tons/yr)	SO_2 Modeled Annual Emission Rate (g/s)
STARCH PLANT							
EP01801	DDGS Indirect Dryer #1	0.05	6.08E-03	1.16	6.08E-03	0.21	6.08E-03
UTILITIES							
EP02701	Ash Pelletizer Dryer DC	0.01	1.48E-03	0.28	1.48E-03	0.05	1.48E-03
EP20001	Biomass-Fired Boiler #1	14.66	1.85E+00	351.77	1.85E+00	64.20	1.85E+00
EP20002	Biomass-Fired Boiler #2	14.66	1.85E+00	351.77	1.85E+00	64.20	1.85E+00
EP20003	Biomass-Fired Boiler #3	14.66	1.85E+00	351.77	1.85E+00	64.20	1.85E+00
EP20004	Biomass-Fired Boiler #4	14.66	1.85E+00	351.77	1.85E+00	64.20	1.85E+00
EP05001	Natural Gas-Fired Boiler #1	0.05	6.85E-03	1.30	6.85E-03	0.24	6.85E-03
EP05002	Natural Gas-Fired Boiler #2	0.05	6.85E-03	1.30	6.85E-03	0.24	6.85E-03
EP05003	Natural Gas-Fired Boiler #3	0.05	6.85E-03	1.30	6.85E-03	0.24	6.85E-03
EP05004	Natural Gas-Fired Boiler #4	0.05	6.85E-03	1.30	6.85E-03	0.24	6.85E-03
EP06001	Firewater Pump Engine (1)	0.94	7.92E-02	1.89	9.90E-03	0.05	1.36E-03

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

Table D5 - Proposed Action with Grain-to-Ethanol Facility NO_x, SO_2, and CO Modeled Emission Rates

POINT SOURCE CO EMISSIONS			1-Hour Averaging Period	8-Hour Averaging Period
Source ID	Source Description	CO Hourly Emission Rate (lb/hr)	CO Modeled 1-Hour Emission Rate (g/s)	CO Modeled 8-Hour Emission Rate (g/s)
STARCH PLANT				
EP01801	DDGS Indirect Dryer #1	6.56	8.27E-01	8.27E-01
UTILITIES				
EP02701	Ash Pelletizer Dryer DC	1.60	2.02E-01	2.02E-01
EP20001	Biomass-Fired Boiler #1	68.52	8.63E+00	8.63E+00
EP20002	Biomass-Fired Boiler #2	68.52	8.63E+00	8.63E+00
EP20003	Biomass-Fired Boiler #3	68.52	8.63E+00	8.63E+00
EP20004	Biomass-Fired Boiler #4	68.52	8.63E+00	8.63E+00
EP05001	Natural Gas-Fired Boiler #1	3.70	4.66E-01	4.66E-01
EP05002	Natural Gas-Fired Boiler #2	3.70	4.66E-01	4.66E-01
EP05003	Natural Gas-Fired Boiler #3	3.70	4.66E-01	4.66E-01
EP05004	Natural Gas-Fired Boiler #4	3.70	4.66E-01	4.66E-01
EP06001	Firewater Pump Engine (1)	2.65	3.34E-01	8.34E-02

(1) The firewater pump engine is an emergency unit which operates a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. This unit was modeled during "normal facility operations" only. For normal facility operations, annual emissions were normalized over 8,760 hours per year.

Source: Salter 2010b.

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Biorefinery Facility
Hugoton, Kansas

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

1,3 BUTADIENE EMISSIONS

Source ID	Source Description	1,3 Butadiene 1-Hour Emission Rate (lb/hr)	1,3 Butadiene Modeled 1-Hour Emission Rate (g/s)
EP-06001 (EMG	Firewater Pump Engine	1.26E-04	1.59E-05

ACETALDEHYDE EMISSIONS

Source ID	Source Description	Acetaldehyde 1-Hour Emission Rate (lb/hr)	Acetaldehyde Modeled 1-Hour Emission Rate (g/s)
EP01400	Grain Pre-Fermentation Vent Scrubber	1.95E-01	2.46E-02
EP01401	Grain Main Fermentation Vent Scrubber	3.48E-01	4.38E-02
EP01500	Distillation Vent Scrubber	3.89E-01	4.90E-02
EP01610	First Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01620	Second Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01630	Third Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01651	Finish Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01801	DDGS Indirect Dryer #1	2.37E-02	2.98E-03
EP02250F	Wet Cake Storage and Loadout	5.83E-03	7.35E-04
EP-18185	EH Fermentation CO2 Scrubber	5.16E-01	6.50E-02
EP-18180	EH Distillation Vent Scrubber	7.08E-02	8.92E-03
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	2.31E-03	2.91E-04
EP-02000	Fugitive Leaks	4.52E-04	5.70E-05
T-02107	EH Product Shift Tank #1	4.80E-02	6.05E-03
T-02108	EH Product Shift Tank #2	4.80E-02	6.05E-03
T-02101	EH Product Off-Spec Tank	3.00E-02	3.77E-03
T-02102	EH Ethanol Product Storage Tank	8.49E-02	1.07E-02
T02117F	Grain Product Shift Tank #1	1.18E-01	1.48E-02
T02118F	Grain Product Shift Tank #2	1.18E-01	1.48E-02
T02111F	Grain Product Off-Spec Tank	4.09E-02	5.15E-03
T02112F	Grain Ethanol Product Storage Tank #1	1.11E-01	1.40E-02
T02113F	Grain Ethanol Product Storage Tank #2	1.11E-01	1.40E-02
T02114F	Grain Ethanol Product Storage Tank #3	1.11E-01	1.40E-02
EP-02100	Vapor Recovery System	3.30E-04	4.16E-05
EP-02100FUG	Loading Losses	2.80E-04	3.53E-05
EP-20001	Biomass-Fired Boiler #1	4.15E-02	5.23E-03
EP-20002	Biomass-Fired Boiler #2	4.15E-02	5.23E-03
EP-20003	Biomass-Fired Boiler #3	4.15E-02	5.23E-03
EP-20004	Biomass-Fired Boiler #4	4.15E-02	5.23E-03
EP-06001 (EMG	Firewater Pump Engine	2.47E-03	3.11E-04

ACETONE EMISSIONS

Source ID	Source Description	Acetone 1-Hour Emission Rate (lb/hr)	Acetone Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.50E-03	1.20E-03
EP-20002	Biomass-Fired Boiler #2	9.50E-03	1.20E-03
EP-20003	Biomass-Fired Boiler #3	9.50E-03	1.20E-03
EP-20004	Biomass-Fired Boiler #4	9.50E-03	1.20E-03

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

ACROLEIN EMISSIONS

Source ID	Source Description	Acrolein 1-Hour Emission Rate (lb/hr)	Acrolein Modeled 1-Hour Emission Rate (g/s)
EP01400	Grain Pre-Fermentation Vent Scrubber	6.00E-02	7.56E-03
EP01401	Grain Main Fermentation Vent Scrubber	2.70E-01	3.40E-02
EP01500	Distillation Vent Scrubber	2.50E-02	3.15E-03
EP01610	First Effect Evaporator Vent Condenser	2.40E-06	3.02E-07
EP01620	Second Effect Evaporator Vent Condenser	2.40E-06	3.02E-07
EP01630	Third Effect Evaporator Vent Condenser	2.40E-06	3.02E-07
EP01651	Finish Evaporator Vent Condenser	2.40E-06	3.02E-07
EP01801	DDGS Indirect Dryer #1	8.41E-02	1.06E-02
EP02250F	Wet Cake Storage and Loadout	8.78E-04	1.11E-04
EP-18185	EH Fermentation CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	3.48E-04	4.38E-05
EP-02000	Fugitive Leaks	4.52E-05	5.70E-06
T-02107	EH Product Shift Tank #1	4.79E-03	6.04E-04
T-02108	EH Product Shift Tank #2	4.79E-03	6.04E-04
T-02101	EH Product Off-Spec Tank	2.99E-03	3.77E-04
T-02102	EH Ethanol Product Storage Tank	8.48E-03	1.07E-03
T02117F	Grain Product Shift Tank #1	1.18E-02	1.48E-03
T02118F	Grain Product Shift Tank #2	1.18E-02	1.48E-03
T02111F	Grain Product Off-Spec Tank	4.08E-03	5.14E-04
T02112F	Grain Ethanol Product Storage Tank #1	1.11E-02	1.40E-03
T02113F	Grain Ethanol Product Storage Tank #2	1.11E-02	1.40E-03
T02114F	Grain Ethanol Product Storage Tank #3	1.11E-02	1.40E-03
EP-02100	Vapor Recovery System	3.30E-05	4.16E-06
EP-02100FUG	Loading Losses	2.80E-05	3.53E-06
EP-20001	Biomass-Fired Boiler #1	2.00E-01	2.52E-02
EP-20002	Biomass-Fired Boiler #2	2.00E-01	2.52E-02
EP-20003	Biomass-Fired Boiler #3	2.00E-01	2.52E-02
EP-20004	Biomass-Fired Boiler #4	2.00E-01	2.52E-02

AMMONIA EMISSIONS

Source ID	Source Description	Ammonia 1-Hour Emission Rate (lb/hr)	Ammonia Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	2.38E+00	3.00E-01
EP-20002	Biomass-Fired Boiler #2	2.38E+00	3.00E-01
EP-20003	Biomass-Fired Boiler #3	2.38E+00	3.00E-01
EP-20004	Biomass-Fired Boiler #4	2.38E+00	3.00E-01

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

BENZENE EMISSIONS

Source ID	Source Description	Benzene 1-Hour Emission Rate (lb/hr)	Benzene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	5.64E-06	7.11E-07
T-02105	EH Denaturant Storage Tank	6.48E-04	8.17E-05
T02112F	Grain Ethanol Product Storage Tank #1	7.38E-06	9.29E-07
T02113F	Grain Ethanol Product Storage Tank #2	7.38E-06	9.29E-07
T02114F	Grain Ethanol Product Storage Tank #3	7.38E-06	9.29E-07
T02115F	Grain Denaturant Storage Tank	9.21E-04	1.16E-04
EP-02100	Vapor Recovery System	2.67E-03	3.37E-04
EP-02100FUG	Loading Losses	2.27E-03	2.86E-04
EP01801	DDGS Indirect Dryer #1	1.69E-04	2.13E-05
EP-02701	Ash Pelletizer Dryer DC	4.12E-05	5.19E-06
EP-20001	Biomass-Fired Boiler #1	2.10E-01	2.65E-02
EP-20002	Biomass-Fired Boiler #2	2.10E-01	2.65E-02
EP-20003	Biomass-Fired Boiler #3	2.10E-01	2.65E-02
EP-20004	Biomass-Fired Boiler #4	2.10E-01	2.65E-02
EP05001	Natural Gas-Fired Boiler #1	1.90E-04	2.40E-05
EP05002	Natural Gas-Fired Boiler #2	1.90E-04	2.40E-05
EP05003	Natural Gas-Fired Boiler #3	1.90E-04	2.40E-05
EP05004	Natural Gas-Fired Boiler #4	1.90E-04	2.40E-05
EP-06001 (EMG	Firewater Pump Engine	3.00E-03	3.79E-04

BUTANE EMISSIONS

Source ID	Source Description	Butane 1-Hour Emission Rate (lb/hr)	Butane Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	1.69E-01	2.13E-02
EP-02701	Ash Pelletizer Dryer DC	4.12E-02	5.19E-03
EP05001	Natural Gas-Fired Boiler #1	1.90E-01	2.40E-02
EP05002	Natural Gas-Fired Boiler #2	1.90E-01	2.40E-02
EP05003	Natural Gas-Fired Boiler #3	1.90E-01	2.40E-02
EP05004	Natural Gas-Fired Boiler #4	1.90E-01	2.40E-02

CARBON DISULFIDE EMISSIONS

Source ID	Source Description	Carbon disulfide 1-Hour Emission Rate (lb/hr)	Carbon disulfide Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	4.51E-08	5.69E-09
T-02105	EH Denaturant Storage Tank	5.19E-06	6.53E-07
T02112F	Grain Ethanol Product Storage Tank #1	5.90E-08	7.43E-09
T02113F	Grain Ethanol Product Storage Tank #2	5.90E-08	7.43E-09
T02114F	Grain Ethanol Product Storage Tank #3	5.90E-08	7.43E-09
T02115F	Grain Denaturant Storage Tank	7.37E-06	9.28E-07
EP-02100	Vapor Recovery System	2.14E-05	2.70E-06
EP-02100FUG	Loading Losses	1.81E-05	2.28E-06

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

CARBON TETRACHLORIDE EMISSIONS			
Source ID	**Source Description**	**Carbon tetrachloride 1-Hour Emission Rate (lb/hr)**	**Carbon tetrachloride Modeled 1-Hour Emission Rate (g/s)**
EP-20001	Biomass-Fired Boiler #1	2.25E-03	2.84E-04
EP-20002	Biomass-Fired Boiler #2	2.25E-03	2.84E-04
EP-20003	Biomass-Fired Boiler #3	2.25E-03	2.84E-04
EP-20004	Biomass-Fired Boiler #4	2.25E-03	2.84E-04

CHLORINE EMISSIONS			
Source ID	**Source Description**	**Chlorine 1-Hour Emission Rate (lb/hr)**	**Chlorine Modeled 1-Hour Emission Rate (g/s)**
EP-20001	Biomass-Fired Boiler #1	3.95E-03	4.98E-04
EP-20002	Biomass-Fired Boiler #2	3.95E-03	4.98E-04
EP-20003	Biomass-Fired Boiler #3	3.95E-03	4.98E-04
EP-20004	Biomass-Fired Boiler #4	3.95E-03	4.98E-04

CHLOROBENZENE EMISSIONS			
Source ID	**Source Description**	**Chlorobenzene 1-Hour Emission Rate (lb/hr)**	**Chlorobenzene Modeled 1-Hour Emission Rate (g/s)**
EP-20001	Biomass-Fired Boiler #1	1.65E-03	2.08E-04
EP-20002	Biomass-Fired Boiler #2	1.65E-03	2.08E-04
EP-20003	Biomass-Fired Boiler #3	1.65E-03	2.08E-04
EP-20004	Biomass-Fired Boiler #4	1.65E-03	2.08E-04

CHLOROFORM EMISSIONS			
Source ID	**Source Description**	**Chloroform 1-Hour Emission Rate (lb/hr)**	**Chloroform Modeled 1-Hour Emission Rate (g/s)**
EP-20001	Biomass-Fired Boiler #1	1.40E-03	1.76E-04
EP-20002	Biomass-Fired Boiler #2	1.40E-03	1.76E-04
EP-20003	Biomass-Fired Boiler #3	1.40E-03	1.76E-04
EP-20004	Biomass-Fired Boiler #4	1.40E-03	1.76E-04

CUMENE EMISSIONS			
Source ID	**Source Description**	**Cumene 1-Hour Emission Rate (lb/hr)**	**Cumene Modeled 1-Hour Emission Rate (g/s)**
T-02102	EH Ethanol Product Storage Tank	2.26E-07	2.84E-08
T-02105	EH Denaturant Storage Tank	2.59E-05	3.27E-06
T02112F	Grain Ethanol Product Storage Tank #1	2.95E-07	3.72E-08
T02113F	Grain Ethanol Product Storage Tank #2	2.95E-07	3.72E-08
T02114F	Grain Ethanol Product Storage Tank #3	2.95E-07	3.72E-08
T02115F	Grain Denaturant Storage Tank	3.68E-05	4.64E-06
EP-02100	Vapor Recovery System	1.07E-04	1.35E-05
EP-02100FUG	Loading Losses	9.07E-05	1.14E-05

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

DICHLOROBENZENE EMISSIONS			
Source ID	Source Description	Dichlorobenzene 1-Hour Emission Rate (lb/hr)	Dichlorobenzene Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	9.65E-05	1.22E-05
EP-02701	Ash Pelletizer Dryer DC	2.35E-05	2.96E-06
EP05001	Natural Gas-Fired Boiler #1	1.09E-04	1.37E-05
EP05002	Natural Gas-Fired Boiler #2	1.09E-04	1.37E-05
EP05003	Natural Gas-Fired Boiler #3	1.09E-04	1.37E-05
EP05004	Natural Gas-Fired Boiler #4	1.09E-04	1.37E-05

DICHLOROMETHANE EMISSIONS			
Source ID	Source Description	Dichloromethane 1-Hour Emission Rate (lb/hr)	Dichloromethane Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.45E-02	1.83E-03
EP-20002	Biomass-Fired Boiler #2	1.45E-02	1.83E-03
EP-20003	Biomass-Fired Boiler #3	1.45E-02	1.83E-03
EP-20004	Biomass-Fired Boiler #4	1.45E-02	1.83E-03

ETHANE EMISSIONS			
Source ID	Source Description	Ethane 1-Hour Emission Rate (lb/hr)	Ethane Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	2.49E-01	3.14E-02
EP-02701	Ash Pelletizer Dryer DC	6.08E-02	7.66E-03
EP05001	Natural Gas-Fired Boiler #1	2.81E-01	3.54E-02
EP05002	Natural Gas-Fired Boiler #2	2.81E-01	3.54E-02
EP05003	Natural Gas-Fired Boiler #3	2.81E-01	3.54E-02
EP05004	Natural Gas-Fired Boiler #4	2.81E-01	3.54E-02

ETHANOL EMISSIONS			
Source ID	Source Description	Ethanol 1-Hour Emission Rate (lb/hr)	Ethanol Modeled 1-Hour Emission Rate (g/s)
EP01400	Grain Pre-Fermentation Vent Scrubber	3.11E+00	3.92E-01
EP01401	Grain Main Fermentation Vent Scrubber	1.33E+01	1.67E+00
EP01500	Distillation Vent Scrubber	2.12E+00	2.67E-01
EP01610	First Effect Evaporator Vent Condenser	1.20E-01	1.51E-02
EP01620	Second Effect Evaporator Vent Condenser	1.20E-01	1.51E-02
EP01630	Third Effect Evaporator Vent Condenser	1.20E-01	1.51E-02
EP01651	Finish Evaporator Vent Condenser	1.20E-01	1.51E-02
EP01801	DDGS Indirect Dryer #1	3.99E+00	5.03E-01
EP02250F	Wet Cake Storage and Loadout	4.36E-01	5.50E-02
EP-18185	EH Fermentation CO2 Scrubber	1.71E+01	2.15E+00
EP-18180	EH Distillation Vent Scrubber	3.85E-01	4.85E-02
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	1.73E-01	2.18E-02
EP-02000	Fugitive Leaks	2.26E+00	2.85E-01
T-02107	EH Product Shift Tank #1	2.54E-01	3.19E-02
T-02108	EH Product Shift Tank #2	2.54E-01	3.19E-02
T-02101	EH Product Off-Spec Tank	2.43E-01	3.07E-02
T-02102	EH Ethanol Product Storage Tank	2.75E-01	3.46E-02
T02117F	Grain Product Shift Tank #1	2.93E-01	3.70E-02
T02118F	Grain Product Shift Tank #2	2.93E-01	3.70E-02
T02111F	Grain Product Off-Spec Tank	2.49E-01	3.14E-02
T02112F	Grain Ethanol Product Storage Tank #1	2.89E-01	3.65E-02
T02113F	Grain Ethanol Product Storage Tank #2	2.89E-01	3.65E-02
T02114F	Grain Ethanol Product Storage Tank #3	2.89E-01	3.65E-02
EP-02100	Vapor Recovery System	1.65E+00	2.08E-01
EP-02100FUG	Loading Losses	1.40E+00	1.76E-01

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

ETHYLBENZENE EMISSIONS			
Source ID	Source Description	Ethylbenzene 1-Hour Emission Rate (lb/hr)	Ethylbenzene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	1.13E-07	1.42E-08
T-02105	EH Denaturant Storage Tank	1.30E-05	1.63E-06
T02112F	Grain Ethanol Product Storage Tank #1	1.48E-07	1.86E-08
T02113F	Grain Ethanol Product Storage Tank #2	1.48E-07	1.86E-08
T02114F	Grain Ethanol Product Storage Tank #3	1.48E-07	1.86E-08
T02115F	Grain Denaturant Storage Tank	1.84E-05	2.32E-06
EP-02100	Vapor Recovery System	5.35E-05	6.74E-06
EP-02100FUG	Loading Losses	4.53E-05	5.71E-06
EP-20001	Biomass-Fired Boiler #1	1.55E-03	1.95E-04
EP-20002	Biomass-Fired Boiler #2	1.55E-03	1.95E-04
EP-20003	Biomass-Fired Boiler #3	1.55E-03	1.95E-04
EP-20004	Biomass-Fired Boiler #4	1.55E-03	1.95E-04

ETHYLENE DICHLORIDE EMISSIONS			
Source ID	Source Description	Ethylene dichloride 1-Hour Emission Rate (lb/hr)	Ethylene dichloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.45E-03	1.83E-04
EP-20002	Biomass-Fired Boiler #2	1.45E-03	1.83E-04
EP-20003	Biomass-Fired Boiler #3	1.45E-03	1.83E-04
EP-20004	Biomass-Fired Boiler #4	1.45E-03	1.83E-04

FORMALDEHYDE EMISSIONS			
Source ID	Source Description	Formaldehyde 1-Hour Emission Rate (lb/hr)	Formaldehyde Modeled 1-Hour Emission Rate (g/s)
EP01400	Grain Pre-Fermentation Vent Scrubber	4.60E-02	5.80E-03
EP01401	Grain Main Fermentation Vent Scrubber	1.58E-01	1.98E-02
EP01500	Distillation Vent Scrubber	2.50E-02	3.15E-03
EP01610	First Effect Evaporator Vent Condenser	1.20E-05	1.51E-06
EP01620	Second Effect Evaporator Vent Condenser	1.20E-05	1.51E-06
EP01630	Third Effect Evaporator Vent Condenser	1.20E-05	1.51E-06
EP01651	Finish Evaporator Vent Condenser	1.20E-05	1.51E-06
EP01801	DDGS Indirect Dryer #1	4.54E-02	5.73E-03
EP02250F	Wet Cake Storage and Loadout	1.17E-02	1.47E-03
EP-18185	EH Fermentation CO2 Scrubber	2.04E-02	2.57E-03
EP-18180	EH Distillation Vent Scrubber	4.55E-03	5.73E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	4.63E-03	5.83E-04
EP-02000	Fugitive Leaks	2.26E-04	2.85E-05
T-02107	EH Product Shift Tank #1	2.40E-02	3.02E-03
T-02108	EH Product Shift Tank #2	2.40E-02	3.02E-03
T-02101	EH Product Off-Spec Tank	1.50E-02	1.89E-03
T-02102	EH Ethanol Product Storage Tank	4.24E-02	5.35E-03
T02117F	Grain Product Shift Tank #1	5.89E-02	7.42E-03
T02118F	Grain Product Shift Tank #2	5.89E-02	7.42E-03
T02111F	Grain Product Off-Spec Tank	2.04E-02	2.57E-03
T02112F	Grain Ethanol Product Storage Tank #1	5.55E-02	6.99E-03
T02113F	Grain Ethanol Product Storage Tank #2	5.55E-02	6.99E-03
T02114F	Grain Ethanol Product Storage Tank #3	5.55E-02	6.99E-03
EP-02100	Vapor Recovery System	1.65E-04	2.08E-05
EP-02100FUG	Loading Losses	1.40E-04	1.76E-05
EP-02701	Ash Pelletizer Dryer DC	1.47E-03	1.85E-04
EP-20001	Biomass-Fired Boiler #1	2.20E-01	2.77E-02
EP-20002	Biomass-Fired Boiler #2	2.20E-01	2.77E-02
EP-20003	Biomass-Fired Boiler #3	2.20E-01	2.77E-02
EP-20004	Biomass-Fired Boiler #4	2.20E-01	2.77E-02
EP05001	Natural Gas-Fired Boiler #1	6.79E-03	8.56E-04
EP05002	Natural Gas-Fired Boiler #2	6.79E-03	8.56E-04
EP05003	Natural Gas-Fired Boiler #3	6.79E-03	8.56E-04
EP05004	Natural Gas-Fired Boiler #4	6.79E-03	8.56E-04
EP-06001 (EMG	Firewater Pump Engine	3.80E-03	4.79E-04

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

HEXANE EMISSIONS

Source ID	Source Description	Hexane 1-Hour Emission Rate (lb/hr)	Hexane Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	1.45E-01	1.82E-02
EP-02701	Ash Pelletizer Dryer DC	3.53E-02	4.45E-03
EP05001	Natural Gas-Fired Boiler #1	1.63E-01	2.05E-02
EP05002	Natural Gas-Fired Boiler #2	1.63E-01	2.05E-02
EP05003	Natural Gas-Fired Boiler #3	1.63E-01	2.05E-02
EP05004	Natural Gas-Fired Boiler #4	1.63E-01	2.05E-02

HYDROGEN CHLORIDE EMISSIONS

Source ID	Source Description	Hydrogen chloride 1-Hour Emission Rate (lb/hr)	Hydrogen chloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	7.10E+00	8.94E-01
EP-20002	Biomass-Fired Boiler #2	7.10E+00	8.94E-01
EP-20003	Biomass-Fired Boiler #3	7.10E+00	8.94E-01
EP-20004	Biomass-Fired Boiler #4	7.10E+00	8.94E-01

METHANOL EMISSIONS

Source ID	Source Description	Methanol 1-Hour Emission Rate (lb/hr)	Methanol Modeled 1-Hour Emission Rate (g/s)
EP01400	Grain Pre-Fermentation Vent Scrubber	5.20E-02	6.55E-03
EP01401	Grain Main Fermentation Vent Scrubber	1.58E-01	1.98E-02
EP01500	Distillation Vent Scrubber	9.94E-03	1.25E-03
EP01610	First Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01620	Second Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01630	Third Effect Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01651	Finish Evaporator Vent Condenser	2.40E-05	3.02E-06
EP01801	DDGS Indirect Dryer #1	3.94E-02	4.97E-03
EP02250F	Wet Cake Storage and Loadout	2.33E-03	2.94E-04
EP-18185	EH Fermentation CO2 Scrubber	3.60E-03	4.54E-04
EP-18180	EH Distillation Vent Scrubber	1.81E-03	2.28E-04
EP-19001FUG	Lignin-Rich Stillage Storage and Loadout	9.25E-04	1.17E-04
EP-02000	Fugitive Leaks	4.52E-04	5.70E-05
T-02107	EH Product Shift Tank #1	4.80E-02	6.05E-03
T-02108	EH Product Shift Tank #2	4.80E-02	6.05E-03
T-02101	EH Product Off-Spec Tank	3.00E-02	3.77E-03
T-02102	EH Ethanol Product Storage Tank	8.49E-02	1.07E-02
T02117F	Grain Product Shift Tank #1	1.18E-01	1.48E-02
T02118F	Grain Product Shift Tank #2	1.18E-01	1.48E-02
T02111F	Grain Product Off-Spec Tank	4.09E-02	5.15E-03
T02113F	Grain Ethanol Product Storage Tank #2	1.11E-01	1.40E-02
T02114F	Grain Ethanol Product Storage Tank #3	1.11E-01	1.40E-02
T02115F	Grain Denaturant Storage Tank	1.11E-01	1.40E-02
EP-02100	Vapor Recovery System	3.30E-04	4.16E-05
EP-02100FUG	Loading Losses	2.80E-04	3.53E-05

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

METHYL CHLOROFORM EMISSIONS			
Source ID	**Source Description**	**Methyl chloroform 1-Hour Emission Rate (lb/hr)**	**Methyl chloroform Modeled 1-Hour Emission Rate (g/s)**
EP-20001	Biomass-Fired Boiler #1	1.55E-03	1.95E-04
EP-20002	Biomass-Fired Boiler #2	1.55E-03	1.95E-04
EP-20003	Biomass-Fired Boiler #3	1.55E-03	1.95E-04
EP-20004	Biomass-Fired Boiler #4	1.55E-03	1.95E-04

NAPHTHALENE EMISSIONS			
Source ID	**Source Description**	**Naphthalene 1-Hour Emission Rate (lb/hr)**	**Naphthalene Modeled 1-Hour Emission Rate (g/s)**
EP01801	DDGS Indirect Dryer #1	4.90E-05	6.18E-06
EP-02701	Ash Pelletizer Dryer DC	1.20E-05	1.51E-06
EP-20001	Biomass-Fired Boiler #1	4.85E-03	6.11E-04
EP-20002	Biomass-Fired Boiler #2	4.85E-03	6.11E-04
EP-20003	Biomass-Fired Boiler #3	4.85E-03	6.11E-04
EP-20004	Biomass-Fired Boiler #4	4.85E-03	6.11E-04
EP05001	Natural Gas-Fired Boiler #1	5.53E-05	6.96E-06
EP05002	Natural Gas-Fired Boiler #2	5.53E-05	6.96E-06
EP05003	Natural Gas-Fired Boiler #3	5.53E-05	6.96E-06
EP05004	Natural Gas-Fired Boiler #4	5.53E-05	6.96E-06
EP-06001 (EMG	Firewater Pump Engine	2.73E-04	3.44E-05

NITROGEN DIOXIDE EMISSIONS			
Source ID	**Source Description**	**Nitrogen Dioxide 1-Hour Emission Rate (lb/hr)**	**Nitrogen Dioxide Modeled 1-Hour Emission Rate (g/s)**
EP01801	DDGS Indirect Dryer #1	3.61E+00	4.55E-01
EP-02701	Ash Pelletizer Dryer DC	8.80E-01	1.11E-01
EP-20001	Biomass-Fired Boiler #1	7.22E+01	9.10E+00
EP-20002	Biomass-Fired Boiler #2	7.22E+01	9.10E+00
EP-20003	Biomass-Fired Boiler #3	7.22E+01	9.10E+00
EP-20004	Biomass-Fired Boiler #4	7.22E+01	9.10E+00
EP05001	Natural Gas-Fired Boiler #1	3.70E+00	4.66E-01
EP05002	Natural Gas-Fired Boiler #2	3.70E+00	4.66E-01
EP05003	Natural Gas-Fired Boiler #3	3.70E+00	4.66E-01
EP05004	Natural Gas-Fired Boiler #4	3.70E+00	4.66E-01
EP-06001 (EMG	Firewater Pump Engine	3.03E+00	3.81E-01

PENTANE EMISSIONS			
Source ID	**Source Description**	**Pentane 1-Hour Emission Rate (lb/hr)**	**Pentane Modeled 1-Hour Emission Rate (g/s)**
EP01801	DDGS Indirect Dryer #1	2.09E-01	2.63E-02
EP-02701	Ash Pelletizer Dryer DC	5.10E-02	6.42E-03
EP05001	Natural Gas-Fired Boiler #1	2.36E-01	2.97E-02
EP05002	Natural Gas-Fired Boiler #2	2.36E-01	2.97E-02
EP05003	Natural Gas-Fired Boiler #3	2.36E-01	2.97E-02
EP05004	Natural Gas-Fired Boiler #4	2.36E-01	2.97E-02

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

PHENOL EMISSIONS			
Source ID	Source Description	Phenol 1-Hour Emission Rate (lb/hr)	Phenol Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	2.55E-03	3.21E-04
EP-20002	Biomass-Fired Boiler #2	2.55E-03	3.21E-04
EP-20003	Biomass-Fired Boiler #3	2.55E-03	3.21E-04
EP-20004	Biomass-Fired Boiler #4	2.55E-03	3.21E-04

PROPANE EMISSIONS			
Source ID	Source Description	Propane 1-Hour Emission Rate (lb/hr)	Propane Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	1.29E-01	1.62E-02
EP-02701	Ash Pelletizer Dryer DC	3.14E-02	3.95E-03
EP05001	Natural Gas-Fired Boiler #1	1.45E-01	1.83E-02
EP05002	Natural Gas-Fired Boiler #2	1.45E-01	1.83E-02
EP05003	Natural Gas-Fired Boiler #3	1.45E-01	1.83E-02
EP05004	Natural Gas-Fired Boiler #4	1.45E-01	1.83E-02

PROPYLENE EMISSIONS			
Source ID	Source Description	Propylene 1-Hour Emission Rate (lb/hr)	Propylene Modeled 1-Hour Emission Rate (g/s)
EP-06001 (EMG	Firewater Pump Engine	8.31E-03	1.05E-03

PROPYLENE DICHLORIDE EMISSIONS			
Source ID	Source Description	Propylene dichloride 1-Hour Emission Rate (lb/hr)	Propylene dichloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	1.65E-03	2.08E-04
EP-20002	Biomass-Fired Boiler #2	1.65E-03	2.08E-04
EP-20003	Biomass-Fired Boiler #3	1.65E-03	2.08E-04
EP-20004	Biomass-Fired Boiler #4	1.65E-03	2.08E-04

STYRENE EMISSIONS			
Source ID	Source Description	Styrene 1-Hour Emission Rate (lb/hr)	Styrene Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.50E-02	1.20E-02
EP-20002	Biomass-Fired Boiler #2	9.50E-02	1.20E-02
EP-20003	Biomass-Fired Boiler #3	9.50E-02	1.20E-02
EP-20004	Biomass-Fired Boiler #4	9.50E-02	1.20E-02

TABLE D6- Proposed Action with Grain-to-Ethanol Facility Odorous Compound Modeled Emissions

SULFUR DIOXIDE EMISSIONS

Source ID	Source Description	Sulfur Dioxide 1-Hour Emission Rate (lb/hr)	Sulfur Dioxide Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	4.82E-02	6.08E-03
EP-02701	Ash Pelletizer Dryer DC	1.18E-02	1.48E-03
EP-20001	Biomass-Fired Boiler #1	1.47E+01	1.85E+00
EP-20002	Biomass-Fired Boiler #2	1.47E+01	1.85E+00
EP-20003	Biomass-Fired Boiler #3	1.47E+01	1.85E+00
EP-20004	Biomass-Fired Boiler #4	1.47E+01	1.85E+00
EP05001	Natural Gas-Fired Boiler #1	5.44E-02	6.85E-03
EP05002	Natural Gas-Fired Boiler #2	5.44E-02	6.85E-03
EP05003	Natural Gas-Fired Boiler #3	5.44E-02	6.85E-03
EP05004	Natural Gas-Fired Boiler #4	5.44E-02	6.85E-03
EP-06001 (EMG	Firewater Pump Engine	9.43E-01	1.19E-01

TOLUENE EMISSIONS

Source ID	Source Description	Toluene 1-Hour Emission Rate (lb/hr)	Toluene Modeled 1-Hour Emission Rate (g/s)
EP01801	DDGS Indirect Dryer #1	2.73E-04	3.44E-05
T-02102	EH Ethanol Product Storage Tank	1.13E-05	1.42E-06
T-02105	EH Denaturant Storage Tank	1.30E-03	1.63E-04
T02112F	Grain Ethanol Product Storage Tank #1	1.48E-05	1.86E-06
T02113F	Grain Ethanol Product Storage Tank #2	1.48E-05	1.86E-06
T02114F	Grain Ethanol Product Storage Tank #3	1.48E-05	1.86E-06
T02115F	Grain Denaturant Storage Tank	1.84E-03	2.32E-04
EP-02100	Vapor Recovery System	5.35E-03	6.74E-04
EP-02100FUG	Loading Losses	4.53E-03	5.71E-04
EP-02701	Ash Pelletizer Dryer DC	6.67E-05	8.40E-06
EP-20001	Biomass-Fired Boiler #1	4.60E-02	5.80E-03
EP-20002	Biomass-Fired Boiler #2	4.60E-02	5.80E-03
EP-20003	Biomass-Fired Boiler #3	4.60E-02	5.80E-03
EP-20004	Biomass-Fired Boiler #4	4.60E-02	5.80E-03
EP05001	Natural Gas-Fired Boiler #1	3.08E-04	3.88E-05
EP05002	Natural Gas-Fired Boiler #2	3.08E-04	3.88E-05
EP05003	Natural Gas-Fired Boiler #3	3.08E-04	3.88E-05
EP05004	Natural Gas-Fired Boiler #4	3.08E-04	3.88E-05
EP-06001 (EMG	Firewater Pump Engine	1.32E-03	1.66E-04

VINYL CHLORIDE EMISSIONS

Source ID	Source Description	Vinyl chloride 1-Hour Emission Rate (lb/hr)	Vinyl chloride Modeled 1-Hour Emission Rate (g/s)
EP-20001	Biomass-Fired Boiler #1	9.00E-04	1.13E-04
EP-20002	Biomass-Fired Boiler #2	9.00E-04	1.13E-04
EP-20003	Biomass-Fired Boiler #3	9.00E-04	1.13E-04
EP-20004	Biomass-Fired Boiler #4	9.00E-04	1.13E-04

XYLENE EMISSIONS

Source ID	Source Description	Xylene 1-Hour Emission Rate (lb/hr)	Xylene Modeled 1-Hour Emission Rate (g/s)
T-02102	EH Ethanol Product Storage Tank	1.13E-06	1.42E-07
T-02105	EH Denaturant Storage Tank	1.30E-04	1.63E-05
T02112F	Grain Ethanol Product Storage Tank #1	1.48E-06	1.86E-07
T02113F	Grain Ethanol Product Storage Tank #2	1.48E-06	1.86E-07
T02114F	Grain Ethanol Product Storage Tank #3	1.48E-06	1.86E-07
T02115F	Grain Denaturant Storage Tank	1.84E-04	2.32E-05
EP-02100	Vapor Recovery System	5.35E-04	6.74E-05
EP-02100FUG	Loading Losses	4.53E-04	5.71E-05
EP-20001	Biomass-Fired Boiler #1	1.25E-03	1.58E-04
EP-20002	Biomass-Fired Boiler #2	1.25E-03	1.58E-04
EP-20003	Biomass-Fired Boiler #3	1.25E-03	1.58E-04
EP-20004	Biomass-Fired Boiler #4	1.25E-03	1.58E-04
EP-06001 (EMG	Firewater Pump Engine	9.18E-04	1.16E-04

Source: Salter 2010b.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

TABLE D7 - Proposed Action with Grain Facility Air Quality Model Results

Criteria Pollutant	Averaging Period		Maximum Modeled Facility Impacts 2002	2003	2004	2005	2006
PM10	24 Hour	1st high	36.82971	36.24228	44.20488	48.25636	41.20346
		date	9/6/2002	10/9/2003	1/19/2004	1/17/2005	12/27/2006
		X	287970.50	288020.40	288070.40	288030.00	288070.40
		Y	4118025.50	4118023.60	4118021.70	4118049.00	4118021.70
	Annual	1st high	9.06062	8.0992	8.43334	8.52564	7.11328
		X	288070.40	288070.40	288070.40	288070.40	288070.40
		Y	4118021.70	4118021.70	4118021.70	4118021.70	4118021.70
NO_2 (Tier 1 NO_x)	Annual	1st high	4.75828	3.69008	3.94618	4.48758	3.83178
		X	288130.00	288180.00	288180.00	288230.00	288230.00
		Y	4118199.00	4118199.00	4118199.00	4118199.00	4118199.00
SO_2	3 Hour	1st high	19.34174	25.14684	22.26949	22.78992	24.69782
		date	10/13/2002	12/19/2003	9/10/2004	10/14/2005	1/22/2006
		X	288370.20	288170.30	288130.00	288512.50	288220.30
		Y	4118010.50	4118018.00	4118049.00	4117209.60	4118016.10
	24 Hour	1st high	6.77603	5.83897	6.10853	6.41813	6.63822
		date	5/5/2002	3/20/2003	5/16/2004	11/28/2005	6/15/2006
		X	288230.00	288430.00	288180.00	288730.00	288130.00
		Y	4118349.00	4116899.00	4118249.00	4116749.00	4118249.00
	Annual	1st high	0.8253	0.63898	0.67862	0.79044	0.67286
		X	288130.00	288180.00	288180.00	288230.00	288230.00
		Y	4118249.00	4118249.00	4118249.00	4118249.00	4118249.00
CO	1 Hour	1st high	149.55358	151.1002	162.48095	153.16476	159.06179
		date	12/15/2002	2/12/2003	2/2/2004	1/21/2005	12/24/2006
		X	288420.20	288430.00	288462.60	288370.20	288612.50
		Y	4118008.70	4117199.00	4117211.50	4118010.50	4117205.70
	8 Hour	1st high	65.49146	63.57522	59.42965	59.89992	66.55986
		date	6/8/2002	3/19/2003	8/30/2005	3/21/2005	4/7/2006
		X	288130.00	288330.00	288130.00	288430.00	288430.00
		Y	4118149.00	4116899.00	4118149.00	4116899.00	4117099.00

Attachment E –

Tables of Supporting Data for the Action Alternative with the Grain-to-Ethanol Facility

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table E1 - Action Alternative with Grain Modeling Potential to Emit

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	Notes
HAUL ROADS											
EP-1000 (Fugitive)	Paved Plant Roads (50% DDGS)	1.14	18.18	3.00	--	--	--	--	--	--	
EP-1000 (Fugitive)	Paved Plant Roads (100% WDGS)	1.27	20.32	3.35	--	--	--	--	--	--	
EP-1050 (Fugitive)	Biomass Laydown Roads	0.26	4.09	0.68	--	--	--	--	--	--	

Note 1. Hourly and daily haul road sources assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day. 24-hour PM_{10} emissions from haul road sources were modeled based on this scenario.

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	Notes
STARCH PLANT											
EP-1101A	Grain Receiving Dust Collector #1	0.82	13.17	2.17	--	--	--	--	--	--	Note 1
EP-1101B	Grain Receiving Dust Collector #2	0.82	13.17	2.17	--	--	--	--	--	--	Note 1
EP-1101FUG (Fugitive)	Grain Receiving	0.32	5.08	0.23	--	--	--	--	--	--	Note 1
EP-1102	Grain Handling Dust Collector	0.34	8.23	1.50	--	--	--	--	--	--	
EP-1102FUG (Fugitive)	Grain Conveyors & Storage	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1110A	Bin Baghouse #1	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1110B	Bin Baghouse #2	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1110FUG (Fugitive)	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1120A	Bin Baghouse #3	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1120B	Bin Baghouse #4	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1120FUG (Fugitive)	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1130A	Bin Baghouse #5	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1130B	Bin Baghouse #6	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1130FUG (Fugitive)	Grain Bins	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1150	Surge Bin Baghouse	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1150FUG (Fugitive)	Surge Bin	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1201	Grain Mill Dust Collector #1	0.51	12.34	2.25	--	--	--	--	--	--	
EP-1201FUG (Fugitive)	Grain Mill #1	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1202	Grain Mill Dust Collector #2	0.51	12.34	2.25	--	--	--	--	--	--	
EP-1202FUG (Fugitive)	Grain Mill #2	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1203	Grain Mill Dust Collector #3	0.51	12.34	2.25	--	--	--	--	--	--	
EP-1203FUG (Fugitive)	Grain Mill #3	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1204	Grain Mill Dust Collector #4	0.51	12.34	2.25	--	--	--	--	--	--	
EP-1204FUG (Fugitive)	Grain Mill #4	0.00	0.00	0.00	--	--	--	--	--	--	
EP-1400	Grain Pre-Fermentation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-1401	Grain Main Fermentation Vent Scrubber	0.25	6.00	1.10	--	--	--	--	--	--	
EP-1500	Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-1610	First Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-1620	Second Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-1630	Third Effect Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-1651	Finish Evaporator Vent Condenser	--	--	--	--	--	--	--	--	--	
EP-1801	DDGS Indirect Dryer #1	3.78	90.82	16.58	3.61	15.80	0.05	0.21	6.56	28.73	
EP-2200	DDGS Loadout Dust Collector #1	0.51	8.23	1.36	--	--	--	--	--	--	Note 1
EP-2200FUG (Fugitive)	DDGS Shipping	0.12	1.92	0.09	--	--	--	--	--	--	Note 1
EP-2250FUG (Fugitive)	Wet Cake Storage and Loadout (with DDGS)	--	--	--	--	--	--	--	--	--	
EP-2250FUG (Fugitive)	Wet Cake Storage and Loadout (100% WDGS)	--	--	--	--	--	--	--	--	--	

Note 1. Hourly and daily grain receiving and DDGS loadout and shipping sources assumes and shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day. 24-hour PM_{10} emissions were modeled based on this scenario.

Table E1 - Action Alternative with Grain Modeling Potential to Emit

Source No.	Source Description	PM10 (lb/hr)	PM10 (lb/day)	PM10 (tons/yr)	NOx (lb/hr)	NOx (tons/yr)	SO2 (lb/hr)	SO2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
ENZYMATIC HYDROLYSIS PLANT											
EP-11025	Gasification Metering Bin #1 (GMB1) DC-11139	0.25	5.94	1.08	--	--	--	--	--	--	
EP-11026	Gasification Metering Bin #2 (GMB2) DC-11239	0.25	5.94	1.08	--	--	--	--	--	--	
EP-11027	EH Metering Bin #1 (EMB1) DC-11339	0.55	13.17	2.40	--	--	--	--	--	--	
EP-11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11037	Gasification Day Bin #1 (GB1) DC-11172	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11039	Gasification Day Bin #2 (GB2) DC-11272	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11041	EH Day Bin (EDB1) Rotary Valve Vent	0.01	0.14	0.02	--	--	--	--	--	--	Note 1
EP-11044	EH Day Bin (EDB1) DC-11372	0.25	3.96	0.65	--	--	--	--	--	--	Note 1
EP-11071	Biomass Grinding Line DC #1	5.27	126.39	23.07	--	--	--	--	--	--	
EP-11080	Floor Sweep System DC-11234	0.51	8.23	1.36	--	--	--	--	--	--	Note 1
EP-11081	Dirt Load-Out Silo DC-11190	0.02	0.32	0.05	--	--	--	--	--	--	Note 1
EP-11082	Dirt Load-Out Silo Spout DC-11168	0.05	0.77	0.13	--	--	--	--	--	--	Note 1
EP-11000 (Fugitive)	Biomass Receiving, Handling and Grinding	0.16	2.63	0.43	--	--	--	--	--	--	Note 1
EP-18185	EH CO2 Scrubber	--	--	--	--	--	--	--	--	--	
EP-18180	EH Distillation Vent Scrubber	--	--	--	--	--	--	--	--	--	
EP-19001FUG (Fugitive)	Lignin-Rich Stillage Storage and Loadout	--	--	--	--	--	--	--	--	--	

Note 1. Hourly and daily biomass receiving, day bins, dirt loadout and lignin loadout emissions assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions from haul roads were modeled based on this scenario.

Source ID	Source Description	PM_{10} (lb/hr)	PM_{10} (lb/day)	PM_{10} (tons/yr)	NO_x (lb/hr)	NO_x (tons/yr)	SO_2 (lb/hr)	SO_2 (tons/yr)	CO (lb/hr)	CO (tons/yr)	Notes
ETHANOL FINISHING AND STORAGE											
EP-2000 (Fugitive)	Fugitive Leaks	--	--	--	--	--	--	--	--	--	
T-2100A	T-2100A Shift Tank	--	--	--	--	--	--	--	--	--	
T-2100B	T-2100B Shift Tank	--	--	--	--	--	--	--	--	--	
T-2100C	T-2100C EH Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-2110A	T-2110A Shift Tank	--	--	--	--	--	--	--	--	--	
T-2110B	T-2110B Shift Tank	--	--	--	--	--	--	--	--	--	
T-2110C	T-2110C Off-Spec Tank	--	--	--	--	--	--	--	--	--	
T-2101	T-2101 Denatured Ethanol	--	--	--	--	--	--	--	--	--	
T-2111	T-2111 Denatured Ethanol	--	--	--	--	--	--	--	--	--	
T-2112	T-2112 Denatured Ethanol	--	--	--	--	--	--	--	--	--	
T-2113	T-2113 Denatured Ethanol	--	--	--	--	--	--	--	--	--	
T-2102	T-2102 Denaturant	--	--	--	--	--	--	--	--	--	
T-2114	T-2114 Denaturant	--	--	--	--	--	--	--	--	--	
EP-2150	Vapor Recovery System	--	--	--	--	--	--	--	--	--	Note 1
EP-2150FUG (Fugitive)	Loading Losses	--	--	--	--	--	--	--	--	--	Note 1

Note 1. Hourly and daily ethanol loadout emissions assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions were modeled based on this scenario.

Table E1 - Action Alternative with Grain Modeling Potential to Emit

Source ID	Source Description	PM_{10}			NO_x		SO_2		CO		Notes
		(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
UTILITIES											
EP-4001	EH Cooling Tower	0.03	0.72	0.13	--	--	--	--	--	--	
EP-4002	Starch Cooling Tower	0.09	2.16	0.39	--	--	--	--	--	--	
EP-5101	Synthesis Gas-Fired Boiler #1 (SGFB1)	See Note 1									
EP-5102	Synthesis Gas-Fired Boiler #2 (SGFB2)	See Note 1									
EP-5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	5.71	137.03	25.01	71.44	312.90	10.60	46.42	49.35	216.14	
EP-5301	Natural Gas-Fired Boiler #1 (NGFB1)	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-5302	Natural Gas-Fired Boiler #2 (NGFB2)	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-5303	Natural Gas-Fired Boiler #3 (NGFB3)	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-5304	Natural Gas-Fired Boiler #4 (NGFB4)	0.69	16.52	3.02	3.70	16.19	0.05	0.24	3.70	16.19	
EP-20020	Char Combustor	See Note 2									
EP-20501	Boiler Ash Handling Dust Collector #1	0.17	4.11	0.75	--	--	--	--	--	--	
EP-20502	Boiler Ash Handling Dust Collector #2	0.69	16.46	3.00	--	--	--	--	--	--	
EP-20510	Sand Handling Dust Collector #1	0.34	5.49	0.91	--	--	--	--	--	--	Note 3
EP-20520	Char Ash Handling Dust Collector #1	0.03	0.82	0.15	--	--	--	--	--	--	
EP-1901	Lime Storage Silo #1 Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-1902	Lime Storage Silo #2 Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-1903	Lime Day Silo Dust Collector	0.03	0.41	0.07	--	--	--	--	--	--	Note 3
EP-20115 (SSM)	Syngas Flare	See Note 4									
EP-9001 (SSM)	Biogas Flare	See Note 4									
EP-6001 (Emergency)	Firewater Pump Engine	0.15	0.30	0.01	3.03	0.15	0.94	0.05	2.65	0.13	Note 5
EP-6051 (Emergency)	Power Back-up Generator	0.49	0.98	0.02	15.73	0.79	0.60	0.03	8.60	0.43	Note 5

Note 1. Syngas may be combusted in the Mixed Fuel-Fired Boiler #1, MFFB1, or the Synthesis Gas-Fired Boilers #1 and #2, SGFB1 and SGFB2. The combustion option for syngas is not final, therefore, both scenarios have been included in the potential to emit calculations. For modeling purposes, syngas has been assumed to be combusted in the MFFB1, as this is the conservative scenario.

Note 2. The gasification system, including the Char Combustor, are not exhausted directly to the atmosphere. The Char Combustor's flue gas is combined with the Mixed Fuel-Fired Boiler #1 flue gas for control.

Note 3. Hourly and daily material handling emissions (excluding ash handling) assumes shipping and receiving will occur 5:00 AM to 9:00 PM only, or 16 hours per day, 330 days per year. 24-hour PM_{10} emissions were modeled based on this scenario.

Note 4. The syngas and biogas flares incorporated into the facility design are not operated under normal operating conditions at the facility; therefore, these sources are not included in the modeling analysis.

Note 5. Emergency equipment will operate a maximum of 2 hours per day for testing, no more than 100 hours per year, during normal facility operations. In the event of an emergency, operations at the facility will be shutdown at all of the major processes during the event.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table E2 - Action Alternative with Grain-to-Ethanol Facility Modeled Source Parameters

AREA SOURCE PARAMETERS (1)

Source ID	Source Description	Actual Width (2) (m)	Adjusted Width (2) (m)	Maximum Length of Area Source (3) (m)	Average Height of Trucks (4) (m)	Area Source Release Height (5) (m)	Initial Vertical Dim. (6) (m)	Total Area of Roads Area Sources (m^2)
EP01000F	Paved Plant Roads	7.3	17.1	171	4.0	4.0	1.8	48607
EP1050F	Biomass Laydown Roads	7.3	17.1	171	4.0	4.0	1.8	7199

Source ID	Source Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Length (X) (m)	Width (Y) (m)	Area (m^2)	Angle
EP1000F	Paved Plant Roads							
PRDA01	Paved Road Area 1	288962.0	4117846.0	952.50	130.0	17.1	2,223	0
PRDA02	Paved Road Area 2	288832.0	4117846.0	953.11	130.0	17.1	2,223	0
PRDA03	Paved Road Area 3	288702.0	4117846.0	953.51	130.0	17.1	2,223	0
PRDA04	Paved Road Area 4	288572.0	4117846.0	954.02	130.0	17.1	2,223	0
PRDA05	Paved Road Area 5	288448.5	4117898.5	955.26	128.0	17.1	2,189	23
PRDA06	Paved Road Area 6	288318.5	4117898.5	955.66	130.0	17.1	2,223	0
PRDA07	Paved Road Area 7	288194.7	4117865.0	955.85	128.0	17.1	2,189	344
PRDA08	Paved Road Area 8	288201.0	4117866.0	955.85	130.0	17.1	2,223	90
PRDA09	Paved Road Area 9	288201.0	4117736.0	955.55	144.5	17.1	2,471	90
PRDA10	Paved Road Area 10	288219.0	4117591.5	955.16	105.0	17.1	1,796	0
PRDA11	Paved Road Area 11	288341.0	4117591.0	954.64	131.0	17.1	2,240	0
PRDA12	Paved Road Area 12	288341.0	4117674.0	955.09	131.0	17.1	2,240	0
PRDA13	Paved Road Area 13	288324.0	4117692.0	955.24	100.0	17.1	1,710	90
PRDA14	Paved Road Area 14	288472.0	4117748.0	954.71	70.0	17.1	1,197	90
PRDA15	Paved Road Area 15	288480.0	4117748.0	954.63	130.0	17.1	2,223	332
PRDA16	Paved Road Area 16	288588.5	4117825.0	954.02	17.1	67.0	1,146	72
PRDA17	Paved Road Area 17	288472.0	4117678.0	954.41	87.0	17.1	1,488	90
PRDA18	Paved Road Area 18	288185.2	4117878.7	955.85	90.0	17.1	1,539	140
PRDA19	Paved Road Area 19	288109.6	4117810.1	955.85	122.0	17.1	2,086	95
PRDA20	Paved Road Area 20	288099.5	4117687.5	955.55	130.0	17.1	2,223	90
PRDA21	Paved Road Area 21	288099.5	4117557.5	955.43	59.0	17.1	1,009	90
PRDA22	Paved Road Area 22	288099.5	4117467.0	955.23	80.0	17.1	1,368	90
PRDA23	Paved Road Area 23	288324.0	4117592.0	954.71	100.0	17.1	1,710	90
PRDA24	Paved Road Area 24	288342.0	4117488.0	954.44	130.0	17.1	2,223	0
PRDA25	Paved Road Area 25	288472.0	4117618.0	954.31	130.0	17.1	2,223	90
EP1050F	Biomass Laydown Roads							
BRD01	Biomass Road Area 1	288489.0	4117701.0	954.48	130.0	17.1	2,223	0
BRD02	Biomass Road Area 2	288619.0	4117701.0	953.83	113.0	17.1	1,932	0
BRD03	Biomass Road Area 3	288600.0	4117701.0	954.02	98.0	17.1	1,676	90
BRD04	Biomass Road Area 4	288617.0	4117718.5	953.85	80.0	17.1	1,368	270

(1) Haul road parameters based on the National Stone, Sand and Gravel Association (NSSGA) guidance document, ***Modeling Fugitive Dust Sources with AERMOD***, revised January 2007; Trinity Consultants test data, ***Analysis of Haul Road Emission Test Data for Determining Dispersion Modeling***, updated June 2004; and the Utah Department of Environmental Quality (Utah DEQ), ***Utah Division of Air Quality Modeling Guidelines***, revised December 17, 2008.

(2) Modeling width for paved and unpaved haul roads based on typical actual road design for heavy truck traffic: 12-foot standard drive lane plus 32 feet (9.75 meters) to account for the turbulent wake caused by the truck traffic. Turbulence caused by the trucks leads to a region behind the truck within which the fugitive dust is mixed. This mixing region, often referred to as a cavity or wake region, reportedly has relatively constant concentrations throughout the region regardless of the direction of wind. Based on test data the region's influence is a minimum of 32 feet (9.75 meters) from the edge of the road.

Maximum Area Source Width = Actual Width + 32 feet

(3) Modeling length based on a maximum 10 to 1 length to actual width ratio.

Maximum Area Source Length = Actual Width x 10

(4) Actual height of truck based on 13 feet, which is the approximate average standard commercial truck height. The U.S. Department of Transportation (DOT) limits commercial vehicle heights to 13.5 feet (state height limits range from 13.6 feet to 14.6 feet).

(5) Modeling release height set equal to the average height of the haul trucks. For volume and area sources, the plumes are assumed to have Gaussian distribution by the model; therefore, the release height should be the location of the maximum concentration. In the case of haul roads, test data does not indicate a location of maximum concentration, but rather indicates that the concentration is relatively constant throughout the plume. Additional review of the test data further supported the use of the average truck height as the plume release height as the particulate emissions appear to be equally mixed in the cavity region (opacity of the plume appear constant throughout the plume).

(6) Initial vertical dimension based on a plume thickness that is equivalent to twice the average height of the haul trucks to account for the turbulent wake caused by the truck traffic. Test data indicated that the cavity region behind the haul truck was at least 24 feet (7.3 meters) in the vertical and 82 feet (25 meters) in the horizontal, while the truck heights varied from 14 feet 2 inches to 15 feet 2 inches. Based on the test data, the use of a plume thickness that is equivalent to twice the average height of the haul trucks is reasonable and accounts for the vertical emission dilution from moving trucks.

Initial Vertical Dimension = Plume Thickness / 4.3 = (2 x Average Haul Truck Height) / 4.3

Source: Salter 2009, modified and Salter 2010a.

Abengoa Bioenergy Biomass of Kansas, LLC
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Table E2 - Action Alternative with Grain-to-Ethanol Facility Modeled Source Parameters

VOLUME SOURCE PARAMETERS									
Source ID	**Source Description**	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**	**Release Height [1] (m)**	**Length of Side (m)**	**Initial Lateral Dimension [2] (m)**	**Structure Height (m)**	**Initial Vertical Dimension [3] (m)**
EP11000F	Biomass Receiving, Handling and Grinding Area	288438.1	4117640.6	954.58	6.86	65.53	15.24	13.72	6.38
EP19001F	Lignin-Rich Stillage Storage and Loadout [4]	288292.5	4117625.0	954.99	2.14	18.29	4.25	4.27	1.99
EP1101F	Grain Receiving	288102.0	4117484.0	955.24	4.57	30.48	7.09	9.14	4.25
EP2200F	DDGS Shipping	288438.5	4117516.5	954.14	5.33	42.67	9.92	10.67	4.96
EP2250F	Wet Cake Storage and Loadout (with DDGS)	288518.0	4117569.0	953.97	0.46	76.20	17.72	0.91	0.43
EP2000F	Fugitive Leaks	Emissions divided equally among storage tanks; as fugitive leaks occur throughout the facility.							
T-2100A	T-2100A Shift Tank [5]	288158.5	4117676.0	955.51	2.29	6.10	1.42	4.57	2.13
T-2100B	T-2100B Shift Tank [5]	288150.5	4117676.0	955.51	2.29	6.10	1.42	4.57	2.13
T-2100C	T-2100C EH Off-Spec Tank [5]	288141.4	4117676.0	955.52	2.29	6.10	1.42	4.57	2.13
T-2110A	T-2110A Shift Tank [5]	288149.5	4117562.5	955.24	6.25	7.62	1.77	12.50	5.81
T-2110B	T-2110B Shift Tank [5]	288164.5	4117562.5	955.24	6.25	7.62	1.77	12.50	5.81
T-2110C	T-2110C Off-Spec Tank [5]	288175.5	4117562.5	955.24	6.25	7.62	1.77	12.50	5.81
T-2101	T-2101 Denatured Ethanol [5]	288152.5	4117704.0	955.55	5.49	13.72	3.19	10.97	5.10
T-2111	T-2111 Denatured Ethanol [5]	288149.5	4117586.0	955.24	7.32	18.29	4.25	14.63	6.80
T-2112	T-2112 Denatured Ethanol [5]	288204.5	4117586.0	955.21	7.32	18.29	4.25	14.63	6.80
T-2113	T-2113 Denatured Ethanol [5]	288177.0	4117586.0	955.24	7.32	18.29	4.25	14.63	6.80
T-2102	T-2102 Denaturant [5]	288134.0	4117694.5	955.55	2.13	4.57	1.06	4.27	1.98
T-2114	T-2114 Denaturant [5]	288185.5	4117562.5	955.19	6.25	7.62	1.77	12.50	5.81
E02150F	Loading Losses [6]	288116.5	4117584.0	955.28	2.35	17.41	4.05	4.70	2.19

(1) Release height = height of structure / 2
(2) Initial lateral dimension of volume source = length of side / 4.3
(3) Initial vertical dimension of elevated source on or adjacent to a building = structure height / 2.15
(4) Peak pile height of wet cake or stillage used as structure height.
(5) Length of side for storage tanks based on tank diameter.
(6) Release and structure height and length of side based on standard railcar tanker dimensions; 15'5" high x 57'1.5" long (http://worldtraderef.com/WTR_site/Rail_Cars/Guide_to_Rail_Cars.asp).

Source: Salter 2009, modified and Salter 2010a.

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Table E2 - Action Alternative with Grain-to-Ethanol Facility Modeled Source Parameters

POINT SOURCE PARAMETERS									
Source ID	**Source Description**	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Temp. (K)**	**Flow Rate (m^3/s)**	**Stack Velocity (m/s)**
STARCH PLANT									
EP01101A	Grain Receiving DC #1	288092.50	4117480.00	955.24	12.19	0.91	Ambient	11.33	17.25
EP01101B	Grain Receiving DC #2	288092.50	4117490.00	955.24	12.19	0.91	Ambient	11.33	17.25
EP01102	Grain Handling DC	288176.50	4117463.00	954.94	21.34	0.61	Ambient	4.72	16.17
EP01110A	Bin Baghouse #1	288155.50	4117501.00	955.19	19.81	0.20	Ambient	0.47	14.55
EP01110B	Bin Baghouse #2	288155.50	4117469.00	954.94	19.81	0.20	Ambient	0.47	14.55
EP01120A	Bin Baghouse #3	288191.00	4117501.00	954.94	19.81	0.20	Ambient	0.47	14.55
EP01120B	Bin Baghouse #4	288191.00	4117469.00	954.93	19.81	0.20	Ambient	0.47	14.55
EP01130A	Bin Baghouse #5	288155.50	4117465.50	954.94	19.81	0.20	Ambient	0.47	14.55
EP01130B	Bin Baghouse #6	288155.50	4117433.50	954.94	19.81	0.20	Ambient	0.47	14.55
EP01150	Surge Bin Baghouse	288212.50	4117464.00	954.86	19.81	0.20	Ambient	0.47	14.55
EP01201	Grain Mill DC #1	288224.00	4117471.50	954.80	16.76	0.76	Ambient	7.08	15.52
EP01202	Grain Mill DC #2	288224.00	4117466.50	954.78	16.76	0.76	Ambient	7.08	15.52
EP01203	Grain Mill DC #3	288224.00	4117462.00	954.75	16.76	0.76	Ambient	7.08	15.52
EP01204	Grain Mill DC #4	288224.00	4117457.50	954.73	16.76	0.76	Ambient	7.08	15.52
EP01400	Grain Pre-Fermentation Vent Scrubber	288268.50	4117455.00	954.38	21.34	0.30	288	1.37	18.76
EP01401	Grain Main Fermentation Vent Scrubber	288325.00	4117455.50	954.38	21.34	0.46	289	4.13	25.18
EP01500	Distillation Vent Scrubber	288236.50	4117523.50	954.94	24.38	0.10	287	0.12	14.55
EP01610	First Effect Evaporator Vent Condenser	288224.50	4117520.00	954.94	9.14	0.05	322	0.01	5.59
EP01620	Second Effect Evaporator Vent Condenser	288224.50	4117510.00	954.94	9.14	0.05	322	0.01	5.59
EP01630	Third Effect Evaporator Vent Condenser	288233.00	4117510.00	954.94	9.14	0.05	322	0.01	5.59
EP01651	Finish Evaporator Vent Condenser	288398.00	4117515.50	954.33	9.14	0.05	322	0.01	5.59
EP01801	DDGS Indirect Dryer #1	288385.58	4117534.00	954.37	22.86	1.83	422	35.39	13.48
EP02200	DDGS Loadout DC #1	288438.50	4117513.00	954.14	12.19	0.76	305	7.08	15.52
ENZYMATIC HYDROLYSIS PLANT									
EP11025	Gasification Metering Bin #1 (GMB1) DC-11139	288408.0	4117709.5	954.94	32.00	0.41	Ambient	3.41	26.25
EP11026	Gasification Metering Bin #2 (GMB2) DC-11239	288408.0	4117697.5	954.86	32.00	0.41	Ambient	3.41	26.25
EP11027	EH Metering Bin #1 (EMB1) DC-11339	288301.0	4117715.0	955.29	19.81	0.76	Ambient	7.55	16.56
EP11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent	288398.5	4117710.0	954.94	1.83	0.08	Ambient	0.12	25.87
EP11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent	288379.5	4117710.0	955.05	1.83	0.08	Ambient	0.12	25.87
EP11037	Gasification Day Bin #1 (GB1) DC-11172	288398.5	4117706.5	954.93	36.58	0.41	Ambient	3.41	26.25
EP11039	Gasification Day Bin #2 (GB2) DC-11272	288379.5	4117706.5	955.03	36.58	0.41	Ambient	3.41	26.25
EP11041	EH Day Bin (EDB1) Rotary Valve Vent	288360.5	4117710.0	955.24	1.83	0.08	Ambient	0.12	25.87
EP11044	EH Day Bin (EDB1) DC-11372	288360.5	4117706.5	955.20	36.58	0.41	Ambient	3.41	26.25
EP11071	Biomass Grinding Line DC #1	288375.6	4117615.6	954.63	22.86	2.44	Ambient	72.49	15.52
EP11080	Floor Sweep System DC-11234	288351.6	4117615.6	954.71	12.19	0.76	Ambient	7.08	15.52
EP11081	Dirt Load-Out Silo DC-11190	288343.1	4117628.1	954.84	19.81	0.15	Ambient	0.28	15.24
EP11082	Dirt Load-Out Silo Spout SP-11168	288340.1	4117628.1	954.86	12.19	0.25	Ambient	0.66	13.04
EP18185	EH CO2 Scrubber	288244.0	4117653.5	955.27	21.34	0.61	294.11	8.12	27.81
EP18180	EH Distillation Scrubber	288225.0	4117692.0	955.55	24.38	0.20	293.00	0.30	9.31
ETHANOL FINISHING AND STORAGE									
EP2150	Vapor Recovery System	288116.5	4117584.0	955.28	3.66	0.15	Ambient	0.47	25.87
UTILITIES									
EP4001A	EH Cooling Tower Cell 1	288229.5	4117779.0	955.58	13.41	10.06	295	548.84	6.91
EP04002A	Grain Ethanol CWT Cell 1	288414.5	4117449.0	954.08	13.41	10.06	295	548.84	6.91
EP04002B	Grain Ethanol CWT Cell 2	288414.5	4117460.5	954.08	13.41	10.06	295	548.84	6.91
EP04002C	Grain Ethanol CWT Cell 3	288414.5	4117471.5	954.09	13.41	10.06	295	548.84	6.91
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	288369.5	4117758.0	955.24	36.58	1.22	466	56.63	48.51
EP05001	Natural Gas-Fired Boiler #1	288357.0	4117441.0	954.33	36.58	1.22	400	15.57	13.34
EP05002	Natural Gas-Fired Boiler #2	288365.0	4117441.0	954.33	36.58	1.22	400	15.57	13.34
EP05003	Natural Gas-Fired Boiler #3	288373.0	4117441.0	954.33	36.58	1.22	400	15.57	13.34
EP05004	Natural Gas-Fired Boiler #4	288381.0	4117441.0	954.33	36.58	1.22	400	15.57	13.34
EP20501	Boiler Ash Handling Dust Collector #1	288357.0	4117805.0	955.55	19.81	0.46	Ambient	2.36	14.37
EP20502	Boiler Ash Handling Dust Collector #2	288383.5	4117805.0	955.55	19.81	0.91	Ambient	9.44	14.37
EP20510	Sand Handling Dust Collector #1	288429.5	4117700.5	954.78	32.00	0.51	Ambient	4.72	23.28
EP20520	Char Ash Handling Dust Collector #1	288429.5	4117716.5	954.86	13.72	0.15	Ambient	0.47	25.87
EP1901	Lime Storage Silo #1 Dust Collector	288228.5	4117619.5	955.24	13.72	0.15	Ambient	0.35	19.40
EP1902	Lime Storage Silo #2 Dust Collector	288232.5	4117619.5	955.24	13.72	0.15	Ambient	0.35	19.40
EP1903	Lime Day Silo Dust Collector	288293.0	4117637.0	955.11	13.72	0.15	Ambient	0.35	19.40
EP6001	Firewater Pump Engine	288182.1	4117650.0	955.24	4.27	0.30	683	0.83	11.32
EP6051	Power Back-up Generator	288282.5	4117812.5	955.62	3.66	0.20	683	1.51	46.57

Source: Salter 2009, modified and Salter 2010a.

Abengoa Bioenergy Biomass of Kansas, LLC
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Table E2 - Action Alternative with Grain-to-Ethanol Facility Modeled Source Parameters

ID	Description	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Height (m)	Length (X) (m)	Width (Y) (m)	Radius (m)	Angle
BUILDING PARAMETERS									
RECTANGULAR BUILDINGS									
BLD1	Administrative Bldg	288175.50	4117847.50	955.85	3.66	27.43	24.38	--	90
BLD10	Biomass Fermentation Area (Areas 16000 & 17000)	288219.50	4117643.50	955.24	12.19	70.10	15.24	--	0
BLD11	Gasification Area (Area 20000)	288411.00	4117765.50	955.21	30.48	70.10	19.81	--	90
BLD12	Pilot Plant Building (Area 21000)	288440.00	4117703.50	954.71	7.32	15.24	15.24	--	0
BLD13B	EH Distillation Area (Areas 18050 and 19000)	288219.50	4117689.50	955.55	27.43	21.34	21.34	--	0
BLD16A	EH Decanters Bldg (Area 19000)	288295.40	4117726.00	955.43	11.28	19.81	6.10	--	0
BLD17	EH Finish Evaporation Area (Area 19000)	288252.00	4117686.00	955.45	18.29	12.19	9.14	--	0
BLD2	Maintenance Bldg	288153.00	4117761.00	955.76	8.53	45.72	36.58	--	0
BLD22A	EH Energy Center	288244.00	4117802.50	955.57	18.29	45.72	39.62	--	90
BLD23A	EH Cooling Tower (Area 04000)	288221.00	4117804.00	955.76	15.54	48.77	16.46	--	90
BLD24	Ash Storage Area (Area 05200)	288408.50	4117838.50	955.55	18.29	60.96	60.96	--	90
BLD26A	Electrical Room near Biomass Unloading	288292.00	4117576.00	954.83	4.57	18.29	12.19	--	0
BLD26B	Electrical Room near Biomass Wash	288270.00	4117700.50	955.45	4.57	21.95	12.19	--	90
BLD28A	Fire Water Pump Bldg (Area 07100)	288181.00	4117647.00	955.24	3.66	15.24	6.10	--	0
BLD28B	Fire Foam Bldg (Area 07100)	288150.80	4117646.50	955.24	3.05	6.10	6.10	--	0
BLD5	Scale House (Areas 1000 & 10000)	288606.00	4117837.00	953.96	7.32	18.29	7.62	--	0
BLD6A	Biomass Receiving Barn (Area 11000)	288409.00	4117673.50	954.72	13.72	65.53	48.77	--	90
BLD6B	Biomass Grinding Lines (Area 11000)	288346.60	4117618.60	954.76	9.14	60.96	45.11	--	0
BLD9	Biomass Process Bldg (Areas 12000 to 14000)	288290.00	4117712.00	955.36	24.38	68.58	30.48	--	90
BLD3	Control Room and Laboratory	288180.63	4117608.54	955.24	3.66	16.15	22.56	--	0
BLD13A	Starch Distillation Area (Area 01500 to 01600)	288222.5	4117507.0	954.94	27.43	40.23	38.10	--	0
BLD16B	Starch Decanters Bldg (Area 01700)	288359.0	4117594.0	954.62	11.28	24.38	9.14	--	90
BLD22B	Starch Energy Center	288349.0	4117478.0	954.36	18.29	45.72	39.62	--	90
BLD23B	Starch Cooling Tower (Area 04000)	288406.0	4117476.5	954.20	10.67	33.53	15.24	--	90
BLD26C	Electrical Room near Fermentation Area	288217.0	4117437.5	954.63	4.57	18.29	12.19	--	0
BLD26D	Electrical Room near DDGS Dryer	288355.5	4117504.5	954.44	4.57	18.29	12.19	--	0
BLD34	Grain Receiving / Loadout Bldg (Area 01100)	288088.5	4117498.0	955.24	9.14	30.48	24.38	--	90
BLD36	Grain Milling Bldg (Area 01200)	288217.5	4117476.0	954.88	15.24	22.86	12.80	--	90
BLD37	Mash Prep Bldg (Area 01300)	288236.0	4117437.5	954.63	15.85	38.10	38.10	--	0
BLD39	Starch Finish Evaporation Area (Area 01650)	288387.5	4117511.0	954.34	18.29	12.19	9.14	--	0
BLD40	DDGS Storage & Loadout Bldg (Area 02200)	288420.0	4117545.0	954.33	10.67	42.67	36.58	--	90
CIRCULAR BUILDINGS									
BLD14A	EH Thin Stillage Tank T-19001 (Area 19000)	288231.0	4117726.0	955.55	17.68	--	--	6.71	--
BLD14B	EH Whole Stillage Tank T-18000 (Area 18000)	288253.0	4117726.0	955.55	17.68	--	--	7.92	--
BLD15A	Biomass Syrup Tank T-19002 (Area 19000)	288282.5	4117726.0	955.49	15.24	--	--	4.57	--
BLD18A	Denatured Ethanol Storage Tank T-2101 (Area 02100)	288152.5	4117704.0	955.55	10.97	--	--	6.86	--
BLD18B	EH Denaturant Tank T-2102 (Area 2100)	288134.0	4117694.5	955.55	2.29	--	--	1.83	--
BLD18C	EH Shift Tank T-2100A (Area 02100)	288158.5	4117676.0	955.51	4.57	--	--	3.05	--
BLD18D	EH Shift Tank T-2100B (Area 02100)	288150.5	4117676.0	955.51	4.57	--	--	3.05	--
BLD18E	EH Off-Spec Tank T-2100C (Area 02100)	288141.4	4117676.0	955.52	4.57	--	--	3.05	--
BLD27	Process / Firewater Tank T-7003 (Area 07000)	288190.0	4117667.0	955.42	17.68	--	--	9.14	--
BLD29	Process Water Tank T-7004 (Area 07000)	288191.0	4117712.0	955.55	17.68	--	--	6.10	--
BLD7A	Gasification Day Bin #1 (GB1) (Area 11000)	288392.0	4117701.5	954.93	30.48	--	--	9.14	--
BLD7B	Gasification Day Bin #2 (GB2) (Area 11000)	288373.0	4117701.5	955.06	30.48	--	--	9.14	--
BLD7C	EH Day Bin (EDB1) (Area 11000)	288354.0	4117701.5	955.17	30.48	--	--	9.14	--
BLD14C	Starch Whole Stillage Tank T-1700 (Area 01700)	288345.0	4117585.0	954.63	16.46	--	--	7.92	--
BLD14D	Starch Intermediate Stillage Tank T-1601 (Area 01650)	288345.0	4117567.0	954.63	12.80	--	--	5.79	--
BLD14E	Starch Thin Stillage Tank T-1600 (Area 01600)	288345.0	4117549.5	954.63	16.46	--	--	6.71	--
BLD15B	Starch Syrup Tank T-1650 (Area 01650)	288344.0	4117533.5	954.63	10.36	--	--	4.27	--
BLD18F	Starch Denatured Ethanol Storage Tank T-2111 (Area 0	288149.5	4117586.0	955.24	14.63	--	--	9.14	--
BLD18G	Starch Denatured Ethanol Storage Tank T-2112 (Area 0	288204.5	4117586.0	955.15	14.63	--	--	9.14	--
BLD18H	Starch Denatured Ethanol Storage Tank T-2113 (Area 0	288177.0	4117586.0	955.24	14.63	--	--	9.14	--
BLD18I	Starch Denaturant Tank T-2114 (Area 02100)	288185.5	4117562.5	955.15	8.84	--	--	3.81	--
BLD18J	Starch Shift Tank T-2110A (Area 02100)	288149.5	4117562.5	955.24	8.84	--	--	4.57	--
BLD18K	Starch Shift Tank T-2110B (Area 02100)	288164.5	4117562.5	955.22	8.84	--	--	4.57	--
BLD18L	Starch Off-Spec Tank T-2110C (Area 02100)	288175.5	4117562.5	955.20	8.84	--	--	4.57	--
BLD35A	Grain Storage T-2001 (Area 02000)	288155.5	4117485.0	955.06	18.29	--	--	16.00	--
BLD35B	Grain Storage T-2002 (Area 02000)	288191.0	4117485.0	954.94	18.29	--	--	16.00	--
BLD35C	Grain Storage T-2003 (Area 02000)	288155.5	4117449.5	954.94	18.29	--	--	16.00	--
BLD38A	Starch Pre-fermentation Tank T-1400 (Area 01400)	288310.0	4117445.5	954.53	17.68	--	--	6.10	--
BLD38B	Starch Fermentation Tank T-1401 (Area 01400)	288310.0	4117464.5	954.53	17.68	--	--	8.23	--
BLD38C	Starch Fermentation Tank T-1402 (Area 01400)	288310.0	4117484.5	954.58	17.68	--	--	8.23	--
BLD38D	Starch Fermentation Tank T-1403 (Area 01400)	288310.0	4117503.5	954.63	17.68	--	--	8.23	--
BLD38E	Starch Fermentation Tank T-1404 (Area 01400)	288283.0	4117503.5	954.65	17.68	--	--	8.23	--
BLD38F	Starch Fermentation Tank T-1405 (Area 01400)	288283.0	4117484.5	954.63	17.68	--	--	8.23	--
BLD38G	Starch Fermentation Tank T-1406 (Area 01400)	288283.0	4117464.5	954.63	17.68	--	--	8.23	--
BLD38H	Starch Beerwell T-1407 (Area 01400)	288283.0	4117445.5	954.63	17.68	--	--	6.10	--
BLD30A	Sulfuric Acid Tank T-1911 (Area 01900)	288261.0	4117430.5	954.63	6.71	--	--	3.05	--
BLD30B	Phosphoric Acid Tank T-1912 (Area 01900)	288269.0	4117430.5	954.63	4.27	--	--	1.52	--
BLD30C	Aqua-Ammonia Tank T-1910 (Area 01900)	288276.0	4117430.5	954.61	6.71	--	--	2.74	--

Source: Salter 2009, modified and Salter 2010a.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table E3 - Action Alternative with Grain-to-Ethanol Facility PM_{10} Modeled Source Emissions

AREA SOURCE PM_{10} EMISSIONS

Source ID	Source Description	Total Area of Roads Area Sources (m^2)	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s-m^2)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s-m^2)
EP-1000 (Fugiti	Paved Plant Roads (50% DDGS)	48,607	18.18	2.9453E-06	3.00	1.7752E-06
EP-1050 (Fugiti	Biomass Laydown Roads	7,199	4.09	4.4781E-06	0.68	2.6991E-06

(1) 24-hour PM_{10} emissions from haul roads were modeled based on a scenariowhich assumes all truck traffic associated with shipping and receiving will occur from 5:00 AM to 9:00 PM only.
(2) Annual PM_{10} emissions from haul roads were modeled such that the emission rates were normalized over 8,760 hours per year.

VOLUME SOURCE PM_{10} EMISSIONS

Source ID	Source Description	24-Hour Averaging Period: PM_{10} 24-Hour Emission Rate (lb/day)	24-Hour Averaging Period: PM_{10} Modeled 24-Hour Emission Rate (g/s)	Annual Averaging Period: PM_{10} Annual Emission Rate (tons/yr)	Annual Averaging Period: PM_{10} Modeled Annual Emission Rate (g/s)
EP11000F	Biomass Receiving, Handling and Grinding Area (1, 2)	2.63	2.0685E-02	0.43	1.2467E-02
EP1101F	Grain Receiving (1, 2)	5.08	4.0043E-02	0.23	6.6216E-03
EP-2200F	DDGS Shipping (1, 2)	1.92	1.5120E-02	0.09	2.6581E-03

(1) 24-hour PM_{10} emissions from fugitive receiving and loadout sources were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.
(2) Annual PM_{10} emissions from fugitive receiving and loadout sources were modeled such that the emission rates were normalized over 8,760 hours per year.

Source: Salter 2009, modified and Salter 2010b.

Table E3 - Action Alternative with Grain-to-Ethanol Facility PM_{10} Modeled Source Emissions

POINT SOURCE PM_{10} EMISSIONS

		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	PM_{10} 24-Hour Emission Rate (lb/day)	PM_{10} Modeled 24-Hour Emission Rate (g/s)	PM_{10} Annual Emission Rate (tons/yr)	PM_{10} Modeled Annual Emission Rate (g/s)
EP-1101A	Grain Receiving Dust Collector #1 (1, 2)	13.17	1.0368E-01	2.17	6.2492E-02
EP-1101B	Grain Receiving Dust Collector #2 (1, 2)	13.17	1.0368E-01	2.17	6.2492E-02
EP-1102	Grain Handling Dust Collector	8.23	4.3200E-02	1.50	4.3200E-02
EP-1110A	Bin Baghouse #1	0.82	4.3200E-03	0.15	4.3200E-03
EP-1110B	Bin Baghouse #2	0.82	4.3200E-03	0.15	4.3200E-03
EP-1120A	Bin Baghouse #3	0.82	4.3200E-03	0.15	4.3200E-03
EP-1120B	Bin Baghouse #4	0.82	4.3200E-03	0.15	4.3200E-03
EP-1130A	Bin Baghouse #5	0.82	4.3200E-03	0.15	4.3200E-03
EP-1130B	Bin Baghouse #6	0.82	4.3200E-03	0.15	4.3200E-03
EP-1150	Surge Bin Baghouse	0.82	4.3200E-03	0.15	4.3200E-03
EP-1201	Grain Mill Dust Collector #1	12.34	6.4800E-02	2.25	6.4800E-02
EP-1202	Grain Mill Dust Collector #2	12.34	6.4800E-02	2.25	6.4800E-02
EP-1203	Grain Mill Dust Collector #3	12.34	6.4800E-02	2.25	6.4800E-02
EP-1204	Grain Mill Dust Collector #4	12.34	6.4800E-02	2.25	6.4800E-02
EP-1401	Grain Main Fermentation Vent Scrubber	6.00	3.1500E-02	1.10	3.1500E-02
EP-1801	DDGS Indirect Dryer #1	90.82	4.7679E-01	16.58	4.7690E-01
EP-2200	DDGS Loadout Dust Collector #1 (1, 2)	8.23	6.4800E-02	0.09	2.6581E-03
EP11025	Gasification Metering Bin #1 (GMB1) DC-11139	5.94	3.1173E-02	1.08	3.1173E-02
EP11026	Gasification Metering Bin #2 (GMB2) DC-11239	5.94	3.1173E-02	1.08	3.1173E-02
EP11027	EH Metering Bin #1 (EMB1) DC-11339	13.17	6.9120E-02	2.40	6.9120E-02
EP11030	Gasification Day Bin #1 (GB1) Rotary Valve Vent (1, 2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11033	Gasification Day Bin #2 (GB2) Rotary Valve Vent (1, 2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11037	Gasification Day Bin #1 (GB1) DC-11172 (1, 2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11039	Gasification Day Bin #2 (GB2) DC-11272 (1, 2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11041	EH Day Bin (EDB1) Rotary Valve Vent (1, 2)	0.14	1.0800E-03	0.02	6.5096E-04
EP11044	EH Day Bin (EDB1) DC-11372 (1, 2)	3.96	3.1173E-02	0.65	1.8789E-02
EP11071	Biomass Grinding Line DC #1	126.39	6.6355E-01	23.07	6.6355E-01
EP11080	Floor Sweep System DC-11234 (1, 2)	8.23	6.4800E-02	1.36	3.9058E-02
EP11081	Dirt Load-Out Silo DC-11190 (1, 2)	0.32	2.5445E-03	0.05	1.5337E-03
EP11082	Dirt Load-Out Silo Spout DC-11168 (1, 2)	0.77	6.0480E-03	0.13	3.6454E-03
EP4001A	EH Cooling Tower Cell 1(3)	0.72	3.7874E-03	0.13	3.7874E-03
EP4002A	Starch Cooling Tower Cell 1 (3)	0.72	3.7874E-03	0.13	3.7874E-03
EP4002B	Starch Cooling Tower Cell 2 (3)	0.72	3.7874E-03	0.13	3.7874E-03
EP4002C	Starch Cooling Tower Cell 3 (3)	0.72	3.7874E-03	0.13	3.7874E-03
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	137.03	7.1941E-01	25.01	7.1941E-01
EP-5301	Natural Gas-Fired Boiler #1 (NGFB1)	16.52	8.6747E-02	3.02	8.6747E-02
EP-5302	Natural Gas-Fired Boiler #2 (NGFB2)	16.52	8.6747E-02	3.02	8.6747E-02
EP-5303	Natural Gas-Fired Boiler #3 (NGFB3)	16.52	8.6747E-02	3.02	8.6747E-02
EP-5304	Natural Gas-Fired Boiler #4 (NGFB4)	16.52	8.6747E-02	3.02	8.6747E-02
EP20501	Boiler Ash Handling Dust Collector #1	4.11	2.1600E-02	0.75	2.1600E-02
EP20502	Boiler Ash Handling Dust Collector #2	16.46	8.6400E-02	3.00	8.6400E-02
EP20510	Sand Handling Dust Collector #1 (4,5)	5.49	4.3200E-02	0.91	2.6038E-02
EP20520	Char Ash Handling Dust Collector #1	0.82	4.3200E-03	0.15	4.3200E-03
EP1901	Lime Storage Silo #1 Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP1902	Lime Storage Silo #2 Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP1903	Lime Day Silo Dust Collector (4,5)	0.41	3.2400E-03	0.07	1.9529E-03
EP6001	Firewater Pump Engine (6)	0.30	1.5884E-03	0.008	2.1758E-04
EP6051	Power Back-up Generator (6)	0.98	5.1622E-03	0.025	7.0715E-04

(1) 24-hour PM_{10} emissions from fugitive receiving and loadout sources were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.

(2) Annual PM_{10} emissions from fugitive receiving and loadout sources were modeled such that the emission rates were normalized over 8,760 hours per

(3) Cooling tower and air condenser emissions divided by the number of cells to obtain an emission rate per cell.

(4) 24-hour PM_{10} emissions from materials and chemical storage sources (excluding ash handling) were modeled based on a scenario which assumes all shipping and receiving will occur from 5:00 AM to 9:00 PM only.

(5) Annual PM_{10} emissions from materials and chemical storage sources (excluding ash handling) were modeled such that the emission rates were normalized over 8,760 hours per year.

(6) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 24-hour PM_{10} emissions from the emergency sources were modeled such that the emission rates were normalized over the 24-hour period. Annual emissions were normalized over 8,760 hours per year.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

Table E4 - Action Alternative with Grain-to-Ethanol Facility NO_x, SO_2, and CO Modeled Source Emissions

POINT SOURCE NO_x EMISSIONS				
		Annual Averaging Period - Tier 1		
Source ID	Source Description	% Conversion as NO_2 (%)	Tier 1 NO_x Annual Emission Rate (tons/yr)	Tier 1 NO_2 Modeled Annual Emission Rate (g/s)
EP-1801	DDGS Indirect Dryer #1	100%	15.80	4.5461E-01
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	100%	312.90	9.0012E+00
EP-5301	Natural Gas-Fired Boiler #1 (NGFB1)	100%	16.19	4.6570E-01
EP-5302	Natural Gas-Fired Boiler #2 (NGFB2)	100%	16.19	4.6570E-01
EP-5303	Natural Gas-Fired Boiler #3 (NGFB3)	100%	16.19	4.6570E-01
EP-5304	Natural Gas-Fired Boiler #4 (NGFB4)	100%	16.19	4.6570E-01
EP6001	Firewater Pump Engine (1)	100%	0.15	4.3517E-03
EP6051	Power Back-up Generator (1)	100%	0.79	2.2629E-02

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, annual emissions were normalized over 8,760 hours per year.

POINT SOURCE SO_2 EMISSIONS							
		3-Hour Averaging Period		24-Hour Averaging Period		Annual Averaging Period	
Source ID	Source Description	SO_2 Hourly Emission Rate (lb/hr)	SO_2 Modeled 3-Hour Emission Rate (g/s)	SO_2 24-Hour Emission Rate (lb/day)	SO_2 Modeled 24-Hour Emission Rate (g/s)	SO_2 Annual Emission Rate (tons/yr)	SO_2 Modeled Annual Emission Rate (g/s)
EP-1801	DDGS Indirect Dryer #1	0.05	6.0776E-03	1.16	6.0776E-03	0.21	6.0776E-03
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	10.60	1.3354E+00	254.37	1.3354E+00	46.42	1.3354E+00
EP-5301	Natural Gas-Fired Boiler #1 (NGFB1)	0.05	6.8485E-03	1.30	6.8485E-03	0.24	6.8485E-03
EP-5302	Natural Gas-Fired Boiler #2 (NGFB2)	0.05	6.8485E-03	1.30	6.8485E-03	0.24	6.8485E-03
EP-5303	Natural Gas-Fired Boiler #3 (NGFB3)	0.05	6.8485E-03	1.30	6.8485E-03	0.24	6.8485E-03
EP-5304	Natural Gas-Fired Boiler #4 (NGFB4)	0.05	6.8485E-03	1.30	6.8485E-03	0.24	6.8485E-03
EP6001	Firewater Pump Engine (1)	0.94	7.9212E-02	1.89	9.9015E-03	0.05	1.3564E-03
EP6051	Power Back-up Generator (1)	0.60	5.0797E-02	1.21	6.3496E-03	0.03	8.6981E-04

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 3-hour and 24-hour SO_2 emissions from the emergency sources were modeled such that the emission rates were normalized over the averaging periods. Annual emissions were normalized over 8,760 hours per year.

Table E4 - Action Alternative with Grain-to-Ethanol Facility NO_x, SO_2, and CO Modeled Source Emissions

POINT SOURCE CO EMISSIONS				
			1-Hour Averaging Period	8-Hour Averaging Period
Source ID	Source Description	CO Hourly Emission Rate (lb/hr)	CO Modeled 1-Hour Emission Rate (g/s)	CO Modeled 8-Hour Emission Rate (g/s)
EP-1801	DDGS Indirect Dryer #1	6.56	8.2656E-01	8.2656E-01
EP5201	Mixed Fuel-Fired Boiler #1 (MFFB1)	49.35	6.2178E+00	6.2178E+00
EP-5301	Natural Gas-Fired Boiler #1 (NGFB1)	3.70	4.6570E-01	4.6570E-01
EP-5302	Natural Gas-Fired Boiler #2 (NGFB2)	3.70	4.6570E-01	4.6570E-01
EP-5303	Natural Gas-Fired Boiler #3 (NGFB3)	3.70	4.6570E-01	4.6570E-01
EP-5304	Natural Gas-Fired Boiler #4 (NGFB4)	3.70	4.6570E-01	4.6570E-01
EP6001	Firewater Pump Engine (1)	2.65	3.3356E-01	8.3389E-02
EP6051	Power Back-up Generator (1)	8.60	1.0841E+00	2.7101E-01

(1) The sources, EP6001 (Firewater Pump Engine) and EP6051 (Power Back-up Generator), are emergency units which each operate a maximum of 2 hours per day, 100 hours per year to comply with the NSPS, 40 CFR Part 60, Subpart IIII, Compression Ignition Internal Combustion Engines. For modeling purposes, these units were modeled during normal facility operations.

- For normal facility operations, 1-hour and 8-hour CO emissions from the emergency sources were modeled such that the emission rates were normalized over the averaging hour periods.

Abengoa Bioenergy Biomass of Kansas, LLC
Biorefinery Facility
Hugoton, Kansas

TABLE E5 - Action Alternative with Grain-to-Ethanol Facility Air Quality Model Results

Criteria Pollutant	Averaging Period		Maximum Modeled Facility Impacts 2002	2003	2004	2005	2006
PM10	24 Hour	1st high	27.44066	24.65608	25.11485	24.4671	22.48992
		date	1/3/2002	10/9/2003	11/14/2004	1/17/2005	12/27/2006
		X	288408.00	288237.30	288379.80	288237.30	288308.00
		Y	4117998.00	4117989.70	4117994.30	4117989.70	4118048.00
	Annual	1st high	6.65309	6.21408	6.40684	6.57604	5.55257
		X	288287.20	288287.20	288287.20	288287.20	288287.30
		Y	4117988.90	4117998.90	4117988.90	4117988.90	4117988.90
NO_2 (Tier 1 NO_x)	Annual	1st high	5.76719	4.53713	5.04544	5.21173	4.47851
		X	288258.00	288258.00	288258.00	288358.00	288308.00
		Y	4118148.00	4118148.00	4118148.00	4118048.00	4118098.00
SO_2	3 Hour	1st high	25.70214	33.93253	31.61998	27.85454	31.39368
		date	12/1/2002	1/19/2003	9/10/2004	11/9/2005	9/6/2006
		X	288337.20	288379.80	288087.30	288358.00	287987.30
		Y	4117988.10	4117994.30	4117992.10	4118148.00	4117993.70
	24 Hour	1st high	5.34005	5.38598	6.73985	5.29246	5.18155
		date	6/30/2002	11/13/2003	9/20/2004	10/4/2005	4/10/2006
		X	288258.00	288458.00	288308.00	288358.00	288346.80
		Y	4118048.00	4118048.00	4117998.00	4117998.00	4117995.50
	Annual	1st high	0.71826	0.56907	0.62208	0.62695	0.54365
		X	288258.00	288258.00	288258.00	288258.00	288308.00
		Y	4118148.00	4118198.00	4118198.00	4118198.00	4118098.00
CO	1 Hour	1st high	762.45674	819.04592	735.87591	689.02429	630.945
		date	12/1/2002	1/19/2003	12/3/2004	10/31/2005	12/11/2006
		X	288408.00	288379.80	288337.20	288408.00	287987.30
		Y	4117998.00	4117994.30	4117988.10	4118098.00	4117993.70
	8 Hour	1st high	63.74674	67.24264	81.10427	69.40323	68.72714
		date	10/21/2002	12/19/2003	11/24/2004	10/13/2005	1/22/2006
		X	288208.00	288208.00	288408.00	288208.00	288258.00
		Y	4118048.00	4118148.00	4117998.00	4118048.00	4117998.00

Appendix G

Federal Register Notices

G. FEDERAL REGISTER NOTICES

The following *Federal Register* notices were used in the preparation of this Abengoa Biorefinery Project EIS.

Volume and page	Publication date	Title
71 FR 46451	August 14, 2006	Guidelines for the Loan Guarantee Program
73 FR 50001	August 25, 2008	Notice of Intent to Prepare an Environmental Impact Statement and Notice of Wetlands Involvement for the Abengoa Biorefinery Project Near Hugoton, KS
73 FR 73211	December 2, 2008	90-Day Finding on a Petition to List the Black-tailed Prairie Dog as Threatened or Endangered
74 FR 19543	April 29, 2009	Amended Notice of Intent to Modify the Scope of the Environmental Impact Statement for the Abengoa Biorefinery Project near Hugoton, KS
74 FR 48525	September 23, 2009	Notice of Availability for the Draft Environmental Impact Statement for the Abengoa Biorefinery Project Near Hugoton, Sevens County, KS
74 FR 48951	September 25, 2009	Environmental Protection Agency Notice of Availability for EIS No. 20090329, Draft EIS, DOE, KS,

September 14th, please contact Jennifer Graban at (202) 260–1491 or *Jennifer.Graban@ed.gov* by Friday, September 8, 2006, to reserve time on the agenda. Please include your name, the organization you represent, if appropriate, and a brief description of the issue you would like to present. Presenters will be allowed five minutes to make their comments. Presenters are requested to submit three written copies and an electronic file (CD or diskette) of their comments at the meeting, which should be labeled with their name and contact information. Individuals interested in solely attending the meeting are advised to register in advance to ensure space availability.

Given the expected number of individuals interested in providing comments at the meeting, reservations for presenting comments should be made as soon as possible. Reservations will be processed on a first-come, first-served basis. Persons who are unable to obtain reservations to speak during the meeting are encouraged to submit written comments. Written comments will be accepted at the meeting site or via e-mail at *Jennifer.Graban@ed.gov.* If you will be emailing written comments, please do so by Friday, September 1, 2006.

The Panel will submit to the President, through the Secretary, a preliminary report not later than January 31, 2007, and a final report not later than February 28, 2008. Both reports shall, at a minimum, contain recommendations, based on the best available scientific evidence.

The meeting site is accessible to individuals with disabilities. Individuals who will need accommodations in order to attend the meeting, such as interpreting services, assistive listening devices, or materials in alternative format, should notify Jennifer Graban at (202) 260–1491 or *Jennifer.Graban@ed.gov* no later than September 8, 2006. We will attempt to meet requests for accommodations after this date, but cannot guarantee their availability.

Records are kept of all Panel proceedings and are available for public inspection at the staff office for the Panel, from the hours of 9 a.m. to 5 p.m.

Dated: August 9, 2006.

Margaret Spellings,

Secretary, U.S. Department of Education.

[FR Doc. 06–6900 Filed 8–11–06; 8:45 am]

BILLING CODE 4000–01–M

DEPARTMENT OF ENERGY

Loan Guarantees for Projects That Employ Innovative Technologies; Guidelines for Proposals Submitted in Response to the First Solicitation

AGENCY: Department of Energy (DOE).

ACTION: Notice.

SUMMARY: DOE publishes policy guidelines that DOE intends to use in connection with the first solicitation of proposals for a loan guarantee for Eligible Projects under Title XVII of the Energy Policy Act of 2005 that are expected to contribute to the goals of the President's Advanced Energy Initiative.

EFFECTIVE DATE: The guidelines in this Notice are effective August 14, 2006.

FOR FURTHER INFORMATION CONTACT: Director, DOE Loan Guarantee Program Office, 1000 Independence Avenue, SW., Washington, DC 20585–0121, Phone: 202–586–8336. Email: *LGProgram@hq.doe.gov.*

With a copy to: Warren Belmar, Deputy General Counsel for Energy Policy, Office of the General Counsel, 1000 Independence Avenue, SW., Washington, DC 20585–0121.

SUPPLEMENTARY INFORMATION:

Introduction

Title XVII of the Energy Policy Act of 2005 (42 U.S.C. 16511–16514) authorizes the Secretary of Energy, after consultation with the Secretary of the Treasury, to make loan guarantees for projects that ''avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.'' Commercial technology is defined as a technology in general use in the marketplace. More specifically, Title XVII identifies ten discrete categories of projects that are eligible for a loan guarantee, including those that employ:

1. Renewable energy systems;
2. Advanced fossil energy technology (including coal gasification meeting the criteria in subsection 1703(d));
3. Hydrogen fuel cell technology for residential, industrial, or transportation applications;
4. Advanced nuclear energy facilities;
5. Carbon capture and sequestration practices and technologies, including agricultural and forestry practices that store and sequester carbon;
6. Efficient electrical generation, transmission, and distribution technologies;
7. Efficient end-use energy technologies;
8. Production facilities for fuel efficient vehicles, including hybrid and advanced diesel vehicles;
9. Pollution control equipment; and
10. Refineries, meaning facilities at which crude oil is refined into gasoline.

A principal purpose of the Title XVII loan guarantee program is to encourage early commercial use in the United States of new or significantly improved technologies in energy projects. DOE's loan guarantee program is not intended for technologies in research and development. Indeed as section 1702(d) requires a ''reasonable prospect of payment'' of any loan or debt obligation issued to a project, technologies for project proposals should be mature enough to assure dependable commercial operations and generate sufficient revenues, and not solely a demonstration project (i.e., a project designated to demonstrate feasibility of a technology on any scale). DOE believes that accelerated commercial use of these new or improved technologies will help to sustain economic growth, yield environmental benefits, and produce a more stable and secure energy supply.

Today, DOE begins implementation of Title XVII with two actions. First, DOE publishes guidelines in the nature of a general statement of policy that DOE intends to apply *only* to the first solicitation of projects. Second, DOE makes available the first solicitation for Pre-Applications for Federal Loan Guarantees for Projects that Employ Innovative Energy Technologies by posting it on the internet at: *http://www.LGProgram.energy.gov/.* Neither a procurement action (under Title 48 of the Code of Federal Regulations) nor a financial assistance award (under 10 CFR part 600) is contemplated by these guidelines and the solicitation. As further described in the solicitation, interested parties are being asked to file an initial Pre-Application for review by DOE. If the Pre-Application meets the suggested requirements of these guidelines, DOE may invite the interested party to submit a comprehensive Application.

DOE anticipates receiving a significant volume of interest in the loan guarantee program, and therefore plans to issue multiple solicitations, following adoption of final regulations within the next year, that will cover the broad array of eligible projects under Title XVII. Applicants who respond to the solicitation but are not approved for a loan guarantee may submit a new or revised proposal in response to future solicitations under the final regulations DOE plans to adopt. DOE does not intend to review Pre-Applications or approve loan guarantees for any proposal that is outside the scope and does not conform with the specific requirements of the initial solicitation. Likewise, only comprehensive applications submitted by interested parties that were invited by DOE to submit a comprehensive application for a Title XVII loan guarantee as a result of the initial solicitation will be considered for a loan guarantee.

While most provisions of today's guidelines are not legally binding, please note that some provisions of these guidelines are based on non-discretionary provisions of law in Title XVII and under the Federal Credit Reform Act of 1990, 2 U.S.C. 661 et seq. (''FCRA''). For example, section 1702(f) of Title XVII specifically limits the term of the loan guarantee by stating that ''the term of an obligation shall require full repayment over a period not to exceed the lesser of (i) 30 years or (ii) 90 percent of the projected useful life of the physical asset to be financed by the obligation (as determined by the Secretary).'' Hence, Applicants should provide a detailed analysis of the expected and generally accepted life cycle of the primary technology and project facility that is the focus of the financing as DOE cannot issue a guarantee that will extend beyond 90 percent of such life cycle or a 30-year term, whichever is shorter.

Moreover, FCRA requires that Congress must authorize Federal loan guarantees in an appropriations act in advance of the execution of a final binding loan guarantee agreement. *See* 2 U.S.C. 661c(b). This requirement applies even though Title XVII allows for the cost of a loan guarantee, as defined in 2 U.S.C. 661a(5)(C), to be paid by the recipient, see 42 U.S.C. 16512(b)(2), and even though today's guidelines provide for a Conditional Commitment that will precede the execution of a final binding Loan Guarantee Agreement. As a result, DOE is currently restricted only to reviewing Pre-Applications and Applications and entering into Conditional Commitments until it obtains the requisite authorization in an appropriations act. DOE may not enter into a binding Loan Guarantee Agreement or issue any loan guarantees until this appropriations authority has been granted.

Discussion of the Guidelines

In this portion of the **SUPPLEMENTARY INFORMATION**, DOE highlights key provisions and, as appropriate, explains the basis for them.

For the first solicitation, these guidelines set forth the type of information that interested parties are expected to include in a Pre-Application and, if invited by DOE, the type of information that Applicants should additionally include in an Application. Information is also provided in these guidelines as to the determining factors that DOE expects to apply in its review of project proposals. DOE intends to evaluate each Pre-Application and Application taking into consideration, among other things, the requirements and conditions contained in the solicitation, the criteria specified under Title XVII to identify Eligible Projects, the project's ability to optimize the probability of repayment of Guaranteed Obligations, and how the project furthers the goals of the President's Advanced Energy Initiative.[1] Please note that even if a Pre-Application or Application contains all of the information specified in these guidelines, DOE retains the right, in its sole discretion, to inform any Applicant that their project proposal has been denied further review.

The guidelines, in accordance with Section 1702(c), provide that any loan guarantee issued by DOE may not exceed 80 percent of total Project Costs. Section VII of the guidelines generally defines Project Costs as those that are necessary, reasonable, and directly related to the design, construction, and startup of a project. Conversely, excluded costs which are also described with greater specificity in Section VII of the guidelines include initial research and development costs and operating costs after the facility has been constructed.

In addition, DOE notes that the Subsidy Cost of the loan guarantee, as well as fees paid for by the Borrower for the Administrative Cost of Issuing a Loan Guarantee, are excluded from Project Costs. As defined in 2 U.S.C. 661a(5)(C), the Subsidy Cost is not a tangible cost associated with the financing or construction of the project facility. Rather, it constitutes the expected long-term liability to the Federal government in issuing the loan guarantee. In addition, DOE believes that it would be undesirable to allow Borrowers to count the Subsidy Cost (including the financing cost of a Borrower paid Subsidy Cost) as a Project Cost, whether funded by an appropriation or by payment made by the Borrower. To do so could have the effect of including the Subsidy Cost as an allowable cost under the loan guarantee, and thus put the Federal government at risk for up to 80 percent of its Subsidy Cost requirement. Additionally, the Borrower paid Subsidy Cost can not be paid from the proceeds of Federally guaranteed or funded debt. For similar reasons, fees required under Section 1702(h) of the Act to cover DOE's administrative expenses are also disallowed from Project Costs, thereby ensuring that the loan guarantee does not place the Federal government at risk for up to 80% of these statutorily required fees.

Consistent with section 1702(b), the guidelines specify that DOE must receive either an appropriation for the Subsidy Cost or payment of that cost by the Borrower. No funds have been appropriated for the Subsidy Cost of loan guarantees; therefore DOE anticipates that the project(s) approved pursuant to the first solicitation will require the Borrower to pay this cost. The guidelines specify that a Project Sponsor should include an estimate of the Subsidy Cost in an Application. In accordance with 2 U.S.C. 661b(a), DOE will then perform its own independent calculation of the Subsidy Cost and will consult and obtain the approval of the Office of Management and Budget for this computation prior to entering into any Loan Guarantee Agreement. DOE will also consult with the Secretary of Treasury prior to entering into any Loan Guarantee Agreement. The Applicant will be required to provide updated project financing information and terms and conditions not later than 30 days prior to closing, should any of the terms of the project financing or project terms change between Conditional Commitment and the Loan Guarantee Agreement.

In addition to the Subsidy Cost, section 1702(h) also requires DOE to collect fees to cover the administrative expenses of issuing loan guarantees. The guidelines specify that DOE will collect fees for administrative expenses as provided for in the Conditional Commitment, as well as additional fees during the term of a loan guarantee. These fees will consist of the administrative expenses that DOE incurs during:

(i) The evaluation of the Pre-Application and Application;

(ii) The offering, negotiation, and closing of a loan guarantee; and

(iii) The servicing of the loan guarantee and monitoring the progress of a project.

Title XVII, and section 1702(h) in particular, afford DOE discretion with

[1] One factor that warrants mentioning here is that a proposed project should be constructed and operated in the United States. DOE believes that the environmental benefits and deployment of new and/or enhanced technologies associated with projects should reside within the United States. In such circumstances it will be easier for DOE to monitor the project, ensure repayment of guaranteed debt in accordance with section 1702(d), and enforce its rights in the event of default.

respect to how it imposes fees to cover applicable administrative costs. For this first solicitation, DOE has elected not to impose such fees in connection with the Pre-Application stage. In effect, this means that Project Sponsors who submit Pre-Applications and are denied further consideration will not be charged any fees for expenses incurred by DOE in reviewing their Pre-Application materials. For project proposals that progress to the Application stage, the invitation to submit an Application that DOE will send to Project Sponsors will specify whether DOE is charging an Application fee, and the amount of any such fee. In addition to the Application fee that DOE may assess, the other administrative fees that DOE will collect in connection with the first solicitation will be from Borrowers who enter into a Conditional Commitment, in an amount sufficient to cover DOE's administrative expenses applicable to that Borrower's Pre-Application, Application, Term Sheet, Conditional Commitment, the Loan Guarantee Agreement, and subsequent monitoring and servicing expenses. With respect to future solicitations, DOE may decide to assess a Pre-Application and/or an Application fee. DOE will revisit this issue in the forthcoming regulations that DOE will propose for public comment later this year.

As for the financing structure of proposed projects, Title XVII does not impose any specific limitations, other than the guarantee ''shall not exceed an amount equal to 80 percent of the project cost of the facility that is the subject of the guarantee as estimated at the time at which the guarantee is issued.'' 42 U.S.C. 16512(c). However, section 1702(d)(1) provides: ''No guarantee shall be made unless the Secretary determines that there is reasonable prospect of repayment of the principal and interest on the obligation by the borrower.'' 42 U.S.C. 16512(d)(1). DOE believes this statutory provision requires DOE to make repayment of debt a very high priority of the loan guarantee program and authorizes DOE to adopt policies that ensure that Borrowers and Lenders have a similar motivation and use their best efforts to ensure repayment. Thus, DOE would prefer to limit the financial risk to the Federal government from the first loan guarantees issued under Title XVII as DOE gains valuable experience and expertise with these financial and commercial arrangements. This intention is bolstered by the mandate of Section 1702(g)(2)(B), which requires that ''with respect to any property acquired pursuant to a guarantee or related agreements, [the Secretary] shall be superior to the rights of any other person with respect to the property.'' This statutory provision requires DOE to possess a first lien priority in the assets of the project and other collateral security pledged. Because DOE is not permitted by Title XVII to adopt a *pari passu* financing structure, any holders of non-guaranteed debt have a subordinate claim to DOE in the event of default, and will not be able to recover on their debt until DOE's claim is paid in full.

To harmonize and balance the twin goals of issuing loan guarantees to encourage early commercial use of new or significantly improved technologies in Eligible Projects while limiting the financial exposure of the Federal government, DOE's first solicitation expresses a preference that DOE not guarantee more than 80 percent of the total face value of any single debt instrument. Under no circumstance does DOE intend to guarantee 100 percent of the loan. Accordingly, if a Borrower seeks a loan guarantee for more than 80 percent of the face value of the underlying debt obligation, DOE's review of the project proposal to determine whether to approve a loan guarantee for such amount will be predicated on the sufficiency of evidence presented by the Borrower in support of a higher guarantee percentage.[2] DOE notes however, that higher guarantee percentages will lead to higher Subsidy Costs.

For similar reasons of increasing the probability of repayment, in reviewing project proposals, DOE intends to consider whether Project Sponsors will make a significant financial commitment to the project. In addition, DOE intends to consider whether a Project Sponsor will rely upon other government assistance (e.g., financial assistance, tax credits, other loan guarantees) to support financing, construction, or operation of the project. DOE does not intend to disqualify project proposals that employ other forms of Federal and non-Federal government assistance, but in reviewing proposals, DOE will take into account how much equity will be invested and the extent of the financial risk borne by the Project Sponsor.[3]

In connection with any loan guaranteed by DOE that may be syndicated, traded, or otherwise sold on the secondary market, DOE will require that the guaranteed portion and non-guaranteed portion of the debt instrument are resold on a pro-rata basis. The guaranteed portion of the debt may not be ''stripped'' from the non-guaranteed portion, i.e. sold separately as an instrument fully guaranteed by the Federal government.

In further support of DOE's objective to ensure full repayment of debt, DOE expects that participating Lenders will have to meet certain eligibility requirements, as described in greater detail in Section VI of these guidelines. These criteria are intended to ensure that the Lender has the financial wherewithal and appropriate experience and expertise to meet its fiduciary obligations in connection with the debt guaranteed by DOE. DOE expects that the Lender and other appropriate parties will exercise a high level of care and diligence in the establishment and enforcement of the conditions precedent to all loan disbursements and Borrower covenants, as provided for in the loan agreement or related documents, throughout the term of the loan. Moreover, DOE also expects each Lender to diligently perform its duties in the servicing and collection of the loan as well as in ensuring that the collateral package securing the loan remains uncompromised. The Lender will also be expected to provide regular, periodic financial reports on the status and condition of the loan, consistent with the terms of the Loan Guarantee Agreement. The Lender is required to promptly notify DOE if it becomes aware of any problems or irregularities concerning the project or the ability of the Borrower to make payment on the loan or other debt obligations.

In addition to the other measures described above limiting the Federal government's risk exposure, commitments to guarantee loans will not exceed a face value of $2 billion, in the aggregate, under the first solicitation. Commencing with a loan guarantee program of this size will allow DOE to achieve considerable progress in assisting new or significantly improved energy technologies to market while also enabling DOE to gain valuable experience and expertise that it will incorporate in program regulations and apply to future solicitations. DOE recognizes that some project proposals

[2] DOE does not have a preference as to whether non-Projects Costs, as defined in Section VII of these guidelines, are financed with debt or equity, as long as DOE maintains a first lien priority in the assets of the project and other collateral pledged as security.

[3] Since the guidelines are not substantive regulations, DOE will not reject project proposals solely on the basis of the guidelines. However, Applicants are advised of their heavy burden of justification if they seek to persuade DOE to accept risk in excess of the outer boundaries of what the guidelines indicate to be preferable.

that would otherwise merit full consideration for a loan guarantee under these guidelines will, because of DOE's self-imposed ceiling on loan guarantee commitments, have to await full consideration under future solicitations issued under the final regulations. To accommodate concerns of Project Sponsors whose proposals are deferred full consideration because they either exceed or comprise a substantial amount of the total loan guarantee commitments available under the first solicitation, DOE will consider whether such proposals should be afforded expedited consideration under the final regulations, when adopted.

Finally, please note that the solicitation issued in conjunction with these guidelines addresses many important aspects of the application process, including the relevant period of time during which Pre-Applications for loan guarantees may be filed. Because each project will be unique and each loan guarantee potentially subjects the Federal government to significant financial liability, DOE plans to engage in a rigorous review of a proposed project before determining that it may be eligible for a loan guarantee or subsequently approving and issuing a loan guarantee.

National Environmental Policy Act (NEPA)

Through the issuance of these guidelines DOE is making no decision relative to the approval of a loan guarantee for a particular proposed project. DOE has therefore determined that publication of the policy guidelines is covered under the Categorical Exclusion found at paragraph A.6 of Appendix A to Subpart D, 10 CFR Part 1021, which applies to the establishment of procedural rulemakings. Accordingly, neither an environmental assessment nor an environmental impact statement is required at this time. However, appropriate NEPA project review will be conducted prior to execution of a Loan Guarantee Agreement.

Review Under the Paperwork Reduction Act

These guidelines provide that Pre-Applications submitted to DOE in response to the solicitation and Applications, if invited by DOE, should contain certain information. This collection of information must be approved by the Office of Management and Budget pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) and the procedures implementing that Act, 5 CFR 1320.1 *et seq.* DOE is requesting emergency processing of the Paperwork Reduction Act Submission for this collection of information pursuant to 5 CFR 1320.13. DOE is requesting that OMB approve the collection of information prior to the issuance of the solicitation. This emergency collection will be valid for 180 days. Shortly after OMB's approval of the emergency collection, DOE will issue a notice seeking public comment on the information collection and will submit the proposed collection of information to OMB for approval pursuant to 44 U.S.C. 3507(a). An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number.

Issued in Washington, DC, on August 8, 2006.

James T. Campbell,

Acting Chief Financial Officer.

Loan Guarantees for Projects That Employ Innovative Technologies; Guidelines for Proposals Submitted in Response to First Solicitation Under Title XVII of the Energy Policy Act of 2005

I. Purpose

These guidelines set forth goals and procedures that the Department of Energy (''DOE'') intends to use for receiving, evaluating, and, after consultation with the Secretary of the Treasury, approving applications for loan guarantees to support Eligible Projects under Title XVII of the Energy Policy Act of 2005.

II. Definitions

As used in these guidelines:

A. *''Act''* means Title XVII of the Energy Policy Act of 2005 (42 U.S.C. 16511–16514).

B. *''Administrative Cost of Issuing a Loan Guarantee''* means the combined total of all of the administrative expenses that DOE incurs during:

1. The evaluation of a Pre-Application and an Application for a loan guarantee;
2. The offering, negotiation, and closing of a loan guarantee; and
3. The servicing of the loan guarantee and monitoring the progress of a project benefiting from a loan guarantee issued by DOE.

Payment of the Administrative Cost of Issuing a Loan Guarantee, which is required to be collected by DOE under section 1702(h) of the Act, is wholly distinct and separate from payment of the Subsidy Cost.

C. *''Applicant''* means any firm, corporation, company, partnership, association, society, trust, joint venture, joint stock company, or governmental non-Federal entity, that has the authority to enter into, and is seeking, a loan guarantee issued by the Secretary for a loan or other debt obligation of an Eligible Project under the Act.

D. *''Application''* means a written submission in response to a DOE invitation to apply for a loan guarantee that DOE will solicit from Applicant after reviewing and approving a completed Pre-Application, and which should include the items listed in Section III.F. of these guidelines.

E. *''Borrower''* means any project company or entity that enters into a loan or other debt obligation for an Eligible Project.

F. *''Commercial Technology''* means a technology in general use in the commercial marketplace, but does not include a technology solely by use of such technology in a demonstration project funded by DOE.

G. *''Conditional Commitment''* means a Term Sheet offered by DOE and accepted by the Applicant, with the understanding of the parties that the Applicant thereafter satisfies all specified and precedent funding obligations, and all other contractual, statutory, regulatory or other requirements.

H. *''Credit Review Board''* means a board created by DOE in accordance with Office of Management and Budget (OMB) Circular A–129 to oversee the loan guarantee program and approve loan guarantees for individual projects.

I. *''Eligible Project''* means a project located in the United States that meets the applicable requirements of section 1703 of the Act.

J. *''Guaranteed Obligations''* means loans or other debt obligations that the Secretary guarantees under a Loan Guarantee Agreement.

K. *''Holder''* means any individual or legal entity that has lawfully succeeded in due course to all or part of the rights, title, and interest in a Guaranteed Obligation.

L. *''Lender''* or *''Eligible Lender''* means any individual or legal entity, approved by DOE, formed for the purpose of, or engaged in the business of, lending money, including, but not limited to, commercial banks, savings and loan institutions, insurance companies, factoring companies, investment banks, institutional investors, venture capital investment companies, trusts, or other entities designated as trustees or agents acting on behalf of bondholders or other lenders.

M. *''Loan Guarantee Agreement''* means a written agreement that, when entered into by a Borrower, a Lender and the Secretary pursuant to the Act after satisfaction of the conditions precedent specified in the Conditional Commitment and any other applicable contractual, statutory, and regulatory requirements, establishes the obligation of the Secretary to guarantee payment of principal and interest on specified loans or other debt obligations of a Borrower to the Lender subject to the terms and conditions specified in the Loan Guarantee Agreement. The term ''Loan Guarantee Agreement'' has the same meaning as a ''loan guarantee commitment'' (as defined in section 502(4) of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a)).

N. *''Project Costs,''* as described with greater specificity in Section VII of these guidelines, means the estimated sum of the amounts to be expended or accrued by Borrower for costs that are necessary, reasonable, and directly related to the design, construction, and startup of an Eligible Project.

O. *''Project Sponsor''* means any individual, firm, corporation, company, partnership, association, society, trust, joint venture, joint stock company or the like that assumes substantial responsibility for the development, financing, and structuring of a project eligible for a loan guarantee and owns or controls the Applicant.

P. *''Pre-Application''* means a written submission in response to a solicitation that broadly describes the project proposal, including the proposed role of a loan guarantee in the project and the eligibility of the project to receive a loan guarantee under the Act, and includes the items listed in Section III.C. of these guidelines.

Q. *''Secretary''* means the Secretary of Energy or designee.

R. *''Subsidy Cost''* has the meaning given the term ''cost of a loan guarantee'' within the meaning of section 502(5)(C) of the Federal Credit Reform Act of 1990 (2 U.S.C. 661a(5)(C)). The ''Subsidy Cost'' represents the net present value, at the time when the guaranteed loan or other debt obligation is disbursed, of the expected liability to the Federal government from issuing the loan guarantee, inclusive of estimated payments to be made by the Federal government, such as default payments, and estimated payments to be made to the Federal government such as recoveries. The Subsidy Cost amount is required by section 1702(b) of the Act to be funded either by an appropriation or by payment by Borrower. Payment of the Subsidy Cost is wholly distinct and separate from payment of the Administrative Cost of Issuing a Loan Guarantee.

S. *''Term Sheet''* means an offering document issued by DOE that specifies the general terms and conditions under which DOE anticipates it may guarantee payment of principal and accrued interest on specified loans or other debt obligations of a Borrower in connection with an Eligible Project. A Term Sheet is not a Loan Guarantee Agreement and imposes no obligation on the Secretary to execute a Loan Guarantee Agreement.

III. Loan Guarantee Application Process

A. In conjunction with these guidelines, DOE is issuing a solicitation announcement to solicit the submission by Project Sponsors of Pre-Applications for loan guarantees for projects that employ innovative technologies. The guidelines will apply to this first solicitation; all future solicitations will be issued pursuant to program regulations that DOE will promulgate at a later time.

B. The solicitation announcement issued in conjunction with these guidelines contains, among other things, the following information:

1. A brief description of the Eligible Projects for which loan guarantee applications are solicited;

2. The place and time for Pre-Application submission;

3. The name and address of the DOE representative whom potential applicants may contact to receive further information and a copy of the solicitation; and

4. The form, format and page limits applicable to the submission of a Pre-Application.

C. In response to the solicitation, interested parties are invited to submit Pre-Applications to DOE. Pre-Applications should meet all requirements specified in the solicitation; DOE does not intend to review or approve loan guarantees for proposals that do not meet the requirements provided for in the solicitation. In addition, the Pre-Application should contain the following information and documentation:

1. A completed Pre-Application form signed by an individual with full authority to bind the Project Sponsor;

2. A business plan including an overview of the proposed project including:

(a) A description of the Project Sponsors, including their experience in project investment, development, construction, operation and maintenance;

(b) A description of the technology to be utilized, including its commercial applications and social uses, the owners or controllers of the intellectual property incorporated in and utilized by such technology, and its manufacturer(s), and licensees, if any, of the technology authorized to make the technology available in the United States, and whether and how the technology is or will be made available in the United States for further commercial use;

(c) The estimated amount of the total Project Costs (including escalation and contingencies);

(d) The timeframe required for construction and commissioning of the facility; and

(e) A description of the primary off-take or revenue-generating agreement(s) that will primarily provide financial support for the project.

3. A financing plan overview describing the amount of equity to be invested and the sources of such equity, the amount of the total debt obligations to be incurred and the funding sources of all such debt, the anticipated guarantee percentage of the Government-guaranteed debt, and a financial model detailing the investments and the cash flows generated from the project over the project life-cycle;

4. An explanation of what impact the loan guarantee will have on the interest rate, debt term, and overall financing structure for the project;

5. A copy of a commitment letter from an Eligible Lender expressing its commitment to provide the required debt financing necessary to construct and fully commission the project subject to commercially reasonable conditions governing disbursement commonly included in arm's length debt financing arrangements for projects and loan amounts similar to the proposed project;

6. A copy of the equity commitment letter(s) from each of the Project Sponsors and a description of the sources for such equity;

7. An overview of how the project will comply with the eligibility requirements under section 1703 of the Act;

8. An outline of the potential environmental impacts of the project and how these impacts will be mitigated;

9. A description of the anticipated air pollution and greenhouse gas reduction benefits;

10. A description of how the proposed project advances the President's Advanced Energy Initiative; and

11. An executive summary briefly encapsulating the key project features and attributes.

D. In reviewing completed Pre-Applications, DOE intends to utilize the criteria referenced in the Act, the solicitation, and these guidelines.[4] In addition, prior to a comprehensive evaluation, an initial review of the Pre-Applications will be performed to determine the following:

1. The proposal is for an Eligible Project; and

2. The submission contains the information requested by the solicitation.

If a Pre-Application fails to meet these requirements, it may be deemed non-responsive and eliminated from further review. As part of the subsequent and more comprehensive Pre-Application review, DOE may conduct an independent review of the financial capability of an Applicant (including personal credit information of the principal(s) if there is insufficient information to assess the financial capability of the organization). In addition, DOE may ask for additional information during the review process and may request one or more meetings with the Project Sponsor(s).

E. After reviewing a completed Pre-Application, DOE will provide a written response to the Project Sponsor.[5] In this response, DOE will do one of two things. DOE will either invite an Applicant to submit a comprehensive Application for a loan guarantee and specify the amount of the Application fee that DOE has decided to assess, if any, or DOE will advise the Project Sponsor that the project proposal is ineligible for further consideration in the review process under the guidelines. Project Sponsors whose proposals are denied further review will not be barred from re-submitting an updated or revised project proposal in response to future solicitations under the final regulations to be adopted by DOE.

F. In response to an invitation to submit an Application, interested Applicants are expected to meet all requirements specified in the invitation, the solicitation and these guidelines. DOE will be expecting that the information and documentation requested, as well as the substance and content of such documentation required for the Application, will conform substantially with that produced during the course of an arm's length commercially negotiated project or commercial financing. The maturity, balance sheet and experience of the Project Sponsors, the credit rating of the Lenders and the off-take counterparties, and the scope and breadth of the security package supporting the loan are additional important factors that DOE will consider in its review of an Application.[6] An Application should include, among other things, the following information and materials:

1. A completed Application form signed by an individual with full authority to bind Applicant;

2. Payment of the Application fee, if any;

3. A detailed description of all material amendments, modifications, and additions made to the information and documentation provided in the Pre-Application, including any changes in the proposed project's financing structure or terms;

4. A description of the nature and scope of the proposed project, including key milestones, location of the project, identification and commercial feasibility of the new or significantly improved technology(ies) to be employed in the project, how Applicant intends to employ such technology(ies) in the project, and how the Applicant or others intend to assure the further commercial availability of the technology(ies) in the United States;

5. A detailed explanation of how the proposed project qualifies as an Eligible Project;

6. A detailed estimate for the total Project Costs (including escalation and contingencies), together with a description of the methodology and assumptions used;

7. An estimate of the amount of the Subsidy Cost for the project, including a description of the methodology used for this calculation and any supporting documentation;

8. A detailed description of the construction contractor(s) and equipment supplier(s), construction schedules for the project including major activity and cost milestones as well as the performance guarantees, performance bonds, liquidated damages provisions, and equipment warranties to be provided;

9. A detailed description of the operations and maintenance provider(s), the plant operating plan, estimated staffing requirements, parts inventory, major maintenance schedule, estimated annual downtime, and performance guarantees and related liquidated damage provisions, if any;

10. A description of the management plan of operations that Applicant will employ in carrying out the project, and information concerning the management experience of each officer or key person associated with the project;

11. A detailed description of the project decommissioning, deconstruction and disposal plan and the anticipated costs associated therewith;

12. An analysis of the market for the product(s) to be produced by the project, including relevant economics justifying the analysis, and copies of any contractual agreements for the sale of these products or assurance of the revenues to be generated from sale of these products;

13. A detailed description of the overall financial plan for the proposed project, including all sources of funding, equity, and debt, and the liability of parties associated with the project over the lifetime of the requested loan guarantee;

14. A copy of all loan documents that Borrower and Lender will sign if the Application for a loan guarantee is approved, containing all of the terms and conditions of the loan or other debt obligations to be guaranteed, including the proposed amount of the loan, interest charges, repayment position, principal repayment schedule, fees, pre-payment and late payment penalties, and cure rights;

15. A copy of all material agreements, whether entered into or proposed, relevant to the investment, construction and commissioning of the project;

16. A copy of the financial closing checklist for the equity and debt;

17. Applicant's business plan on which the project is based and project pro forma statements for the proposed life of the loan guarantee, including income statements, balance sheets, and cash flows. All such statements should include assumptions made in their preparation and the range of revenue, operating cost, and credit assumptions considered;

18. Financial statements for the past three (3) years that have been audited by an independent certified public accountant, including all associated notes, as well as interim financial statements and notes for the current fiscal year, of Applicant and parties relevant to Applicant's financial backing, together with business and financial interests of principal organizations, if appropriate, such as parent and subsidiary corporations or partners of Applicant;

[4] While these factors are designed for review of Pre-Applications, DOE intends to use these factors, as appropriate, in reviewing Applications as well.

[5] While DOE intends to review Applicant's written submission, neither the Pre-Application nor any written or other feedback that DOE may provide in response to the Pre-Application is intended to obviate the need for an Application. In addition, any response that DOE may provide to a Pre-Application or subsequent Application does not obligate DOE to issue a loan guarantee for a project; only a duly executed Loan Guarantee Agreement may contractually obligate DOE to guarantee any loan or other debt obligations.

[6] Additional factors that DOE expects to consider when reviewing Applications are described in Section IV of these guidelines.

19. A copy of all legal opinions, engineering reports, and other material reports, analysis, and reviews related to the project;

20. Credit history of Applicant and, if appropriate, any party who owns or controls a five percent or greater interest in the project or the Applicant;

21. A preliminary credit assessment for the project without a loan guarantee from a nationally recognized rating agency;

22. A list of all project-related applications filed and approvals issued by Federal, state, and local government agencies for permits and authorizations to site, construct, and operate the project. If still outstanding, the Application should contain an estimated date of completion for any required filings and approvals;

23. A report containing an analysis of the potential environmental impacts of the project that will enable DOE to assess whether the project will comply with all applicable environmental requirements and how and to what measurable extent the project avoids, reduces, or sequesters air pollutants or anthropogenic emissions of greenhouse gases, including how Borrower intends to verify those benefits;

24. A listing of assets associated, or to be associated, with the project and any other asset that will serve as collateral for the guaranteed loan and assure repayment of the loans and other debt obligations of the project, including appropriate data as to the value and useful life of any physical assets and a description of any other associated security and its value. With respect to any ownership interest in a real property asset described above or any pledged asset that is not part of the project, an appraisal should be performed by state licensed or certified appraisers that is consistent with the ''Uniform Standards of Professional Appraisal Practice,'' promulgated by the Appraisal Standards Board of the Appraisal Foundation;

25. An analysis demonstrating that at the time of the Application, there is a reasonable prospect that Borrower will be able to repay the loan or other debt obligation to be guaranteed (including interest) according to its terms, and a complete description of the operational and financial assumptions on which this demonstration is based;

26. Written affirmation from an officer of the Lender confirming that Lender is an Eligible Lender in good standing with DOE's and other agencies' loan guarantee programs; and

27. Such other information requested in the solicitation or invitation to submit an Application necessary for a complete assessment of the loan guarantee application for the project.

G. Following Applicant's submission of an Application, DOE will review the Application based on the factors mentioned in subsection F of Section III and Section IV of the guidelines. If the Credit Review Board determines that a project may be suitable for a loan guarantee, because, among other things, it qualifies as an Eligible Project, there exists a reasonable expectation of payment based on the materials provided in the Application, and the proposed project will advance the President's Advanced Energy Initiative, DOE may notify the Borrower and Lender in writing and provide them with a copy of a proposed Term Sheet. In the event that DOE reviews an Application and decides not to proceed further with the issuance of a proposed Term Sheet, DOE will inform Applicant in writing the reason(s) for the denial.

H. Concurrent with the review process described above, DOE will consult with the U.S. Department of Treasury regarding the terms and conditions of the potential loan guarantee and will work with OMB to determine the Subsidy Cost for a potential loan guarantee based on the particular set of terms and conditions associated with the project. OMB will ultimately review and approve the final determination of the Subsidy Cost.

I. Subsequent to any negotiations and revisions of the proposed Term Sheet including the Subsidy Cost in accordance with subsection H of Section III of the guidelines, the Term Sheet becomes a Conditional Commitment if, and only if, both DOE and Applicant agree to the proposed terms and conditions and sign the Term Sheet. Among other things, the Conditional Commitment will specify the required payment of fees for the Administrative Cost of Issuing a Loan Guarantee. Subsequent to entering into a Conditional Commitment, and upon agreement as to the detailed terms and conditions to be contained in the Loan Guarantee Agreement and other related documents, as well as availability of authority provided in an appropriations act for the loan guarantee, and fulfillment of other applicable statutory, regulatory, or other requirements, the Credit Review Board will set a closing date. DOE will enter into a Loan Guarantee Agreement with an Applicant that satisfies the specified conditions precedent if and only if all funding and other contractual, statutory and regulatory requirements have been satisfied.

J. Prior to the closing date, the Secretary will ensure that:

1. Pursuant to section 1702(b) of the Act, Congress has made an appropriation for the Subsidy Cost of the loan guarantee, or that the Secretary will receive payment in full from the Borrower as part of the closing and Congress has provided sufficient additional authority in an appropriations act;

2. Pursuant to section 1702(h) of the Act, and in accordance with Section V.R. of these guidelines, the Secretary has received from Borrower payment of a fee for DOE's Administrative Cost of Issuing a Loan Guarantee or will receive payment of the fee as part of the closing;

3. The Director of OMB has reviewed and approved DOE's calculation of the Subsidy Cost of the loan guarantee;

4. The Secretary of the Treasury has been consulted as to the terms and conditions of the Loan Guarantee Agreement;

5. The Loan Guarantee Agreement and related documents contain all terms and conditions the Secretary deems reasonable and necessary to protect the interests of the United States; and

6. All conditions precedent specified in the Conditional Commitment have either been satisfied or waived by the Secretary and all other applicable contractual, statutory, and regulatory requirements have been satisfied.

IV. Evaluation of Applications

In evaluating Applications invited for submission, DOE plans to consider the following factors: [7]

A. Whether the Application is complete, signed by the appropriate entity or entities with the authority to bind the Project Sponsor and other relevant parties to the agreement, and complies with the eligibility requirements stated in the Act, these guidelines, and the solicitation;

B. Whether the Application contains sufficient information, including a detailed description of the nature and scope of the project and the nature, scope, and risk coverage of the loan guarantee sought, to enable DOE to perform a thorough assessment of the project;

C. Whether and to what measurable extent the project avoids, reduces, or sequesters air pollutants or anthropogenic emissions of greenhouse gases;

D. Whether the new or significantly improved technology to be employed in the project, as compared to commercial technologies in service in the United States at the time the guarantee is

[7] While these factors are designed for review of Applications, DOE intends to use these factors, as appropriate, in reviewing Pre-Applications as well:

issued, is ready to be employed commercially in the United States, can yield a commercially viable product(s) in the use proposed in the project, and is or will be available for further commercial use in the United States;

E. Whether the project will advance the goals of the President's Advanced Energy Initiative;

F. Whether the requested amount of the loan guarantee is reasonable relative to the nature and scope of the project;

G. The extent to which Project Costs are funded by guaranteed debt;

H. The extent to which Applicant and other principals involved in the project have made a significant equity commitment to the project;

I. Whether the project will be ready for full deployment and operations in the proximate future;

J. Whether there is sufficient evidence that Applicant will initiate and complete the project in a timely, efficient, and acceptable manner;

K. Whether and/or to what extent Applicant will rely upon other Federal and non-Federal governmental assistance (grants, tax credits, other loan guarantees, etc.) to support the financing and construction and/or operation of the project;

L. Whether there is reasonable assurance that the project is economically feasible and will produce sufficient revenues to service the project's debt obligations over the life of the loan guarantee and assure timely repayment of guaranteed loans and other debt obligations;

M. Whether the collateral, warrantees, and other assurance of repayment described in the Application provide adequate safeguard to the Federal government in the event of default;

N. Whether Applicant possesses the capacity and expertise to successfully operate the project, based on factors such as financial soundness, management organization, and the nature and extent of corporate and personnel experience;

O. Whether the project will comply with all applicable laws and regulations, including all applicable environmental statutes and regulations;

P. Whether the levels of market, regulatory, legal, financial, technological, and other risks associated with the project are appropriate for a loan guarantee provided by DOE;

Q. Whether the entity issuing the loan or other debt obligation subject to the loan guarantee is an Eligible Lender; and

R. Such other criteria that the Secretary and the Credit Review Board deem relevant in evaluating the merits of an Application.

V. Findings by the Secretary

Prior to the issuance by DOE of a loan guarantee, the Secretary should ensure that Applicant satisfies the following requirements and conditions (some or all of which should be specified in the Loan Guarantee Agreement):

A. The project qualifies as an Eligible Project under the Act;

B. The project will be constructed and operated in the United States and the technology is or is likely to be available in the United States for further commercial application;

C. The debt guaranteed by DOE is limited to no more than 80 percent of total Project Costs;

D. The amount of the loan guarantee does not exceed 80 percent of the total face value of the loan or other debt obligation of the project, or provides sufficient evidence to support a guarantee exceeding 80 percent (but in no event 100 percent);

E. Applicant and other principals involved in the project have made a significant equity investment;

F. The prospective Borrower is obligated to make full repayment of the guaranteed loan over a period of up to the lesser of 30 years or 90 percent of the projected useful life of the project's major physical assets, as calculated in accordance with generally accepted accounting principles and practices;

G. The loan guarantee does not finance, either directly or indirectly, a Federally tax-exempt obligation. Accordingly, the loan guarantee may not be used for a Federally tax-exempt obligation or serve as collateral to secure a tax-exempt obligation;

H. The guaranteed portion of a loan must not be separated from or "stripped" from the non-guaranteed portion of the loan and resold in the secondary debt market;

I. The amount of the loan guaranteed, when combined with other funds committed to the project, will be sufficient to carry out the project, including adequate contingency funds;

J. There is a reasonable prospect of repayment by Borrower of the principal and interest of the Guaranteed Obligations;

K. The prospective Borrower has pledged project assets and other collateral or surety, including non project-related assets, as determined by the Secretary to be necessary as assurance for the repayment of the loan;

L. The Loan Guarantee Agreement and related documents include detailed terms and conditions as appropriate to protect the interests of the United States in the case of default, including ensuring availability of all the intellectual property rights, technical data including software, and physical assets necessary for any person selected, including, but not limited to, the Secretary, to complete and operate the defaulting project;

M. The Borrower's interest rate on the guaranteed loan is determined by the Secretary to be reasonable, taking into account the range of interest rates prevailing in the private sector for similar Federal government guaranteed obligations of comparable risk;

N. The guaranteed loan is not subordinate to any loan or other debt obligation for the project not part of the Guaranteed Obligations and is in a first lien position regarding all assets of the project and all collateral security pledged;

O. There is satisfactory evidence that Borrower is willing, competent, and capable of performing the terms and conditions of the loan or other debt obligation and the loan guarantee;

P. The Lender is not a Federal entity, possesses sufficient financial wherewithal and expertise, and will exercise the requisite standard of care as deemed necessary by the Secretary and stated in DOE's lender eligibility criteria in Section VI of these guidelines;

Q. Lender or other parties servicing the loan and monitoring the project should be satisfactory to the Secretary. In addition, the Secretary will need to find that the Lender and other appropriate parties will exercise a high level of care and diligence in the establishment and enforcement of the conditions precedent to all loan disbursements and the Borrower covenants throughout the term of the loan and that each Lender will be required to diligently perform its duties in the servicing and collection of the loan as well as in ensuring that the collateral package securing the loan remains uncompromised. The Lender will also provide annual or more frequent periodic financial reports on the status and condition of the loan, and is required to promptly notify DOE if it becomes aware of any problems or irregularities concerning the project or the ability of the Borrower to make payment on the loan or other debt obligations. Even though DOE will rely on Lender (or other servicer) to service and monitor the loan with utmost care and expertise, Lender's responsibilities with regard to the loan are separate from DOE's own monitoring and review of the loan and the project;

R. As specified in the Conditional Commitment, the prospective Borrower makes payment of the fee for the Administrative Cost of Issuing a Loan Guarantee pursuant to section 1702(h) of the Act. While covering the other costs included in the Administrative Cost of Issuing a Loan Guarantee, this payment will not include the servicing and monitoring costs identified in Section II.B. of these guidelines. These latter costs will be assessed in accordance with the Loan Guarantee Agreement which will require payment of administrative fees to the Federal government by Borrower, either directly or through the Lender, periodically thereafter for the duration of the loan guarantee. DOE intends to use all of the fees mentioned above to defray administrative expenses associated with issuing and monitoring loan guarantees;

S. If Borrower is to make payment in full for the Subsidy Cost of the loan guarantee pursuant to section 1702(b)(2) of the Act, such payment must be received by the Secretary prior to, or at the time of, closing;

T. DOE representatives have access to the project site at all reasonable times in order to monitor the performance of the project;

U. DOE and Borrower have reached an agreement as to what project information will be made available to DOE and which project information will be made publicly available;

V. The prospective Borrower has filed applications for or obtained any required regulatory approvals for the project and is in compliance with all Federal and state regulatory requirements;

W. Applicant has no delinquent Federal debt, including tax liabilities, unless the delinquency has been resolved with the appropriate Federal agency in accordance with the standards of the Debt Collection Improvement Act of 1996; and

X. The Loan Guarantee Agreement contains such other terms and conditions as the Secretary deems reasonable and necessary to protect the interests of the United States.

VI. Lender Eligibility

Lenders associated with a project should meet the following requirements:

A. The Lender is a ''non-Federal qualified institutional buyer,'' as defined in 17 CFR 230.144A(a), including qualified retirement plans and governmental plans;

B. The Lender is not a party debarred or suspended from participation in a Federal government contract (under 48 CFR 9.4) or participation in a non-procurement activity (under a set of uniform regulations implemented in agency regulations for numerous agencies, including DOE, at 10 CFR 1036);

C. The Lender is not delinquent on any Federal debt or loan;

D. The Lender is duly organized and legally authorized to enter into the transaction;

E. The Lender is able to demonstrate experience in originating and servicing loans for commercial deals similar in size and scope with the project under consideration; and

F. The Lender is able to demonstrate experience or capability as the lead lender or underwriter of other energy related projects.

VII. Project Costs

A. In conjunction with the Secretary's determination of the Project Costs associated with the issuance of a loan guarantee, Applicant should record such costs in accordance with generally accepted accounting principles and practices. Applicant should calculate the sum of reasonable and customary costs that it has paid and expects to pay, and which are directly related to the project, to estimate the total sum of Project Costs. Project Costs may include, but are not limited to:

1. Costs of acquisition, lease or rental of real property, including engineering fees, surveys, title insurance, recording fees, and legal fees incurred in connection with land acquisition, lease or rental, site improvements, site restoration, access roads, and fencing;

2. Engineering, architectural, legal and bond fees, and insurance paid in connection with construction of the facility; and materials, labor, services, travel and transportation for facility construction, startup, and tests;

3. Equipment purchase and startup testing;

4. Costs to provide equipment, facilities, and services related to safety and environmental protection;

5. Financial and legal services costs, including other professional services and fees necessary to obtain required licenses and permits and to prepare environmental reports and data;

6. Interest costs and other normal charges affixed by lenders;

7. Necessary and appropriate insurance and bonds of all types;

8. Costs of startup, commissioning and shakedown;

9. Costs of obtaining licenses to intellectual property necessary to design, construct, and operate the project; and

10. Other necessary and reasonable costs approved by the Secretary.

B. Applicant should not record the following costs as Project Costs associated with the loan guarantee:

1. Fees and commissions charged to Borrower, including finder fees, for obtaining Federal funds;

2. Parent corporation's general and administrative expenses, and non-project related parent corporation assessments, including organizational expenses;

3. Goodwill, franchise, trade, or brand name costs;

4. Dividends and profit sharing to stockholders, employees, and officers;

5. Research, development, and demonstration costs of readying the energy technology for employment in a commercial project;

6. Costs that are excessive or are not directly required to carry out the project, as determined by the Secretary;

7. Administrative Cost of Issuing a Loan Guarantee paid by the Borrower;

8. The Subsidy Cost of the loan guarantee; and

9. Operating expenses incurred after startup, commissioning and shakedown.

VIII. Principal and Interest Assistance Contract

With respect to any Guaranteed Obligation, the Secretary may enter into a contract to pay Holders, for and on behalf of Borrower, from funds appropriated for that purpose, the principal and interest charges that become due and payable on the unpaid balance of the Guaranteed Obligation, if the Secretary finds that:

A. Borrower is unable to meet the payments and is not in default;

B. Borrower will, and is financially able to, continue to make the scheduled payments on the remaining portion of the principal and interest due under the non-guaranteed portion of the debt obligation, or an arrangement, approved by the Secretary, has otherwise been agreed to avoid an impending payment default;

C. It is in the public interest to permit Borrower to continue to pursue the purposes of the project;

D. In paying the principal and interest, the Federal government expects a probable net benefit greater than it would receive in the event of a default;

E. The payment authorized is no greater than the amount of principal and interest that Borrower is obligated to pay under the agreement being guaranteed; and

F. Borrower agrees to reimburse the Secretary for the payment (including interest) on terms and conditions that are satisfactory to the Secretary and executes all written contracts required by the Secretary for such purpose.

IX. Full Faith and Credit

As specified in the Act, the United States pledges its full faith and credit to the payment of all Guaranteed Obligations with respect to principal and interest under the terms and conditions of the Loan Guarantee Agreement.

X. Default/Audit

As required by sections 1702(g)(1)(A) and 1702(i)(1) of the Act, DOE in the near future will issue regulations pertaining to default and audit requirements that will apply to any loan guarantee issued, and Loan Agreement executed, by DOE.

[FR Doc. E6–13268 Filed 8–11–06; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

[Docket ID: ERRE–BT–2006–WAV–0140]

Energy Conservation Program for Consumer Products: Publication of the Petition for Waiver of Peerless Boilers Heat, LLC From the Department of Energy Residential Furnace and Boiler Test Procedures

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of Petition for Waiver and request for comments.

SUMMARY: Today's notice publishes a Petition for Waiver from Peerless Boilers Heat, LLC (PB). This petition (hereafter ''PB Petition'') request a waiver from the Department of Energy's (hereafter ''Department'' or ''DOE'') test procedures for residential furnaces and boilers. Today's notice also includes an alternate test procedure PB has requested DOE to include in the Decision and Order, should the Department grant PB a waiver. The Department is soliciting comments, data, and information with respect to the PB Petition and the proposed alternate test procedure.

DATES: The Department will accept comments, data, and information regarding this Petition for Waiver until, but no later than September 13, 2006.

ADDRESSES: Please submit comments, identified by Docket ID number: EERE–BT–2006–WAV–0140, by any of the following methods:

- *Mail:* Ms. Brenda Edwards-Jones, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Mailstop EE–2J, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–2945. Please submit one signed original paper copy.
- *Hand Deliver/Courier:* Ms. Brenda Edwards-Jones, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Room 1J–018, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585–0121.
- *E-mail: PBPetitiion@ee.doe.gov.* Include either the Docket ID number: EERE–BT–2006–WAV–0140, and/or ''PB Petition'' in the subject line of the message.
- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.

Instructions: All submissions received must include the agency name and case number for this proceeding. Submit electronic comments in Microsoft Word, WordPerfect, PDF, or text (ASCII) file format and avoid the use of special characters or any form of encryption. Wherever possible, include the electronic signature of the author. Absent an electronic signature, comments should electronically must be followed and authenticated by submitting the signed original paper document. The Department does not accept telefacsimiles (faxes). Any person submitting written comments must also send a copy of such comments to the petitioner. (10 CFR 430.27(b)(1)(iv)). The contact information for the petitioner in today's notice is: Mr. Jeffrey K. Alexander, Vice President, PB Heat, LLC, 9th & Rothermel Drive, P.O. Box 447, New Berlinville, PA 19545–0477.

According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit two copies: One copy of the document including all the information believed to be confidential, and one copy of the document with the information believed to be confidential deleted. The Department will make its own determination about the confidential status of the information and treat it according to its determination.

Docket: For access to the docket to read the background comments relevant to this matter, go to the U.S. Department of Energy, Forrestal Building, Room 1J–018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Available documents include the following items: This notice, public comments received, the PB Petition, and prior Department rulemakings regarding residential furnace and boilers. Please call Ms. Brenda Edwards-Jones at the above telephone number for additional information regarding visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: Mohammed Khan, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Mail Stop EE–2J, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–9611; E-mail: *Mohammed.Khan@ee.doe.gov;* or Thomas DePriest, Esq., U.S. Department of Energy, Office of General Counsel, Mail Stop GC–72, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–9507; E-mail: *Thomas.DePriest@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

I. Background and Authority

Title III of the Energy Policy and Conservation Act (EPCA) sets forth a variety of provisions concerning energy efficiency. Part B of Title III (42 U.S.C. 6291–6309) provides for the ''Energy Conservation Program for Consumer Products other than Automobiles.'' It specifically provides for definitions, test procedures, labeling provisions, energy conservation standards, and the authority to require information and reports from manufacturers. With respect to test procedures, Part B generally authorizes the Secretary of Energy to prescribe test procedures that are reasonably designed to produce results which reflect energy efficiency, energy use and estimated operating costs, and that are not unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) EPCA provides that the Secretary of Energy may amend test procedures for consumer products if the Secretary determines that amended test procedures would more accurately reflect energy efficiency, energy use and estimated operating costs, and that they are not unduly burdensome to conduct. (42 U.S.C. 6293(b))

Today's notice involves residential products covered under Part B. The PB Petition requests a waiver from the residential furnace and boiler test procedures for PB's PO–50, PO–60, PO–63 and PO–73 models of oil-fired boilers. The test procedures for residential furnaces and boilers appear at 10 CFR Part 430, Subpart B, Appendix N.

The Department's regulations contain provisions allowing a person to seek a information collection documents from the General Services Administration, FAR Secretariat (VPR), Room 4041, 1800 F Street, NW, Washington, DC 20405, telephone (202) 501–4755. Please cite OMB Control No. 9000–0144, Payment by Electronic Funds Transfer, in all correspondence.

Dated: August 15, 2008.

Al Matera,

Director, Office of Acquisition Policy.

[FR Doc. E8–19669 Filed 8–22–08; 8:45 am]

BILLING CODE 6820–EP–S

DEPARTMENT OF ENERGY

Notice of Intent To Prepare an Environmental Impact Statement and Notice of Wetlands Involvement for the Abengoa Biorefinery Project Near Hugoton, KS (DOE/EIS 0407)

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy (DOE).

ACTION: Notice of intent to prepare an environmental impact statement, conduct a public scoping meeting, and opportunity for public comment; Notice of Wetlands Involvement.

SUMMARY: The U.S. Department of Energy (DOE) announces its intent to prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508), and the DOE NEPA regulations (10 CFR Part 1021) to assess the potential environmental impacts of a project proposed by Abengoa Bioenergy Biomass of Kansas, LLC (ABBK), to construct and operate a biomass-to-ethanol and energy facility near Hugoton, Kansas (hereinafter termed ''Abengoa Biorefinery Project'' or the ''Project''). DOE's proposed action is to provide cost-share Federal funding to ABBK to construct and operate the Project. DOE is issuing this Notice of Intent to inform the public about the proposed action; announce plans to conduct a public scoping meeting; invite public participation in the scoping process; and solicit public comments for consideration in establishing the scope of the EIS, including the range of reasonable alternatives and the potential environmental impacts to be analyzed.

DATES: The public scoping period begins on August 25, 2008, and will continue through October 9, 2008. DOE will consider all comments received or postmarked by October 9, 2008, in defining the scope of this EIS. Comments received or postmarked after that date will be considered to the extent practicable. A public scoping meeting will be held in Memorial Hall at the Stevens County Courthouse, Hugoton, Kansas, on September 10, 2008 from 6 p.m. to 8 p.m. Written and oral comments will be given equal weight.

ADDRESSES: Written comments on the scope of the EIS should be directed to Kristin Kerwin at the U.S. Department of Energy Golden Field Office, 1617 Cole Boulevard, Golden, Colorado 80401. You may also contact Ms. Kerwin by telephone at 303–275–4968, fascimilie at 303–275–4790, or e-mail: *kristin.kerwin@go.doe.gov*. Envelopes and the subject line of e-mails should be labeled ''Abengoa EIS Scoping Comments.''

The public scoping meeting will be held on September 10, 2008 from 6 p.m. to 8 p.m. at the following location: Memorial Hall, Stevens County Courthouse, 200 East 6th St., Hugoton, Kansas 67951–2606.

FOR FURTHER INFORMATION CONTACT: For information on the proposed project, information on how to comment, or to receive a copy of the draft EIS when it is issued, contact Kristin Kerwin by any of the means described in the **ADDRESSES** section above.

For further information on the DOE Office of Energy Efficiency and Renewable Energy Integrated Biorefinery Program, contact Jacques Beaudry-Losique, Biomass Program Manager, U.S. Department of Energy, 1000 Independence Avenue, SW., EE–2E, 5H–021, Washington, DC 20585, telephone: 202–586–5188, facsimile: 202–586–1640, e-mail: *eere_biomass@ee.doe.gov*.

For general information on the DOE NEPA process, please contact: Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC–20), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0103; e-mail: *AskNEPA@hq.doe.gov*; telephone: 202–586–4600; leave a message at 1–800–472–2756; or facsimile: 202–586–7031.

SUPPLEMENTARY INFORMATION:

Background and Need for Agency Action: The Energy Policy Act of 2005 (EPAct 2005), Section 932, directs the Secretary of Energy to conduct a program of research, development, demonstration, and commercial application for bioenergy, including, integrated biorefineries that may produce biopower, biofuels, and bioproducts. Section 932 provides that ''the goals of the biofuels and bioproducts programs shall be to develop, in partnership with industry and institutes of higher education—

(1) Advanced biochemical and thermochemical conversion technologies capable of making fuels from lignocellulosic feedstocks that are price-competitive with gasoline or diesel in either internal combustion engines or fuel cell-powered vehicles;

(2) Advanced biotechnology processes capable of making biofuels and bioproducts with emphasis on development of biorefinery technologies using enzyme-based processing systems;

(3) Advanced biotechnology processes capable of increasing energy production from lignocellulosic feedstocks, with emphasis on reducing the dependence of industry on fossil fuels in manufacturing facilities; and

(4) Other advanced processes that will enable the development of cost-effective bioproducts, including biofuels.''

Section 932(d) provides that ''the Secretary shall carry out a program to demonstrate the commercial application of integrated biorefineries. The Secretary shall ensure geographical distribution of biorefinery demonstration under this subsection. The Secretary shall not provide more than $100,000,000 under this subsection for any single biorefinery demonstration. In making awards under this subsection, the Secretary shall encourage—

(A) The demonstration of a wide variety of lignocellulosic feedstocks;

(B) The commercial application of biomass technologies for a variety of uses, including—

i. Liquid transportation fuels;

ii. High-value biobased chemicals;

iii. Substitutes for petroleum-based feedstocks and products; and

iv. Energy in the form of electricity or useful heat; and

(C) The demonstration of the collection of treatment of a variety of biomass feedstocks.''

Section 932(d) further directs the Secretary to solicit proposals for demonstration of advanced biorefineries and to select only proposals that demonstrate economic viability without Federal subsidy after initial construction costs are paid and for projects that are replicable.

In implementing section 932, DOE's goal is to demonstrate that commercial-scale integrated biorefineries that use a wide variety of lignocellulosic feedstocks (biomass), can operate profitably once constructed, and can be replicated. Lignocellulosic feedstock includes energy crops, corn fiber, wood wastes, agricultural wastes such as corn stover, and certain municipal solid wastes. DOE notes that, while the refining process for ethanol from biomass is more complex than the refining process for ethanol derived from grain, cellulosic ethanol can yield a greater net energy benefit and result in lower greenhouse gas emissions.

Accordingly, DOE issued a funding opportunity announcement for the construction and operation of commercial-scale integrated biorefineries intended to demonstrate the use of a wide variety of cellulosic feedstocks. On February 28, 2007, DOE announced the selection of six biorefinery projects for negotiation of financial assistance awards. In that announcement, DOE proposes to invest up to $385 million in the six projects over the next four years.

Abengoa Bioenergy Biomass of Kansas, LLC (ABBK) of Chesterfield, Missouri, was one of the six applicants competitively selected for negotiation of award under DOE's funding opportunity announcement. Abengoa proposed an innovative approach to biorefinery operations that involves production of a biofuel and of energy in the form of steam that can be used to meet energy needs and displace fossil fuels such as coal and natural gas. In addition, siting the facility in Kansas would qualify Abengoa for state tax credits for biofuels, which would make the biorefinery a more viable commercial operation.

DOE granted an initial award to ABBK to advance the conceptual design; to initiate the permitting process; and to support an environmental review under NEPA for ABBK's proposed biomass-to-ethanol-and-energy facility near Hugoton, KS. DOE requires that ABBK fulfill these design, permitting, and environmental review obligations prior to deciding whether to cofund the construction and operation phase of the project. The total anticipated cost of this initial work is $37.5 million of which DOE is funding 40% ($15 million) and ABBK is providing 60% ($22.5 million).

As described below, DOE is now proposing to negotiate a second financial assistance agreement for approximately $61 million for the construction and operation of the biomass to ethanol facility, whose anticipated total cost is approximately $190.5 million.

ABBK is also planning to construct and operate a traditional grain-to-ethanol production facility at the same site that would integrate the biomass-to-ethanol facility into the overall facility. This grain-to-ethanol facility would use a traditional starch conversion process to produce ethanol from grain feedstocks (sorghum or corn) along with distillers grains with solubles, which is a product. While the traditional grain-to-ethanol facility would be constructed and operated with private funds, DOE plans to analyze the traditional grain-to-ethanol facility as a connected action in the EIS.

Proposed Action: DOE is proposing to provide approximately $61 million in Federal funding to ABBK for the construction and operation of a commercial-scale biomass-to-ethanol and energy facility near Hugoton, KS. The total estimated cost (beyond the initial award) for construction and operation of the biomass-to-ethanol portion of the project is approximately $190.5 million.

The biomass-to-ethanol facility would process 400 dry metric tons per day of biomass to produce approximately 12 million gallons per year (MGPY) of denatured ethanol. The biomass-to-ethanol facility would utilize an enzymatic hydrolysis process for converting biomass feedstocks to ethanol and co-products, and a gasification technology to convert biomass to synthesis gas. Biomass feedstock would be supplied from waste products from the production of crops produced within a 30 mile radius of the facility, and may include sorghum stubble, corn stover, switchgrass, and other opportunity feedstocks that are available in the area.

The traditional grain-to-ethanol process would use 32 million bushels of grain (sorghum and corn) to produce approximately 88 MGPY of denatured ethanol annually, two-thirds of which (i.e. that derived from sorghum) would qualify as *Advanced Biofuels* under Section 207 of the Energy Independence and Security Act of 2007 (EISA) (Per EISA, *Advanced Biofuels* includes all biofuels except corn-based ethanol). Solids from the process will be converted to animal feed, resulting in the production of up to 781,800 tons per year wet distillers grain with solubles (WDGS). The facility will have the capability to dry up to 50 percent of the WDGS, producing a maximum of 152,000 tons per year of dried distiller's grains with solubles (DDGS). The difference between the two sources of animal feed is moisture; DDGS contains approximately 10 percent moisture while WDGS contains approximately 65 percent moisture.

The overall integrated biorefinery, comprising both the proposed biomass-to-ethanol facility and the grain-to-ethanol facility, would be capable of producing about 100 MGPY of denatured ethanol and would be located on approximately 800 acres, which includes the combined facility footprint of about 385 acres and a buffer area between the proposed biorefinery and the City of Hugoton to the east. Hugoton has a population of about 3,700 and is located in Stevens County in southwest KS. Land use in the area is primarily agricultural in nature with cropland being the dominant use and grassland being the secondary use. The area has diverse biomass feedstocks, numerous large cattle feedlots, and a variety of grains grown locally.

The project site itself currently consists of row-cropped agricultural land and is adjoined by grain elevators, an asphalt plant, industrial park, and airport to the south; golf course and agricultural land to the west; two residences to the northwest; and agricultural cropland to the north. About 65 % of the site would qualify as prime farmland if it were irrigated. The proposed biorefinery site and additional buffer area to the east are currently zoned Agricultural, but the biorefinery location is proposed for a change to Heavy Industrial zoning.

Infrastructure required to operate the proposed biorefinery would include the following:

- Water, which would be supplied from wells on-site and near the project site utilizing water rights acquired from local owners;
- Electricity, which would be brought to the project site by Pioneer Electric from an existing substation located a few miles to the north of the project site;
- Natural gas, which would be brought through a lateral connection to one of the nearby interstate pipelines or through the local distribution company;
- Wastewater treatment—wastewater would be treated on-site, non-contact cooling water will be used for irrigation;
- Railroad service would be provided by the Cimarron Valley Short Line which runs adjacent to the project site; and
- Road access would be via a truck bypass route that the City of Hugoton intends to construct prior to the completion of the project.

During construction, truck traffic to the site would be expected to average about 30 shipments a day. During operations, truck traffic would be expected to increase to about 470 shipments a day. Most of the grain and biomass would be obtained from growers located near the proposed facility, but about 8 million tons of grain would be shipped to the facility from non-local sources each year.

Alternatives: NEPA requires that agencies evaluate reasonable alternatives to the proposed action in an EIS. To implement the requirements of

EPAct 2005, Section 932(d), in a separate, earlier proceeding DOE conducted a competitive solicitation. DOE received 24 applications in the response to the solicitation. Of these, nine did not comply with statutory requirements for eligibility under Section 932. DOE reviewed the remaining 15 applications on their merits and, having considered the objectives set forth in Section 932, selected six proposals, including ABBK's proposal for appropriate NEPA review. DOE selected ABBK's proposal for negotiation of a funding agreement in part because of its particular scale, location, and technology.

DOE will consider reasonable only alternatives to the proposed action that meet its purpose and need. Accordinly, DOE proposes to analyze the following alternatives in detail in the EIS: (1) To provide federal funding for the Abengoa Biorefinery Project as proposed by ABBK (the Proposed Action); (2) to provide federal funding for the Abengoa Biorefinery Project contingent on implementation of environmental mitigation measures, which would be determined based on the environmental impact analysis in the EIS; and (3) to not provide federal funding for the proposed project (the No Action alternative).

Preliminary Identification of Environmental Issues: The purpose of this Notice is to solicit comments and suggestions for consideration in the preparation of the EIS. As background for public comment, this Notice contains a list of potential environmental issues that DOE has tentatively identified for analysis. This list identifies resource areas that may be affected by construction and operation of the proposed Project and that DOE plans to analyze in the EIS. This list is not intended to be all-inclusive or to imply any predetermination of impacts. DOE welcomes comments on this list and other suggestions on the scope of the EIS.

1. Water Resources: Potential impacts on surface and groundwater resources and water quality, including effects of water usage, wastewater management, storm water management.
2. Potential impacts on apparent isolated wetlands at the project site.
3. Utility and transportation infrastructure requirements for delivery of feedstocks and process chemicals to the facility and distribution of products from the facility to the marketplace.
4. Land Use: Changes in land use, including the proposed site and the geographical area that will provide feedstock to the proposed facility.
5. Local and Regional Air Quality.
6. Cultural Resources: Including potential effects on historic and archaeological resources and Native American tribal resources.
7. Ecological Resources: Terrestrial and aquatic plants and animals including state and Federally listed threatened and endangered species and other protected resources.
8. Health and safety impacts: Including construction-related safety and process-related safety associated with handling and management of process chemicals.
9. Noise: Potential impacts resulting from construction and operation of the proposed plant and from transportation of feedstocks, process materials, and plant byproducts.
10. Socioeconomic impacts: Potential socioeconomic impacts of plant construction and operation, including effects on public services and infrastructure resulting from the influx of construction personnel and plant operating staff, and environmental justice issues.
11. Aesthetic and scenic resources: Potential visual effects associated with plant structures and operations.
12. Cumulative impacts that result from the incremental impacts of the proposed plant when added to the other past, present, and reasonably foreseeable future activities within the regions of influence. This may include potential impacts resulting from widespread replication of this type of technology.
13. Global Climate Change: Potential greenhouse gas emissions and impacts on global climate change that may result from this project.

Public Scoping Process: Interested agencies, organizations, Native American tribes, and members of the public are encouraged to submit comments or suggestions concerning the content of the EIS, including the range of reasonable alternatives and the potential environmental impacts to be analyzed. DOE invites oral comments and suggestions at the public scoping meeting. The public scoping period will be open until October 9, 2008.

Written comments should be sent to Kristin Kerwin as described in the **ADDRESSES** section of this Notice. The public scoping meeting will be held at the location, date, and time listed in the **DATES** and **ADDRESSES** sections of this notice. This meeting will be informal. A presiding officer designated by DOE will establish procedures governing the conduct of the meeting and an overview of the proposed Project will be provided. The meeting will not be conducted as an evidentiary hearing, and those who choose to make statements will not be cross-examined by other speakers. However, DOE representatives may ask speakers questions to help ensure that DOE fully understands their comments or suggestions. To request time to speak at the meeting, please contact Kristin Kerwin via telephone, mail, fax or e-mail as listed in the **ADDRESSES** section of this Notice. Persons may also sign up to speak before the meeting at the reception desk at the entrance to the meeting and will be provided opportunities to speak after previously scheduled speakers have spoken, as time allows. To ensure that everyone who wishes to speak has a chance to do so, five minutes will be allotted to each speaker. Depending on the number of persons requesting to speak, DOE may allow longer times for representatives of organizations. Persons wishing to speak on behalf of an organization should identify that organization when they sign up to speak.

A complete transcript of the public scoping meeting will be retained by DOE and made available to the public for review via the Golden Field Office Online Public Reading Room at: *http://www.eere.energy.gov/golden/Reading_Room.aspx* and during business hours at the Department of Energy, Freedom of Information Reading Room, Forrestal Building, Room 1E–90, 1000 Independence Avenue, SW., Washington, DC 20585–0001. Additional copies of the public scoping meeting transcripts will be made available during business hours at the following location: Stevens County Library, 500 S. Monroe Street, Hugoton, Kansas 67951.

Draft EIS Schedule and Availability: The draft EIS is scheduled to be issued in late 2008. The availability of the draft EIS will be announced in the **Federal Register** and local media. The draft EIS will be made available for public inspection at the location listed above and on the Internet. Comments on the Draft EIS will be considered in preparing the Final EIS.

Interested parties who do not wish to submit comments at this time, but who would like to receive a copy of the draft EIS should contact Kristin Kerwin as provided in the **ADDRESSES** section of this notice.

Issued in Washington, DC, on this 19th day of August, 2008.

Alexander A. Karsner,

Assistant Secretary, Energy Efficiency and Renewable Energy.

[FR Doc. E8–19633 Filed 8–22–08; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R6–ES–2008–0111; MO 9921050083–B2]

Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List the Black-tailed Prairie Dog as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 90-day petition finding and initiation of status review.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 90-day finding on a petition to list the black-tailed prairie dog (*Cynomys ludovicianus*) as threatened or endangered under the Endangered Species Act of 1973, as amended (Act). We find that the petition presents substantial scientific or commercial information indicating that listing the black-tailed prairie dog may be warranted. Therefore, with the publication of this notice, we are initiating a status review of the species to determine if listing the species is warranted. To ensure that the review is comprehensive, we are soliciting scientific and commercial information regarding this species.

DATES: To allow us adequate time to conduct a status review, we request that we receive information on or before February 2, 2009.

ADDRESSES: You may submit information by one of the following methods:

- *Federal rulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: FWS–R6–ES–2008–0111; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, Suite 222; Arlington, VA 22203.

We will not accept e-mail or faxes. We will post all information received on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see the Information Solicited section below for more information).

FOR FURTHER INFORMATION CONTACT: Pete Gober, Field Supervisor, South Dakota Fish and Wildlife Office, 420 South Garfield Avenue, Suite 400, Pierre, SD 54501; telephone at 605–224–8693, extension 224. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Information Solicited

When we make a finding that a petition presents substantial information indicating that listing a species may be warranted, we are required to promptly commence a review of the status of the species. To ensure that the status review is complete and based on the best available scientific and commercial information, we are soliciting information concerning the status of the black-tailed prairie dog. We request information from the public, other concerned governmental agencies, Tribes, the scientific community, industry, or any other interested parties concerning the status of the black-tailed prairie dog. We are seeking information regarding the species' historical and current status and distribution, its biology and ecology, ongoing conservation measures for the species and its habitat, and threats to the species or its habitat.

Please note that comments merely stating support or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act (16 U.S.C. 1533(b)(1)(A)) directs that determinations as to whether any species is a threatened or endangered species must be made ''solely on the basis of the best scientific and commercial data available.'' At the conclusion of the status review, we will issue a 12-month finding on the petition, as provided in section 4(b)(3)(B) of the Act (16 U.S.C. 1533(b)(3)(B)).

You may submit your information concerning this 90-day finding by one of the methods listed in the **ADDRESSES** section. We will not consider submissions sent by e-mail or fax or to an address not listed in the **ADDRESSES** section.

If you submit information via *http://www.regulations.gov*, your entire submission—including any personal identifying information—will be posted on the Web site. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov.*

Information and materials we receive, as well as supporting documentation we used in preparing this 90-day finding, will be available for public inspection on *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, South Dakota Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Background

Section 4(b)(3)(A) of the Act (16 U.S.C. 1531 *et seq.*) requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information to indicate that the petitioned action may be warranted. We are to base this finding on information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files at the time we make the finding. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish our notice of the finding promptly in the **Federal Register**.

Our standard for substantial information within the Code of Federal Regulations (CFR) with regard to a 90-day petition finding is ''that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted'' (50 CFR 424.14(b)). If we find that substantial information was presented, we are required to promptly commence a review of the status of the species.

In making this finding, we relied on information provided by the petitioners, as well as information readily available in our files at the time of the petition review. We evaluated the information in accordance with 50 CFR 424.14(b). Our process for making this 90-day finding under section 4(b)(3)(A) of the Act and section 424.14(b) of our regulations is limited to a determination of whether the information in the petition meets the ''substantial scientific and commercial information'' threshold.

On August 6, 2007, we received a formal petition dated August 1, 2007, from Forest Guardians (now WildEarth Guardians), Biodiversity Conservation Alliance, Center for Native Ecosystems, and Rocky Mountain Animal Defense, requesting that we list the black-tailed prairie dog throughout its historical range (and portions thereof) in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming, and in Canada and Mexico. The petitioners also requested that, if the Service believes that *Cynomys ludovicianus arizonensis* is a distinct subspecies or population segment, it be listed as threatened or endangered throughout its historical range as well. In addition, the petitioners requested that the Service designate critical habitat for the species. The petition clearly identified itself as a petition and included the requisite identification information as required in 50 CFR 424.14(a). We acknowledged receipt of the petition in a letter to the petitioners on August 24, 2007, and indicated that emergency listing of the black-tailed prairie dog was not warranted. We also explained that we would not be able to address the petition until fiscal year 2009, due to existing court orders and settlement agreements for other listing actions. However, in fiscal year 2008, funding became available, and we began work on this petition finding.

Previous Federal Actions

On October 24, 1994, we received a petition from Biodiversity Legal Foundation and Jon C. Sharps, dated October 21, 1994, to classify the black-tailed prairie dog as a Category 2 candidate species. Category 2 included taxa for which information in our possession indicated that a proposed listing rule was possibly appropriate, but we did not have available sufficient data on biological vulnerability and threats to support a proposed rule. We reviewed the petition, and on May 5, 1995, we concluded that the black-tailed prairie dog did not warrant Category 2 candidate status.

On July 31, 1998, we received a petition from the National Wildlife Federation dated July 30, 1998, to list the black-tailed prairie dog as threatened throughout its range. On August 26, 1998, we received another petition to list the black-tailed prairie dog as threatened throughout its range from Biodiversity Legal Foundation, Predator Project, and Jon C. Sharps. We accepted this second request as supplemental information to the National Wildlife Federation petition. On February 4, 2000, we announced a 12-month finding that issuing a proposed rule to list the black-tailed prairie dog was warranted but precluded by other higher priority actions (65 FR 5476), and the species was included in the list of candidate species. Two candidate assessments and resubmitted petition findings for the black-tailed prairie dog were completed on October 30, 2001 (66 FR 54808), and June 13, 2002 (67 FR 40657). On August 18, 2004, we completed a resubmitted petition finding for the black-tailed prairie dog (69 FR 51217), which concluded that listing the species was not warranted, because recent distribution, abundance, and trend data indicated that the threats to the species were not as serious as earlier believed. The species was then removed from the candidate list.

On February 7, 2007, Forest Guardians and others filed a complaint challenging the decision to remove the black-tailed prairie dog from the candidate list. On August 6, 2007, we received a new formal petition dated August 1, 2007, from Forest Guardians (now WildEarth Guardians), Biodiversity Conservation Alliance, Center for Native Ecosystems, and Rocky Mountain Animal Defense, requesting we list the black-tailed prairie dog throughout its historical range (and portions thereof) in Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming and in Canada and Mexico. The plaintiffs filed the new petition, and withdrew their 2007 complaint, on October 9, 2007.

On March 13, 2008, WildEarth Guardians filed a complaint for failure to complete a 90-day finding on their August 1, 2007 petition. On July 1, 2008, a stipulated settlement and order were signed, in which we agreed to submit a 90-day finding to the **Federal Register** by November 30, 2008. This 90-day finding is in response to the stipulated settlement.

Species Information

The black-tailed prairie dog is a member of the Sciuridae family, which includes squirrels, chipmunks, marmots, and prairie dogs. Prairie dogs constitute the genus *Cynomys.* Taxonomists currently recognize five species of prairie dogs belonging to two subgenera, all in North America (Hoogland 2006a, pp. 8–9). The white-tailed subgenus, *Leucocrossuromys*, includes Utah (*C. parvidens*), white-tailed (*C. leucurus*), and Gunnison's prairie dogs (*C. gunnisoni*) (Hoogland 2006a, pp. 8–9). The black-tailed subgenus, *Cynomys*, consists of Mexican (*C. mexicanus*) and black-tailed prairie dogs (Hoogland 2006a, pp. 8–9). Generally, the black-tailed prairie dog occurs east of the other four species in more mesic habitat (Hall and Kelson 1959, p. 365). Based on information currently available, we consider the black-tailed prairie dog a monotypic species (Pizzimenti 1975, p. 64). Information submitted by the petitioners and readily available within our files indicates that the black-tailed prairie dog is a valid taxonomic species and a listable entity under the Act. We found that *Cynomys ludovicianus arizonensis* is not considered a distinct subspecies or population segment (Pizzimenti 1975, p. 64).

The Utah and Mexican prairie dogs are currently listed as threatened (49 FR 22330) and endangered (35 FR 8495), respectively. The Gunnison's prairie dog is currently a candidate species within the montane portion of its range (73 FR 6660). The white-tailed prairie dog is undergoing formal status review to consider whether listing is warranted.

The black-tailed prairie dog is a burrowing, colonial mammal; brown in color; approximately 12 inches (30 centimeters) in length; and weighing 1–3 pounds (500–1,500 grams) (Hoogland 2006a, pp. 8–9). The black-tailed prairie dog can be distinguished from other prairie dog species by several key characteristics, which include having a longer (2–3 inches (7–10 centimeters)) black-tipped tail, being non-hibernating, and living at lower elevations (2,300–7,200 feet (700–2,200 meters)) (Hoogland 2006a, pp. 8–9). Overlap of the geographic ranges of the five species is minimal; consequently, species can be identified by locality (Hall and Kelson 1959, p. 365; Hoogland 2006a, pp. 8–9).

The black-tailed prairie dog is considered a keystone species, that is, one that is an indicator of species composition within an ecosystem, and that is key to the persistence of the ecosystem (Kotliar *et al.* 1999, pp. 183, 185). The black-footed ferret (*Mustela nigripes*), swift fox (*Vulpes velox*), golden eagle (*Aquila chrysaetos*), and ferruginous hawk (*Buteo regalis*) utilize prairie dogs as a food source; the mountain plover (*Charadrius montanus*) and burrowing owl (*Athene cunicularia*) depend on habitat (burrows) created by prairie dogs. Numerous other species share habitat with prairie dogs, and rely on them to varying degrees (Kotliar *et al.* 1999, pp. 181–182).

Several biological factors determine the reproductive potential of the black-tailed prairie dog. Females usually do not breed until their second year, live 4–5 years, and produce a single litter of an average of 3 pups annually (Hoogland 2001, p. 917; Hoogland 2006b, p. 38). Therefore, 1 female may produce 0 to 15 young in its lifetime. While the black-tailed prairie dog is not prolific in comparison to many other rodents, it is capable of rapid population increases after population reductions (Collins *et al.* 1984, p. 360; Pauli 2005, p. 17; Reeve and Vosburgh 2006, p. 144).

Historically, black-tailed prairie dogs generally occurred in large colonies that often contained thousands of individuals, covered hundreds or thousands of acres, and extended for miles (Bailey 1905, p. 90; Bailey 1932, p. 122; Ceballos *et al.* 1993, p. 109; Lantz 1903, p. 2671). Currently, most colonies are much smaller. Colonial behavior offers an effective defense mechanism by aiding in the detection of predators and by deterring predators through mobbing behavior (Hoogland 1995, pp. 3–6). It increases reproductive success through cooperative rearing of juveniles and aids parasite removal via shared grooming (Hoogland 1995, pp. 3–6).

Colonial behavior can increase the transmission of disease (Antolin *et al.* 2002, p. 122; Biggins and Kosoy 2001, p. 911; Olsen 1981, p. 236). Sylvatic plague is a disease foreign to North America that can spread from prairie dog to prairie dog through the exchange of infected fleas or by contact between infected mammals (Biggins and Kosoy 2001, p. 911) (*see* Threats Analysis, Factor C).

Species Range

The historical range of the black-tailed prairie dog included portions of 11 States, Canada, and Mexico (Hall and Kelson 1959, p. 365). The black-tailed prairie dog currently exists in 10 States—Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming. The species occurs from extreme south-central Canada to northeastern Mexico and from approximately the 98th meridian west to the Rocky Mountains. It has been extirpated from Arizona (Arizona Game and Fish Department 1988, p. 26). Range contractions have occurred in the southwestern portion of the species' range in New Mexico and Texas through conversion of grasslands to desert shrub (Pidgeon *et al.* 2001, p. 1773; Weltzin *et al.* 1997, pp. 758–760). In the eastern portion of the species' range in Kansas, Nebraska, Oklahoma, South Dakota, and Texas, range contractions are largely due to habitat destruction by cropland development (Black-footed Ferret Recovery Foundation 1999, entire).

Population Estimates

Most estimates of black-tailed prairie dog populations are not based on numbers of individual animals, but on estimates of the amount of occupied habitat. The actual number of animals present depends upon the density of animals in that locality. Density of animals varies depending on the season, region, and climatic conditions, but typically ranges from 2–18 individuals per acre (ac) (5–45 individuals per hectare (ha)) (Fagerstone and Ramey 1996, p. 85; Hoogland 1995, p. 98; King 1955, p. 46; Koford 1958, p. 10–11). Density also can vary temporally, due to poisoning, plague, and recreational shooting as discussed in later sections.

Numerous Statewide estimates of black-tailed prairie dog occupied habitat are available, spanning a time period from 1903 to the present. In Table 1, we summarize historical estimates, 1961 estimates from the Bureau of Sport Fisheries and Wildlife (BSFW) that resulted from a rangewide survey following large-scale poisoning efforts, and the most recent available estimates. Different methodologies were used at different times and in different locales to derive the various estimates presented; however, these estimates are the best available and are comparable for the purpose of determining general population trends on the scale of order-of-magnitude changes. Methods have improved in recent years with the advent of tools such as aerial survey, satellite imagery, and geographic information systems (GIS). Consequently, estimates that use these tools can be expected to be more accurate.

TABLE 1—STATEWIDE OCCUPIED HABITAT ESTIMATES FOR THE BLACK-TAILED PRAIRIE DOG

State or country	Historical acres (hectares)	1961 (BSFW) acres (hectares)	Most recent acres (hectares)
Arizona	650,000 (263,045) (Van Pelt 2007)	0	0.
Colorado	3,000,000 (1,214,056) (Clark 1989) 7,000,000 (2,832,799) (Knowles 1998).	96,000 (38,849)	631,000 (255,356); (Van Pelt 2007).
Kansas	2,000,000 (809,371) (Lantz 1903) 2,500,000 (1,011,714) (Knowles 1998).	50,000 (20,234)	130,521 (52,819); (Van Pelt 2007).
Montana	1,471,000 (595,292) (Flath & Clark 1986) 6,000,000 (2,428,113) (Knowles 1998).	28,000 (11,331)	90,000 (364,217); (Van Pelt 2007).
Nebraska	6,000,000 (2,428,113) (Knowles 1998)	30,000 (12,140)	136,991 (55,428); (Van Pelt 2007).
New Mexico	>6,640,000 (2,687,112) (Bailey 1932)	17,000 (6,879)	43,639 (17,660); (Van Pelt 2007).
North Dakota	2,000,000 (809,371) (Knowles 1998)	20,000 (8,093)	22,396 (9,063); (Van Pelt 2007).
Oklahoma	950,000 (384,451) (Knowles 1998)	15,000 (6,070)	57,677 (23,341) (Van Pelt 2007).
South Dakota	1,757,000 (711,032) (Linder et al. 1972).	33,000 (13,354)	625,410 (253,094) (Kempema 2007).
Texas	57,600,000 (23,309,892) (Bailey 1905)	26,000 (10,521)	132,515 (53,626) (Van Pelt 2007).
Wyoming	16,000,000 (6,474,970) (Knowles 1998).	49,000 (19,829)	229,607 (92,918) (Van Pelt 2007).
United States Total	78,700,000 (31,848,760) (BFFRF 1999) 102,600,000 (41,520,746) (sum of State average above).	364,000 (147,305)	2,100,000 (849,839).
Canada	2,000 (809) (Knowles 1998)		2,500 (1,011) (Everest & Tuckwell 2007).
Mexico	1,384,000 (560,084) (Ceballos et al. 1993).		>49,000 (19,829) (List 2001).
Rangewide	80,000,000–104,000,000 (32,374,851–42,087,306).		2,152,000 (870,883).

Several estimates of historically occupied habitat for all species of prairie dogs are available; the most credible estimates indicate that approximately 100,000,000 ac (40,000,000 ha) of occupied habitat existed rangewide (Anderson *et al.* 1986, p. 50; Miller *et al.* 1996, p. 24; Nelson 1919, p. 5). If average historical estimates for each State, Canada, and Mexico are summed, the rangewide estimate is approximately 104,000,000 ac (41,600,000 ha). Based on a quantification of potential habitat throughout the range of the black-tailed prairie dog and assuming a 20 percent occupancy rate (an average based on historical occupation of natural short- and mixed-grass prairie available), approximately 80,000,000 ac (32,000,000 ha) of black-tailed prairie dog occupied habitat existed historically (Black-footed Ferret Recovery Foundation 1999, entire; Ceballos *et al.* 1993, p. 109; Whicker and Detling 1988, p. 778). Therefore, a reasonable rangewide estimate of historically occupied habitat for the black-tailed prairie dog is 80–100 million ac (32–40 million ha).

In 1961, the BSFW, a predecessor of the Service, tabulated habitat estimates on a county-by-county basis throughout the range of all prairie dog species in the western United States (BSFW 1961, p. 1). These estimates were completed by District Agents for the Bureau who were familiar with the habitat due to their past control efforts. The survey was completed in response to concerns from within the agency regarding possible adverse impacts to prairie dogs following large-scale poisoning (Oakes 2000, p. 167). Although the data are from 1961, they provide a rangewide estimate for a single point in time when prairie dogs were reduced to very low numbers by intensive government poisoning efforts. The survey has been cited in other seminal documents, including Cain *et al.* (1972, Appendix VIII) and Leopold (1964, p. 38), which resulted in significant changes in predator and rodent control policies in the United States, including a ban of Compound 1080, a highly toxic poison once widely used to control prairie dogs and other mammal species.

If the most recent estimates of occupied habitat are summed for each of the States, Canada, and Mexico, the rangewide estimate is 2,152,000 ac (870,883 ha). Rangewide and Statewide trends for area of black-tailed prairie dog occupied habitat appear to be increasing since the low point following a half century of coordinated rangewide control efforts.

Trends from site-specific estimates are not always reflected in Statewide trends. Site-specific estimates are typically derived from field surveys related to monitoring or research, and include extensive ground-truthing, which provides more precise assessments. Consequently, site-specific estimates are often more accurate than Statewide estimates. However, black-tailed prairie dog monitoring and research are often focused on plague epizootics (outbreaks of disease that rapidly affect many animals in a specific area at the same time). Consequently, the trends available regarding site-specific occupied habitat estimates often include plague-affected sites (see Table 2 in Threats Analysis Factor C).

Population Impacts

Three major impacts, which somewhat overlap, have influenced historical black-tailed prairie dog populations. The first major impact on the species was the initial conversion of prairie grasslands to cropland in the eastern portion of its range from approximately the 1880s to the 1920s. The conversion of native prairie to cropland likely reduced occupied habitat in the United States from as much as 100 million ac (40 million ha) of occupied black-tailed prairie dog colonies to about 50 million ac (20 million ha) or less (Laycock 1987, p. 4; Whicker and Detling 1988, p. 778). The second major impact on the species was large-scale poisoning efforts, conducted from approximately 1918 to 1972, to reduce competition between prairie dogs and domestic livestock (BSFW 1961, p. 1). Large-scale, repeated control efforts likely reduced occupied habitat in the United States from about 50 million ac (20 million ha) to approximately 364,000 ac (162,000 ha) by 1961 (BSFW 1961). The third major impact on the species was the inadvertent introduction of an exotic disease, sylvatic plague, into North American ecosystems around 1900. The first recorded impacts on the black-tailed prairie dog were recorded in 1946 (Miles *et al.* 1952, p. 41).

Threats Analysis

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations at 50 CFR 424 set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

Under the Act, a threatened species is defined as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An endangered species is defined as a species that is in danger of extinction throughout all or a significant portion of its range. We evaluated each of the five listing factors to determine whether the level of threat identified by information in the petition or in our files was substantial and indicated that listing the black-tailed prairie dog as threatened or endangered may be warranted. Our evaluation is presented below.

We placed the threats listed in the petition under the most appropriate listing factor. However, we recognize that several potential threats affecting the species might be considered under more than one factor. For example, poisoning can affect black-tailed prairie dog habitat (Factor A), and can be affected by State and Federal regulatory mechanisms (Factor D), but is primarily addressed in this finding under Factor E (other natural or manmade factors).

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Information Provided in the Petition

The petitioners assert that several factors are affecting black-tailed prairie dog and its habitat, including that:

(1) Conversion to cropland, resulting in habitat loss, is likely increasing due to the demand for corn-based ethanol for vehicle fuel and the removal of land from the Conservation Reserve Program (CRP) for increased corn production;

(2) Urbanization is a threat to the species and its habitat, especially in the Front Range of Colorado;

(3) Oil, gas, and mineral extraction cause habitat degradation and loss, and increased habitat fragmentation;

(4) The loss of prairie dogs from shooting, plague, and poisoning causes a corresponding loss of habitat, primarily due to degraded habitat, decreased grassland productivity, and eventual burrow collapse; and

(5) Livestock grazing and fire suppression negatively impact black-tailed prairie dog habitat by allowing the proliferation of woody plants and noxious weeds that replace native forage species.

Response

In some instances, black-tailed prairie dog habitat is currently being destroyed, modified, or curtailed by: (1) Conversion of native prairie habitat to cropland; (2) urbanization; (3) oil, gas, and mineral extraction; (4) habitat loss caused by loss of prairie dogs; and (5) livestock grazing, fire suppression, and weeds. However, extensive rangeland remains available for potential expansion of black-tailed prairie dog occupied habitat.

The most substantial cause of habitat destruction that we are able to quantify is cropland development. Conversion of the native prairie to cropland has largely progressed across the species' range from east to west; the most intensive agricultural use is in the eastern portion of the species' range. By 1999, approximately 37 percent of the historical suitable habitat within the species' range had been converted to cropland uses (Black-footed Ferret Recovery Foundation 1999, entire). The Natural Resources Conservation Service quantified land cover and use changes from 1982 to 1997; the 11 States within the historical range of the species experienced an estimated 2 percent loss of rangeland during this time period (U.S. Department of Agriculture 2000, pp. 18–24). When the 2 million ac (1.6 million ha) of currently occupied habitat is contrasted with the 342 million ac (139 million ha) of remaining non-Federal rangeland (statistics for Federal land were unavailable), it appears that sufficient potential habitat still occurs in each of the 11 States within the historical range of the species to accommodate large expansions of black-tailed prairie dog populations. This estimate of potential habitat includes rangeland Statewide, but does not include pasture or CRP lands, because these areas were not included in the analysis. However, prairie dogs do use pasture, and therefore this estimate is considered conservative.

Urbanization is occurring within portions of the black-tailed prairie dog range, particularly the Front Range of Colorado. However, on a larger Statewide or rangewide context, loss of habitat due to urbanization is not significant, given the recent Statewide estimates of occupied habitat in Colorado and elsewhere (Table 1). The accuracy of the 2004 Colorado Division of Wildlife (CDOW) estimate of 631,000 ac (255,000 ha) of occupied habitat in Colorado is questioned by the petitioners. Other recent estimates of occupied habitat available for Colorado include: 461,000 ac (187,000 ha), calculated from Tipton et al. (2008, p. 1002); a minimum of 788,000 ac (319,000 ha) of occupied habitat (CDOW 2007, entire); and a minimum of 215,000 ac (87,000 ha) of active occupied habitat (EDAW 2000, p. 20). Each of these estimates for Colorado indicates a substantial increase in occupied habitat since 1961.

Oil, gas, and mineral extraction are occurring within portions of the black-tailed prairie dog range. However, no information provided by the petitioners or readily available in our files quantifies the impacts. Additionally, population trends do not suggest that oil, gas, and mineral extraction are a limiting factor for the species.

Black-tailed prairie dogs do affect their own habitat. The loss or reduction of prairie dogs in areas can result in that habitat becoming degraded. However, documentation of prairie dog effects on habitat is mixed. Black-tailed prairie dogs can have a positive effect on habitat (Johnson-Nistler *et al.* 2004, p. 641; Koford 1958, pp. 43–62; Kotliar *et al.* 1999, p. 178; Lantz *et al.* 2006, p. 2671); positive effects have been particularly notable in the southwestern portion of the species' range where the foraging and clipping habits of prairie dogs destroy seedlings of undesirable shrub and tree species that may invade and eventually convert grasslands, and aeration of soil from burrow construction increases growth of grasses (Davis 1974, p. 156; Fagerstone and Ramey 1996, p. 89; Koford 1958, pp. 43–62; List *et al.* 1997, p. 150; Weltzin *et al.* 1997, pp. 758–760). Black-tailed prairie dogs also may have a neutral habitat effect, i.e., a balance between clipping vegetation that could be forage for cattle and improving the protein content of remaining grass, or negative habitat effect by reducing grass species and causing conversion to forb species undesirable for cattle (Bonham and Lerwick 1976, p. 225; Fagerstone and Ramey 1996, p. 88; Johnson-Nistler *et al.* 2004, p. 641; Klatt and Hein 1978, p. 316; Koford 1958, pp. 43–62). No information provided by the petitioners or readily available in our files quantifies the overall impact that black-tailed prairie dogs have on their own habitat. However, extensive rangeland remains available for potential expansion of black-tailed prairie dog habitat (U.S. Department of Agriculture 2000, pp. 18–24).

Information exists regarding the increase of nonnative plant species in the presence of overgrazing and the absence of fire. However, the impact of plant composition on habitat suitability for black-tailed prairie dogs is contradictory (Cerovski 2004, p. 101; Detling 2006, p. 115; Koford 1958, pp. 43–62; Uresk *et al.* 1981, p. 200; Vermeire 2004, p. 691). Available information indicates that livestock grazing typically encourages black-tailed prairie dog expansion (Andelt 2006, p. 131; Fagerstone and Ramey 1996, p. 88; Forest 2005, p. 528; Groombridge 1992, p. 290; Hubbard and Schmitt 1983, p. 30; Koford 1958, p. 68; Marsh 1984, p. 203; Osborn and Allan 1949, p. 330; Snell 1985, p. 30; Snell and Hlavachick 1980, p. 240; Uresk *et al.* 1981, p. 200; U.S. Forest Service 1995, p. 5; U.S. Forest Service 1998, p. 4; Wuerthner 1997, pp. 460–461). Additionally, extensive rangeland remains available for potential expansion of occupied habitat (U.S. Department of Agriculture 2000, pp. 18–24).

Summary of Factor A

On the basis of our evaluation of the most recent Statewide estimates of occupied habitat and the amount of potential habitat available for expansion, we determined that the petition does not present substantial information indicating that listing the black-tailed prairie dog may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range. The threat to prairie dogs presented by sylvatic plague is addressed under Factor C, and the threat presented by poisoning is addressed under Factor E.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Information Provided in the Petition

The petitioners assert that recreational shooting of black-tailed prairie dogs and collecting for the pet trade are threats to the black-tailed prairie dog; they indicate that shooting is of special concern because of the cumulative effect of localized extirpation across the species' range. The petitioners indicate that shooting causes both direct effects (mortality) and indirect effects such as behavioral changes, diminished reproduction and body condition, and emigration. The petitioners indicate that the number of shooters is increasing, and the technology available to them is advancing.

The petitioners do not believe that collecting for the pet trade has as great an impact as several other factors, but suggest that pet prairie dogs infected with an exotic disease could be released into the wild, which could pose a risk to wild black-tailed prairie dogs.

Response

Recreational shooting of black-tailed prairie dogs can reduce population densities, cause behavioral changes, diminish reproduction and body condition, increase emigration, and cause extirpation in isolated circumstances (Knowles 1988, p. 54; Pauli 2005, p. 1; Reeve and Vosburgh 2006, p. 144; Stockrahm 1979, pp. 80–

84; Vosburgh 1996, pp. 13, 15, 16, and 18; Vosburgh and Irby 1998, pp. 366–371). However, available information indicates that populations can recover from very low numbers following intensive shooting (Cully and Johnson 2006, pp. 6–7; Dullum *et al.* 2005, p. 843; Knowles 1988, p. 12; Pauli 2005, p. 17; Vosburgh 1996, pp. 16, 31). Based on the research cited in this paragraph, it appears that a typical scenario is that either: (1) Once populations have been reduced, shooters go elsewhere and populations are allowed to recover; or (2) shooting maintains reduced population size at specific sites. Research does not further clarify or quantify these factors, and shooting, investigated separately from other threat factors, does not appear to have a significant impact on black-tailed prairie dogs, overall. We do not have an analysis on rangewide impacts of shooting on prairie dogs.

Many landowners maintain prairie dog populations and derive income from charging people for recreational shooting. Monetary gain from shooting fees may motivate landowners to preserve prairie dog colonies for future shooting opportunities, which is currently an alternative to eradicating them by poisoning (Reeve and Vosburgh 2006, pp. 154–155; Vosburgh and Irby 1998, pp. 366–371).

Substantial information is not presented by the petitioners or available in our files to evaluate potential effects of collecting or the spread of disease resulting from the pet trade.

Summary of Factor B

Recreational shooting of prairie dogs can cause localized effects. However, much of the literature documenting effects from shooting of prairie dogs also describes subsequent rebounds in local populations; extirpations, while documented, are rare and, therefore, not a significant threat to the species. Recent Statewide estimates of occupied habitat further reinforce this observation by documenting population increases in areas subject to shooting. We conclude that neither shooting nor the pet trade is a threat to the black-tailed prairie dog. On the basis of our evaluation, we determined that the petition does not present substantial information indicating that listing the black-tailed prairie dog may be warranted due to overutilization for commercial, recreational, scientific, or educational purposes.

C. Disease and Predation

Information Provided in the Petition

The petitioners assert that sylvatic plague causes mortality rates approaching 100 percent in infected colonies. They indicated that evidence is too preliminary to say that high levels of exposure are necessary before prairie dogs contract plague, or to say that prairie dogs have a limited immune response to plague. The petitioners challenge studies indicating that isolated, low density populations are protected from plague, and indicating that some sites have recovered to pre-plague levels. They note that in recent years several epizootics have occurred, and that plague has expanded into South Dakota. They also note that although not a rangewide threat, prairie dogs also are susceptible to tularemia and monkeypox.

Response

Plague is an exotic disease foreign to the evolutionary history of North American prairie dogs. It is caused by the bacterium *Yersinia pestis,* which fleas acquire by biting infected animals, and subsequently transmit via a bite to other animals. The disease also can be transmitted through pneumonic (airborne) or septicemic (blood) pathways from infected to disease-free animals (Barnes 1993, p. 28; Cully *et al.* 2006, p. 158; Ray and Collinge 2005, p. 203; Rocke *et al.* 2006, p. 243; Webb *et al.* 2006, p. 6236). Plague was first observed in wild rodents in North America near San Francisco, California in 1903 (Eskey and Haas 1940, p. 1), and was first documented in black-tailed prairie dogs in Texas in 1946 (Miles *et al.* 1952, p. 41).

Black-tailed prairie dogs are very sensitive to plague, and mortality frequently reaches 100 percent (Barnes 1993, p. 28). Two patterns of die-offs are typically described for black-tailed prairie dogs: (1) A rapid and nearly 100 percent die-off with incomplete recovery, such as has occurred at the Rocky Mountain Arsenal and the Comanche National Grassland in Colorado (Cully and Williams 2001, pp. 899–903); and (2) a partial die-off resulting in smaller, but stable, populations and smaller, more dispersed colonies, such as has occurred at the Cimarron National Grassland (Cully and Williams 2001, pp. 899–903). Several researchers have suggested that the response of black-tailed prairie dogs to plague may vary based on population density or degree of colony isolation (Cully 1989, p. 49; Cully and Williams 2001, pp. 899–903; Lomolino *et al.* 2003, pp. 118–119). Table 2 illustrates die-offs and extent of recovery for several well-studied sites that have experienced plague epizootics.

TABLE 2—SITE-SPECIFIC ESTIMATES OF OCCUPIED BLACK-TAILED PRAIRIE DOG HABITAT OVER TIME (IN ACRES (HECTARES))

Site	1st Estimate	2nd Estimate	3rd Estimate	4th Estimate	5th Estimate
Comanche NG, CO	5,000 (2,023) in 1995 (Augustine *et al.* 2008).	1,600 (647) in 1999 (PP) (Augustine *et al.* 2008).	10,700 (4,330) in 2005 (Augustine *et al.* 2008).	3,000 (1,214) in 2006 (PP) (Augustine *et al.* 2008).	
Pueblo Chemical Depot, CO.	4,333 (1,753) in 1998 (Young 2008).	67 (27) in 2000 (PP) (Young 2008).	3,423 (1,385) in 2005 (Young 2008).	2,712 (1,097) in 2006 (PP) (Young 2008).	
Rocky Mtn Arsenal, CO.	4,574 (1,851) in 1988 (Seery 2001).	247 (99) in 1989 (PP) (Seery 2001).	2,429 (982) in 1994 (Seery 2001).	22 (8) in 1995 (PP) (Seery 2001).	1,646 (666) in 2000 (Seery 2001).
N. Cheyenne Res., MT.	10,720 (4,338) in 1990 (Larson 2008).	378 (152) in 1995 (PP) (Fourstar 1998).	3,300 (1,335) in 2001 (Vosburgh 2003).	3,913 (1,585) in 2003 (Vosburgh 2003).	5,683 (2,299) in 2006 (Larson 2008).
Kiowa/Rita Blanca NG, TX, OK, NM.	1,600 (647) in 1999 (Cully & Johnson 2006).	6,800 (2,751) in 2003 (Cully & Johnson 2006).	4,500 (1,821) in 2004 (PP) (Cully & Johnson 2006).	3,000 (1,214) in 2005 (PP) (Cully & Johnson 2006).	
Thunder Basin NG, WY.	16,300 (6,596) in 2001 (Cully & Johnson 2006).	1,600 (647) in 2002 (PP) (Cully & Johnson 2006).	9,000 (3,642) in 2003 (Byer 2003).		

PP = post-plague.

Some studies have documented the development of antibodies in black-tailed prairie dogs surviving a plague epizootic. In one Colorado site, over 50 percent of survivors developed antibodies (Pauli 2005, pp. 1, 71). Recent laboratory research indicates that, at low levels of exposure, a small percentage of black-tailed prairie dogs show some immune response and consequently some resistance to plague, indicating that a plague vaccine may be developed in the future (Creekmore *et al.* 2002, pp. 32, 38). Preliminary work has demonstrated significantly higher antibody titers and survival rates in vaccinated black-tailed prairie dogs that were challenged with the plague bacterium (Mencher *et al.* 2004, pp. 5, 8–9). Oral vaccination may be effective for managing plague epizootics in free-ranging prairie dog populations by reducing mortality in exposed individuals (Mencher *et al.* 2004, pp. 8–9).

Since the black-tailed prairie dog was removed from the candidate list in 2004, plague has expanded its range into South Dakota, previously the only State where plague had not been documented in prairie dogs (Service 2005, p. 1). Despite 3 years of dusting prairie dog burrows in portions of the area with insecticide, in 2008, the disease reached the black-footed ferret recovery area in Conata Basin (Larson 2008, entire). Approximately 9,000 ac (3,600 ha) have been affected through June 2008 in Conata Basin (Griebel 2008, entire). Conata Basin is one of the largest remaining black-tailed prairie dog complexes, and is the most successful recovery site in North America for the endangered black-footed ferret. Plague also has been documented on Pine Ridge and Cheyenne River Reservations in South Dakota (Mann-Klager 2008, entire). The establishment of sylvatic plague in South Dakota could have a significant impact on both the black-tailed prairie dog and the black-footed ferret (Creekmore *et al.* 2002, p. 38).

Tularemia and monkeypox are diseases that have had impacts on captive black-tailed prairie dogs associated with the pet trade; however, we have no information to indicate that either of these diseases are a concern for wild prairie dogs.

Summary of Factor C

Some encouraging information regarding plague is available, particularly the development of a vaccine to improve management of plague in prairie dog populations. However, information indicates that plague has expanded its range in recent years and has caused population declines at several sites. On the basis of our evaluation, we determined that the petition presents substantial information to indicate that listing the black-tailed prairie dog as a threatened or endangered species may be warranted due to sylvatic plague.

On the basis of our evaluation, we determined that the petition does not present substantial information indicating that listing the black-tailed prairie dog may be warranted due to tularemia or monkeypox.

D. The Inadequacy of Existing Regulatory Mechanisms

Information Provided in the Petition

The petitioners assert that regulatory actions influencing habitat loss, shooting, the pet trade, sylvatic plague, and chemical control are inadequate to mitigate impacts from these threats. They indicate that: (1) Most of the regulations that promote black-tailed prairie dog conservation, enacted after the 1998 petitions to list the species, have been rescinded or weakened; (2) Federal, State, and Tribal regulations and local statutes and policies enacted since removal of the black-tailed prairie dog from the candidate list in 2004 favor killing rather than preserving the species; and (3) regulatory mechanisms pertaining to oil and gas development on Federal lands are inadequate and lack safeguards for black-tailed prairie dogs.

Response

Many of the regulations promoting prairie dog conservation enacted after the 1998 petitions to list the black-tailed prairie dog have been rescinded or weakened. Regulations enacted since removal of the black-tailed prairie dog from the candidate list in 2004 have not favored preservation of the species. Several notable examples are presented in the petition or readily available in our files, including:

(1) The U.S. Environmental Protection Agency (EPA) has not provided annual records to the Service on the amount of acreage poisoned with zinc phosphide or the amount of chemical sold, despite this reporting being included as a ''Reasonable and Prudent Alternative'' in a 1993 Biological Opinion (Service 1993, p. II–107). EPA did not agree to collect or provide this data in response to the Biological Opinion. On April 25, 2002, we sent a letter to EPA requesting any records on the amount of zinc phosphide sold or acres poisoned; EPA responded that they were not obligated to provide this information. Having records of this information would enable us to monitor the rangewide effects of poisoning on black-tailed prairie dogs, and the endangered black-footed ferret, whose primary prey is the black-tailed prairie dog.

(2) The EPA has not initiated additional formal consultation, following the 1993 Biological Opinion, regarding the recent permitting of chlorophacinone and diphacinone (both anticoagulants) to poison prairie dogs, despite their statement that additional consultation may be necessary if any new uses of these pesticides are proposed (EPA 1998, p. 109). Use of these two chemicals constitutes new uses because neither poison was registered for field use on prairie dogs at the time of the 1993 Biological Opinion. Secondary poisoning has been documented in the field in a badger and a bald eagle; additionally, many other species, including the black-footed ferret, are known to be highly susceptible to both chlorophacinone and diphacinone.

(3) The U.S. Forest Service weakened their restrictions on poisoning by rescinding a 2000 policy letter regarding control of black-tailed prairie dogs (Manning 2004, entire), which allowed for expansion of poisoning on their lands.

(4) The State of Montana changed the dual status of the species from ''nongame wildlife in need of management'' and ''vertebrate pest'' to the single status of ''vertebrate pest'' (Hanebury 2007, entire), which eases restrictions on prairie dog poisoning.

(5) The State of South Dakota weakened the designation of ''species of management concern'' for the black-tailed prairie dog by designating it as a pest if: Plague is reported east of the Rocky Mountains, the Statewide population is greater than 145,000 ac (59,000 ha), or the species is colonizing within a 1-mile (1.6-kilometer) buffer around concerned landowners (South Dakota State Legislature 2005, entire). Currently all of these criteria are being met; therefore, the species is considered a pest in South Dakota, which eases restrictions on prairie dog poisoning.

(6) Since 2004, State agricultural departments have issued permits authorizing the use of chlorophacinone for poisoning prairie dogs in Colorado, Kansas, Nebraska, Oklahoma, Texas, and Wyoming.

(7) Since 2004, State agricultural departments have issued permits authorizing the use of diphacinone for poisoning prairie dogs in Colorado, Kansas, Nebraska, Texas, and Wyoming.

Following the 1998 petitions to list the black-tailed prairie dog, representatives from each State wildlife agency within the historical range of the species formed the Prairie Dog Conservation Team. The Team developed ''A Multi-State Conservation Plan for the Black-tailed Prairie Dog, *Cynomys ludovicianus*, in the United States'' (Luce 2002, p. 2). The purpose of this Multi-State Plan was to provide standards for future prairie dog management within the 11 States. The Multi-State Plan endorsed the following minimum 10-year target objectives: (1) Maintain at least the currently occupied acreage of black-tailed prairie dog habitat in the United States; (2) increase to at least 1,693,695 ac (685,946 ha) of occupied black-tailed prairie dog acreage in the United States by 2011; (3) maintain at least the current black-tailed prairie dog occupied acreage in the 2 complexes greater than 5,000 ac (2,025 ha) that now occur on and adjacent to Conata Basin-Buffalo Gap National Grassland, South Dakota, and Thunder Basin National Grassland, Wyoming; (4) develop and maintain a minimum of 9 additional complexes greater than 5,000 ac (2,025 ha), with each State managing or contributing to at least one complex greater than 5,000 ac (2,025 ha) by 2011; (5) maintain at least 10 percent of total occupied acreage in colonies or complexes greater than 1,000 ac (400 ha) by 2011; and (6) maintain distribution over at least 75 percent of the counties in the historical range, or at least 75 percent of the historical geographic distribution. Objectives 3, 4, 5, and 6 have not yet been met; however, objectives 4 and 5 need not be met until 2011.

States also agreed to draft Statewide management plans. Colorado has finalized a conservation plan for grassland species that supports and meets the objectives of the Multi-State Plan. Kansas, Oklahoma, and Texas have finalized management plans that support the Multi-State Plan objectives, but have not yet met all of those objectives. Montana, New Mexico, North Dakota, and South Dakota have finalized management plans that do not support or meet all of the objectives of the Multi-State Plan. Arizona, Nebraska, and Wyoming have draft plans that were not approved by their Wildlife Commissions.

Summary of Factor D

On the basis of our evaluation, we determined that the petition presents substantial information to indicate that listing the black-tailed prairie dog as a threatened or endangered species may be warranted due to the inadequacy of existing regulatory mechanisms, particularly regarding poisoning, which is discussed further under Factor E.

E. Other Natural or Manmade Factors Affecting Continued Existence

Information Provided in the Petition

The petitioners assert that several other threat factors are affecting the black-tailed prairie dog, including that:

(1) The historical loss of approximately one-third of the species' potential habitat has resulted in black-tailed prairie dog populations, particularly in the eastern portion of the species' range, remaining vulnerable to stochastic events.

(2) The agricultural industry has put pressure on elected officials to increase both the methods and public financial assistance available to eradicate prairie dogs, promoting intolerance of the species, and that these officials have, in turn, put pressure on public land and wildlife managers to eradicate prairie dogs and halt initiatives to protect them; the majority of States with black-tailed prairie dogs have supported increased lethal control of prairie dogs, including the approval of anticoagulants;

(3) While drought is a natural phenomenon, its effects are exacerbated by the other stressors affecting the species; and

(4) Climate change may contribute to invasion of noxious weeds and exacerbate the effects of habitat fragmentation.

Response

The black-tailed prairie dog evokes strong emotions in many people, which may affect regulations, recreational shooting, and poisoning. However, no information presented by the petitioners, or available in our files, quantifies the effects of intolerance separately from the actual threat factors. Therefore, we only address the latter.

The information presented by the petitioners and available in our files indicates that, in States with recent data available, including South Dakota and Wyoming, the extent of poisoning may have increased since the black-tailed prairie dog was removed from the candidate list in 2004 (Cerovski 2004, p. 101; Kempema 2007, p. 8). Table 3 includes the total sales of zinc phosphide bait by the South Dakota bait station in the 4 years prior to candidate removal. South Dakota is the only State that has been permitted by EPA to manufacture and sell zinc phosphide. Sales from the South Dakota bait station are largely limited to South Dakota, Wyoming, and Nebraska. The States of Colorado, Kansas, Montana, New Mexico, North Dakota, Oklahoma, and Texas acquire zinc phosphide from various manufacturers, but no recent information regarding sales has been made available to us. Additionally, as described in Factor D, other methods of prairie dog control have expanded since 2004, because the anticoagulants chlorophacinone and diphacinone were approved for use in Colorado, Kansas, Nebraska, Oklahoma, Texas, and Wyoming.

TABLE 3—SALES OF ZINC PHOSPHIDE BAIT PRIOR (FRIDLEY 2003, ENTIRE) AND SUBSEQUENT TO (KEMPEMA 2007, P. 8; LARSON 2008, ENTIRE) REMOVAL OF THE BLACK-TAILED PRAIRIE DOG FROM THE CANDIDATE LIST

Amount of bait sold in pounds (kilograms)	Year
42,400 (19,323)	2000
26,775 (12,145)	2001
42,500 (19,278)	2002
97,950 (44,429)	2003
	Species removed from candidate list.
334,900 (151,908)	2004
191,775 (86,988)	2005
307,900 (139,661)	2006
241,625 (109,599)	2007

If all of the bait sold by the South Dakota bait station were applied at the recommended rate of 1/3 pound per acre (Hygnstrom *et al.* 1994, p. B–89), this would equate to approximately 128,000 ac (52,000 ha) poisoned in

2000, 80,000 ac (33,000 ha) in 2001, 128,000 ac (52,000 ha) in 2002, 294,000 ac (119,000 ha) in 2003, 1,005,000 ac (407,000 ha) in 2004, 575,000 ac (233,000 ha) in 2005, 924,000 ac (374,000 ha) in 2006, and 725,000 ac (294,000 ha) in 2007. To provide some perspective, if the current estimate from Table 1 of approximately 2.1 million ac (850,000 ha) of occupied habitat in the United States is used, enough poison has been sold by this single facility since 2004 to poison all occupied habitat in the United States with enough remaining to poison an additional 1 million ac (400,000 ha). This scenario does not include the possibility of individuals stockpiling poison, or applying it at rates greater than 1/3 pound per acre.

Prairie dogs were extirpated from Arizona through poisoning campaigns that occurred in the early 1900s (Van Pelt 2007). As noted in the Population Estimates section of this document, that extirpation took place during a relatively unregulated period of large-scale extermination efforts using a highly toxic poison (Compound 1080).

Drought is a natural and cyclical occurrence within the range of the black-tailed prairie dog to which the animal has adapted (Forrest 2005, p. 528). It has been noted that, in at least some instances, occupied habitat tends to increase during periods of drought, and densities decrease, because animals spread out in search of food (Young 2008, p. 5). However, no information presented by the petitioners, or in our files, quantifies the effect of drought, singly or in conjunction with other threats, on the species rangewide.

The impacts of stochastic events and climate change on prairie dog populations are speculative. No information presented by the petitioners, or available in our files, quantifies these effects. No information on the direct relationship between climate change and population trends is available. Currently, black-tailed prairie dogs occupy, in fragmented populations, 2.1 million acres across 11 States; therefore, it is unlikely that stochastic events pose a threat to the species. In addition, extensive rangeland remains available for potential expansion of black-tailed prairie dog habitat (U.S. Department of Agriculture 2000, pp. 18–24). Therefore the threat of stochastic events does not appear to be significant.

Summary of Factor E

On the basis of our evaluation, we determined that the petition presents substantial information to indicate that listing the black-tailed prairie dog as a threatened or endangered species may be warranted due to poisoning of black-tailed prairie dogs.

We determined that the petition does not present substantial information indicating that listing the black-tailed prairie dog may be warranted due to intolerance to or misconceptions about prairie dogs. We also determined that the petition does not present substantial information indicating that listing the black-tailed prairie dog may be warranted due to stochastic events, drought, or climate change.

Finding

We have assessed information provided by the petitioners and readily available in our files. On the basis of our evaluation, we find that the petition presents substantial information indicating that listing the black-tailed prairie dog under the Act may be warranted based on threats associated with Factor C (sylvatic plague), Factor D (inadequate Federal and State regulations), and Factor E (poisoning). Therefore, we are initiating a status review to determine whether listing the black-tailed prairie dog under the Act is warranted.

We determined that an emergency listing is not warranted at this time, because available information regarding Statewide populations indicates stable to increasing trends since 1961. However, if at any time we determine that emergency listing of the black-tailed prairie dog is warranted, we will initiate an emergency listing.

The petitioners also request that critical habitat be designated for the species concurrent with final listing under the Act. We consider the need for critical habitat designation when listing species. If we determine in our 12-month finding following the status review of the species that listing the black-tailed prairie dog is warranted, we will address the designation of critical habitat in the subsequent proposed rule.

References Cited

A complete list of all references cited in this document is available, upon request, from the South Dakota Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Author

The primary authors of this notice are the staff members of the U.S. Fish and Wildlife Service, South Dakota Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: November 23, 2008.

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. E8–28528 Filed 12–1–08; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 622

[Docket No. 070719384–81468–03]

RIN 0648–AV80

Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Reef Fish Fishery of the Gulf of Mexico; Gulf of Mexico Gag Grouper Management Measures

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; interim measures; request for comments.

SUMMARY: This final rule implements temporary measures to reduce overfishing of gag in the Gulf of Mexico (Gulf). This final rule reduces the commercial quota for gag, establishes a gag bag limit within the grouper aggregate bag limit, and extends the recreational closed season for gag. In addition, if Federal regulations applicable to gag, red snapper, gray triggerfish, or greater amberjack are more restrictive than state regulations, this rule requires vessels with Federal reef fish permits to comply with Federal regulations regardless of where such fish are harvested. The intended effect is to reduce overfishing of gag and increase compliance with Federal regulations designed to end overfishing or rebuild overfished reef fish stocks in the Gulf.

DATES: This rule is effective January 1, 2009 through May 31, 2009. Comments must be received no later than 5 p.m., eastern time, on January 2, 2009.

ADDRESSES: You may submit comments on this temporary rule, identified by ''0648–AV80, by any of the following methods:

- Electronic Submissions: Submit all electronic public comments via the Federal e-Rulemaking Portal: http://www.regulations.gov.

(2) A mail receipt that is not dated by the U.S. Postal Service.

If your application is postmarked after the application deadline date, we will not consider your application.

Note: The U.S. Postal Service does not uniformly provide a dated postmark. Before relying on this method, you should check with your local post office.

c. *Submission of Paper Applications by Hand Delivery.*

If you qualify for an exception to the electronic submission requirement, you (or a courier service) may deliver your paper application to the Department by hand. You must deliver the original and two copies of your application, by hand, on or before the application deadline date, to the Department at the following address: U.S. Department of Education, Application Control Center, Attention: (CFDA Number 84.116S), 550 12th Street, SW., Room 7041, Potomac Center Plaza, Washington, DC 20202–4260.

The Application Control Center accepts hand deliveries daily between 8:00 a.m. and 4:30:00 p.m., Washington, DC time, except Saturdays, Sundays, and Federal holidays.

Note for Mail or Hand Delivery of Paper Applications: If you mail or hand deliver your application to the Department—

(1) You must indicate on the envelope and—if not provided by the Department—in Item 11 of the SF 424 the CFDA number, including suffix letter, if any, of the competition under which you are submitting your application; and

(2) The Application Control Center will mail to you a notification of receipt of your grant application. If you do not receive this grant notification within 15 business days from the application deadline date, you should call the U.S. Department of Education Application Control Center at (202) 245–6288.

V. Application Review Information

Selection Criteria: The selection criteria for evaluating the applications for this program are from 34 CFR 75.210 and are listed in the application package.

VI. Award Administration Information

1. *Award Notices:* If your application is successful, we notify your U.S. Representative and U.S. Senators and send you a Grant Award Notification (GAN). We may notify you informally, also.

If your application is not evaluated or not selected for funding, we notify you.

2. *Administrative and National Policy Requirements:* We identify administrative and national policy requirements in the application package and reference these and other requirements in the *Applicable Regulations* section of this notice.

We reference the regulations outlining the terms and conditions of an award in the *Applicable Regulations* section of this notice and include these and other specific conditions in the GAN. The GAN also incorporates your approved application as part of your binding commitments under the grant.

3. *Reporting:* At the end of your project period, you must submit a final performance report, including financial information, as directed by the Secretary. If you receive a multi-year award, you must submit an annual performance report that provides the most current performance and financial expenditure information as directed by the Secretary under 34 CFR 75.118. The Secretary may also require more frequent performance reports under 34 CFR 75.720(c). For specific requirements on reporting, please go to *http://www.ed.gov/fund/grant/apply/appforms/appforms.html.*

4. *Performance Measures:* Under the Government Performance and Results Act (GPRA), the Department will use the following measures to assess the performance of this program:

(a) The percentage of FIPSE grantees reporting project dissemination to others.

(b) The percentage of FIPSE projects reporting institutionalization on their home campuses.

If funded, you will be asked to collect and report data on these measures in your project's annual performance report (34 CFR 75.590). Applicants are also advised to consider these two measures in conceptualizing the design, implementation, and evaluation of the proposed project because of their importance in the application review process. Collection of data on these measures should be part of the project evaluation plan, along with any measures of progress on goals and objectives that are specific to your project.

VII. Agency Contacts

FOR FURTHER INFORMATION CONTACT: Krish Mathur, FIPSE—Fund for the Improvement of Postsecondary Education, 1990 K Street, NW., room 6155, Washington, DC 20006–8544. Telephone: (202) 502–7512 or by e-mail: *krish.mathur@ed.gov.*

If you use a TDD, call the FRS, toll free, at 1–800–877–8339.

VIII. Other Information

Accessible Format: Individuals with disabilities can obtain this document and a copy of the application package in an accessible format (*e.g.,* braille, large print, audiotape, or computer diskette) on request to the program contact person listed under **FOR FURTHER INFORMATION CONTACT** in section VII of this notice.

Electronic Access to This Document: You can view this document, as well as all other documents of this Department published in the **Federal Register**, in text or Adobe Portable Document Format (PDF) on the Internet at the following site: *http://www.ed.gov/news/fedregister.*

To use PDF, you must have Adobe Acrobat Reader, which is available free at this site. If you have questions about using PDF, call the U.S. Government Printing Office (GPO), toll free, at 1–888–293–6498; or in the Washington, DC, area at (202) 512–1530.

Note: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at: *http://www.gpoaccess.gov/nara/index.html.*

Delegation of Authority: The Secretary of Education has delegated authority to Daniel T. Madzelan, Director, Forecasting and Policy Analysis for the Office of Postsecondary Education, to perform the function of the Assistant Secretary for Postsecondary Education.

Dated: April 24, 2009.

Daniel T. Madzelan,

Director, Forecasting and Policy Analysis.

[FR Doc. E9–9881 Filed 4–28–09; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Amended Notice of Intent To Modify the Scope of the Environmental Impact Statement for the Abengoa Biorefinery Project Near Hugoton, KS

AGENCY: Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy.

ACTION: Amended notice of intent.

SUMMARY: The U.S. Department of Energy (DOE or the Department) is providing this Amended Notice of Intent to announce its intent to modify the scope of an ongoing environmental impact statement in which DOE is assessing the potential environmental impacts of a project proposed by Abengoa Bioenergy Biomass of Kansas, LLC (ABBK), to construct and operate a biomass-to-ethanol and energy facility near Hugoton, Kansas (Abengoa Biorefinery Project). DOE issued its original Notice of Intent on Aug. 25, 2008, for the proposed construction and operation of a biomass-to-ethanol and energy facility that was planned to be

integrated with a traditional grain-to-ethanol production facility on the same site.

DATES: The public scoping period begins today, and will end on May 29, 2009. DOE will consider all comments received or postmarked by May 29, 2009. DOE will consider late comments to the extent practicable. DOE will hold a public scoping meeting in Memorial Hall at the Stevens County Courthouse, 200 East 6th St., Hugoton, Kansas 67951–2606, on May 19, 2009, from 6 p.m. to 8 p.m. DOE will give equal weight to written and oral comments.

ADDRESSES: Please direct written comments on the scope of the EIS to Ms. Kristin Kerwin at the U.S. Department of Energy, Golden Field Office, 1617 Cole Boulevard, Golden, Colorado, 80401. You also may contact Ms. Kerwin by telephone at 303–275–4968, by facsimile at 303–275–4790, or by e-mail at *kristin.kerwin@go.doe.gov.* Please label envelopes and the subject line of e-mails with the heading ''Abengoa EIS Scoping Comments.''

FOR FURTHER INFORMATION CONTACT: For information on the proposed project, information on how to comment, or to receive a copy of the Draft EIS when it is issued, contact Ms. Kristin Kerwin by any of the means described above under the **''ADDRESSES''** section.

For further information on the DOE Office of Energy Efficiency and Renewable Energy, Integrated Biorefinery Program, contact: Ms. Valri Lightner, Biomass Program Manager (Acting), U.S. Department of Energy, 1000 Independence Avenue, SW., EE–2E, Washington, DC 20585; telephone: 202–586–0937; facsimile: 202–586–1640; e-mail: *eere_biomass@ee.doe.gov.*

For further information on DOE's Loan Guarantee Program, contact: Mr. Daniel Tobin, Loan Guarantee Officer, U.S. Department of Energy, 1000 Independence Avenue, SW., CF–1.3, Washington, DC 20585; telephone: 202–586–1940; facsimile: 202–586–4052; e-mail: *daniel.tobin@hq.doe.gov.*

For further information on the U.S. Department of Agriculture Rural Business-Cooperative Service Biorefinery Assistance Program contact: Energy Branch, Attention: Biorefinery Assistance Program, 1400 Independence Avenue, SW., Mail Stop 3225, Washington, DC 20250–3225; telephone: 202–720–1400.

For general information regarding the DOE National Environmental Policy Act (NEPA) process contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, U.S. Department of Energy, 1000 Independence Avenue, SW., GC–20, Washington, DC 20585; e-mail *AskNEPA@hq.doe.gov;* telephone 202–586–4600; or leave a message at 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

Background: In September 2007, DOE granted an initial award to ABBK to advance the conceptual design, initiate the permitting process, and support an environmental review under NEPA for ABBK's proposed biomass-to-ethanol and energy facility near Hugoton, Kansas, pursuant to section 932 of EPAct 2005. DOE requires completion of the design, permitting, and environmental review obligations prior to deciding whether to co-fund the construction and operation phase of the project. The total anticipated cost of this initial work was $37.5 million of which DOE funded 40 percent ($15 million) and ABBK provided 60 percent ($22.5 million). For additional information on section 932 of EPAct 2005 and details regarding DOE's competitive solicitation process for commercial-scale integrated biorefineries, refer to the original NOI, (73 FR 50001 (Aug. 25, 2008)).

In DOE's original NOI, the Department announced its intent to prepare an EIS for the Abengoa Biorefinery Project. DOE indicated that it was proposing to negotiate a second financial assistance agreement for approximately $61 million for the final design, construction, and operation of the biomass-to-ethanol and energy facility. This facility was planned to be integrated with a traditional grain-to-ethanol production facility, and the grain-to-ethanol facility was to be constructed and operated using private funds.

In January 2009, because of economic viability concerns and anticipated market conditions, ABBK notified DOE that it no longer was considering the construction and operation of the traditional grain-to-ethanol facility, and, further, was proposing to modify its biomass-to-ethanol and energy production facility by including a steam-driven turbine to generate electricity that would be supplied to the regional power grid. In addition, ABBK stated its intent to solicit loan guarantees from the DOE Loan Guarantee Program pursuant to Title XVII of EPAct 2005 and from the USDA RBC Biorefinery Assistance Program pursuant to section 9003 of the 2008 Farm Bill.

EPAct 2005 (Title XVII) authorizes the Department to issue loan guarantees to eligible projects that ''avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases,'' and ''employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.'' ABBK submitted a DOE loan guarantee application on February 26, 2009.

Section 9003 of the 2008 Farm Bill is intended to assist in the development and construction of commercial-scale biorefineries and the retrofitting of existing facilities using eligible technology for the development of advanced biofuels. ABBK has not submitted an application to the USDA RBC Biorefinery Assistance Program for a loan guarantee under section 9003 of the 2008 Farm Bill. After the receipt and review of an application, the RBC may decide to provide a loan guarantee to ABBK. The RBC would only do so if the application is for an eligible project that provides for the development, construction, and retrofitting of commercial biorefineries using eligible technology.

Previous Public Scoping Comments: The Department received 14 scoping comments during the public scoping period that ended on October 9, 2008, and received no comments after that date. Commenters expressed support for the proposed biorefinery project, suggested there would be no adverse environmental impacts from constructing and operating the biorefinery, requested information, or asked that DOE include certain analyses in the EIS. For example, the U.S. Department of Agriculture Natural Resources Conservation Service requested an analysis of the potential impacts from biomass production and harvesting on soils, surface and groundwater quality and quantity, air quality, and upland wildlife habitat. DOE will address these comments, as well as those submitted during the public comment period for this Amended NOI, in the Abengoa Biorefinery EIS.

Proposed Action: DOE is proposing to provide cost-shared Federal funding, only potentially, to issue a loan guarantee for the Abengoa Biorefinery Project. DOE would provide approximately $61 million in Federal funding pursuant to section 932 of EPAct 2005 to ABBK for the final design, construction, and initial operation of a commercial-scale biomass-to-ethanol and energy production facility near Hugoton, Kansas. The total estimated cost (beyond the initial award) for final design, construction, and initial operation of the facility with the new scope is approximately $290 million.

DOE may also provide a loan guarantee pursuant to Title XVII of EPAct 2005.[1]

The biomass-to-ethanol facility would use an enzymatic hydrolysis process for converting biomass feedstocks to ethanol and co-products, and a gasification technology to convert biomass to synthesis gas. The synthesis gas would be used to fire a gas-powered boiler to generate steam that ultimately would be used to produce electricity. Biomass feedstock would be supplied from waste products from the production of crops produced near the facility, and may include sorghum stubble, corn stover, switchgrass, and other opportunity feedstocks that are available.

The estimated biomass usage (dry metric tons per day) and output of ethanol (million gallons per year) for the biomass-to-ethanol facility, the project site features and location, and infrastructure requirements would remain the same as outlined in the original NOI. However, electricity produced by the steam-powered turbine would be sold to Pioneer Electric Cooperative, Inc., for supply to the regional power grid. As discussed in the original NOI, the proposed project would require a new transmission line to bring electricity to the site. The power produced by the steam-powered turbine would be supplied back to the regional power grid via this same new transmission line. The line would run from the proposed project location to the east side of Road 11, then several miles north to the existing substation.

In addition to processing an estimated 400 dry metric tons per day of biomass for the biomass-to-ethanol facility (to produce approximately 12 million gallons per year of denatured ethanol), the synthesis gas production facility would process an estimated 300 dry metric tons per day of biomass, and the electric generation portion of the facility would process and estimated 275 to 700 dry metric tons per day of biomass. The entire facility would process approximately 975 to 1400 dry metric tons per day of biomass.

Alternatives: The Department proposes to analyze the following alternatives in detail in the EIS: (1) The Abengoa Biorefinery Project as proposed by ABBK; (2) the Abengoa Biorefinery Project as proposed by ABBK without supplying electricity to the regional power grid; and (3) the No Action alternative, which assumes that none of the proposed facilities is constructed.

In addition, DOE plans to evaluate ranges of options for implementing the proposed project, including onsite versus offsite storage of feedstock; wet (unprotected or uncovered) versus dry (protected or covered) storage of feedstock; and smaller or larger boiler sizes. DOE will also explore potential mitigation measures that could be implemented for any of the alternatives.

Preliminary Identification of Environmental Issues: One purpose of this Amended NOI is to solicit comments and suggestions for DOE to consider in preparing the EIS. As background for public comment, the Department tentatively has identified the following list of potential environmental issues for analysis. This list identifies resource areas that may be affected by construction and operation of the proposed Abengoa Biorefinery Project and that DOE plans to analyze in the EIS. This list is not intended to be all-inclusive or to imply any predetermination of impacts. DOE welcomes comments on these resource areas and other suggestions on the scope of the EIS.

1. *Water resources:* potential impacts on surface and groundwater resources and water quality, including effects of water usage, wastewater management, and storm water management.
2. *Wetlands:* potential impacts on apparent isolated wetlands at the project site.
3. *Utility and transportation infrastructure:* requirements for delivery of feedstocks and process chemicals to the facility and distribution of products from the facility to the marketplace.
4. *Land use:* changes in land use, including the proposed site and the geographical area that will provide feedstock to the proposed facility.
5. *Local and regional air quality:* changes in air quality.
6. *Cultural resources:* including potential effects on historic and archaeological resources and American Indian tribal resources.
7. *Ecological resources:* terrestrial and aquatic plants and animals including state and Federally-listed threatened and endangered species and other protected resources.
8. *Health and safety:* including construction-related safety and process-related safety associated with handling and management of process chemicals.
9. *Noise:* potential impacts resulting from construction and operation of the proposed plant and from transportation of feedstocks, process materials, and plant byproducts.
10. *Socioeconomics:* potential socioeconomic impacts of plant construction and operation, including effects on public services and infrastructure resulting from the influx of construction personnel and plant operating staff, and environmental justice issues.
11. *Aesthetic and scenic resources:* potential visual effects associated with plant structures and operations.
12. Cumulative impacts that result from the incremental impacts of the proposed plant when added to the other past, present, and reasonably foreseeable future activities. This may include potential impacts resulting from widespread replication of this type of technology, and from traditional grain-to-ethanol production facilities.
13. *Global climate change:* potential greenhouse gas emissions that may result from this project.

Public Scoping Process: Interested agencies, organizations, American Indian tribes, and members of the public are encouraged to submit comments or suggestions concerning the proposed content of the Abengoa Biorefinery EIS, including the range of reasonable alternatives and the potential environmental impacts. DOE invites written and oral comments and suggestions at the public scoping meeting. The public scoping period will be open until May 29, 2009.

Please send written comments to Ms. Kristin Kerwin, as described above under the "ADDRESSES" section. The public scoping meeting will be held at the location, date, and time listed in the "DATES" and "ADDRESSES" sections of this Amended NOI. This meeting will be informal. A presiding officer designated by DOE will establish procedures governing the conduct of the meeting, and DOE will provide an overview of the proposed Abengoa Biorefinery Project. DOE will not conduct the meeting as an evidentiary hearing, and those who choose to make statements will not be cross-examined by other speakers. However, DOE representatives may ask speakers questions to help ensure that DOE understands their comments or suggestions.

For advanced registration to speak at the meeting, please contact Ms. Kristin Kerwin via telephone, mail, fax, or e-mail as listed in the "ADDRESSES" section. For those persons who wish to speak but do not register in advance, DOE will provide an opportunity to speak after previously scheduled speakers have spoken, as time allows. To ensure that everyone who wishes to speak has a chance to do so, DOE will allot at least five minutes to each speaker. Persons wishing to speak on behalf of an organization should identify that organization when they request to speak.

[1] The amount requested for the loan guarantee is not being disclosed at this time because it is business sensitive. Moreover, should DOE approve a loan guarantee, that amount may differ from the original request.

DOE will retain a transcript of the public scoping meeting and will make the transcript available to the public for review via the Golden Field Office Online Public Reading Room at: *http://www.eere.energy.gov/golden/Reading_Room.aspx.* DOE will make available additional copies of the public scoping meeting transcripts during business hours at the following location: Stevens County Library, 500 S. Monroe Street, Hugoton, Kansas 67951.

Schedule: DOE expects to issue the Draft EIS in summer 2009 and will announce the availability of the Draft EIS in the **Federal Register** and local media. DOE will consider comments on the Draft EIS in preparing the Final EIS.

Interested parties who do not wish to submit comments at this time, but who would like to receive a copy of the Draft EIS, should contact Kristin Kerwin, as provided in the "ADDRESSES" section of this notice.

Other Agency Involvement: The Department has invited the U.S. Department of Agriculture to become a cooperating agency in the preparation of this EIS. DOE anticipates that the U.S. Department of Agriculture Rural Business-Cooperative Service will assist with the Department's review process and adopt the Abengoa Biorefinery EIS, to the extent practicable, to satisfy that agency's NEPA-related requirements and support its decisions under section 9003 of the 2008 Farm Bill.

Issued in Washington, DC, on April 22, 2009.

Steven G. Chalk,

Principal Deputy Assistant Secretary, Energy Efficiency and Renewable Energy.

[FR Doc. E9–9716 Filed 4–28–09; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

State Energy Advisory Board (STEAB)

AGENCY: Department of Energy.

ACTION: Notice of Open Meeting.

SUMMARY: This notice announces a meeting of the State Energy Advisory Board (STEAB). The Federal Advisory Committee Act (Pub. L. 92–463; 86 Stat. 770) requires that public notice of these meetings be announced in the **Federal Register**.

DATES: June 23–25, 2009.

ADDRESSES: L'Enfant Plaza Hotel, 480 L'Enfant Plaza, SW. Washington, DC 20024.

FOR FURTHER INFORMATION CONTACT: Gary Burch, STEAB Designated Federal Officer, Office of Commercialization and Project Management, Golden Field Office, U.S. Department of Energy, 1617 Cole Boulevard, Golden, CO 80401, Telephone 303–275–4801.

SUPPLEMENTARY INFORMATION:

Purpose of the Board: To make recommendations to the Assistant Secretary for the Office of Energy Efficiency and Renewable Energy regarding goals and objectives, programmatic and administrative policies, and to otherwise carry out the Board's responsibilities as designated in the State Energy Efficiency Programs Improvement Act of 1990 (Pub. L. 101–440).

Tentative Agenda: Discuss ways STEAB can support DOE's implementation of the Economic Recovery Act, support commercialization efforts for both energy efficiency and renewable energy, consider potential collaborative activities involving the State Energy Offices, and update members on other routine business matters.

Public Participation: The meeting is open to the public. Members of the public who wish to make oral statements pertaining to agenda items should contact Gary Burch at the address or telephone number listed above. Requests to make oral comments must be received five days prior to the teleconference; reasonable provisions will be made to include requested topic(s) on the agenda. Written statements may be filed with the Board either before or after the meeting. The Chair of the Board is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business.

Minutes: The minutes of the meeting will be available for public review and copying within 60 days on the STEAB Web site, *http://www.steab.org.*

Issued at Washington, DC, on April 22, 2009.

Rachel Samuel,

Deputy Committee Management Officer.

[FR Doc. E9–9762 Filed 4–28–09; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Savannah River Site

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Savannah River Site. The Federal Advisory Committee Act (Pub. L. No. 92–463, 86 Stat. 770) requires that public notice of this meeting be announced in the **Federal Register**.

DATES: Monday, May 18, 2009, 1 p.m.–5 p.m.

Tuesday, May 19, 2009, 8:30 a.m.–4 p.m.

ADDRESSES: The Mulberry Inn, 601 East Bay Street, Savannah, Georgia 31401.

FOR FURTHER INFORMATION CONTACT: Gerri Flemming, Office of External Affairs, Department of Energy, Savannah River Operations Office, P.O. Box A, Aiken, SC 29802; Phone: (803) 952–7886.

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to make recommendations to DOE in the areas of environmental restoration, waste management, and related activities.

Tentative Agenda:

Monday, May 18, 2009

1 p.m. Combined Committee Session
5 p.m. Adjourn

Tuesday, May 19, 2009

8:30 a.m. Approval of Minutes, Agency Updates, Public Comment Session, Chair and Facilitator Updates, Administrative Committee Report, Strategic and Legacy Management Committee Report, Public Comment Session
12 p.m. Lunch Break
1 p.m. Waste Management Committee Report, Facility Disposition and Site Remediation Committee Report, Nuclear Materials Committee Report, Public Comment Session
4 p.m. Adjourn

If needed, time will be allotted after public comments for items added to the agenda and administrative details. A final agenda will be available at the meeting Monday, May 18, 2009.

Public Participation: The EM SSAB, Savannah River Site, welcomes the attendance of the public at its advisory committee meetings and will make every effort to accommodate persons with physical disabilities or special needs. If you require special accommodations due to a disability, please contact Gerri Flemming at least seven days in advance of the meeting at the phone number listed above. Written statements may be filed with the Board either before or after the meeting. Individuals who wish to make oral statements pertaining to agenda items should contact Gerri Flemming's office at the address or telephone listed above. Requests must be received five days prior to the meeting and reasonable provision will be made to include the consultation, pursuant to section 7 of the Endangered Species Act, section 305 of the Magnuson-Stevens Fishery Conservation and Management Act, and section 106 of the National Historic Preservation Act.

m. Kenai Hydro, L.L.C. filed a Pre-Application Document (PAD, including a proposed process plan and schedule) with the Commission, pursuant to 18 CFR 5.5 of the Commission's regulations.

n. A copy of the PAD is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site (*http://www.ferc.gov*), using the ''eLibrary'' link. Enter the docket number, excluding the last three digits in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCOnlineSupport@ferc.gov* or toll free at 1–866–208–3676, or for TTY, (202) 502–8659. A copy is also available for inspection and reproduction at the address in paragraph h.

o. Register online at *http://www.ferc.gov/docs-filing/esubscription.asp* to be notified via e-mail of new filing and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Kimberly D. Bose,

Secretary.

[FR Doc. E9–22856 Filed 9–22–09; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

Draft Environmental Impact Statement for the Abengoa Biorefinery Project Near Hugoton, Stevens County, KS (DOE/EIS–0407D)

AGENCY: Office of Energy Efficiency and Renewable Energy, DOE.

ACTION: Notice of Availability.

SUMMARY: The U.S. Department of Energy (DOE) announces the availability of the *Draft Environmental Impact Statement for the Abengoa Biorefinery Project near Hugoton, Stevens County, KS* (DOE/EIS–0407D) (referred to as the ''Draft Abengoa Biorefinery EIS'' or ''Draft EIS''). This Draft EIS was prepared in accordance with the Council on Environmental Quality's National Environmental Policy Act (NEPA) Implementing Regulations (40 CFR parts 1500–1508) and DOE NEPA Implementing Regulations (10 CFR part 1021). The U.S. Department of Agriculture, Rural Development, (USDA–RD) is a cooperating agency in preparation of the Draft Abengoa Biorefinery EIS.

DOE's Proposed Action in the Draft Abengoa Biorefinery EIS is to provide federal funding to Abengoa Bioenergy Biomass of Kansas, LLC (ABBK) to support the final design, construction, and startup of a commercial-scale integrated biorefinery to be located near the city of Hugoton, Stevens County, Kansas (hereafter referred to as the Abengoa Biorefinery Project). The Abengoa Biorefinery Project would use lignocellulosic biomass as feedstock to produce ethanol and biopower (electricity) sufficient to meet the needs of the biorefinery and to sell to the regional power grid. In the Draft EIS, DOE also evaluates an Action Alternative, under which the biorefinery would not produce electricity for sale to the regional grid, and a No-Action Alternative, under which the biorefinery would not be constructed. The Draft Abengoa Biorefinery Project EIS evaluates the potential direct, indirect, and cumulative environmental impacts from the construction and operation of the Abengoa Biorefinery Project. DOE's preferred alternative is the Proposed Action.

DATES: The public is invited to comment on the Draft EIS, and all comments received no later than November 9, 2009 will be addressed in preparing the Final EIS. Comments received after the end of the public comment period will be considered to the extent practicable. A public hearing on the Draft EIS will be held at the Stevens County Courthouse, 200 East 6th St., Hugoton, Kansas 67951–2606, on October 21 2009, from 6 p.m. to 8 p.m. Written and oral comments will be accepted and given equal weight.

ADDRESSES: Copies of this Draft EIS are available for review at The Stevens County Library, 501 S. Monroe Street, Hugoton, KS 67951, 620–544–2301, and the U.S. Department of Energy, FOIA Reading Room, 1E–190, Forrestal Bldg., 1000 Independence Avenue, SW., Washington, DC 20585, 202–586–3142. The Draft EIS is also available on the Golden Field Office On-line FOIA Public Reading Room: *http://www.eere.energy.gov/golden/Reading_Room.aspx,* at: *http://www.biorefineryprojecteis-abengoa.com* and at: *http://www.gc.energy.gov/NEPA.*

How to Comment on the Draft EIS: Oral and written comments on the Draft EIS will be accepted at the public hearing, or written comments may be mailed to Ms. Kristin Kerwin at the U.S. Department of Energy, Golden Field Office, 1617 Cole Boulevard, Golden, Colorado 80401, or submitted via e-mail to: *kristin.kerwin@go.doe.gov*. Envelopes and the subject line of e-mails and faxes should be labeled ''Draft Abengoa Biorefinery EIS Comments.'' Comments or requests for information may also be submitted via the EIS Web site at *http://www.biorefineryprojecteis-abengoa.com*.

FOR FURTHER INFORMATION CONTACT: For information on the Draft Abengoa Biorefinery EIS, or information on how to comment, contact Ms. Kristin Kerwin by any of the means described above under **ADDRESSES**, or access the Abengoa Biorefinery Project EIS Web site at: *http://www.biorefineryprojecteis-abengoa.com.*

For further information on the DOE Office of Energy Efficiency and Renewable Energy Integrated Biorefinery Program, contact Mr. John Ferrell, Biomass Program Manager (Acting), U.S. Department of Energy, 1000 Independence Avenue, SW., EE–2E, 5H–021, Washington, DC 20585, *telephone:* 202–586–6745, *facsimile:* 202–586–1640, *e-mail: eere_biomass@ee.doe.gov.*

For further information on the U.S. Department of Agriculture Rural Business-Cooperative Service Biorefinery Assistance Program contact: Energy Branch, Attention: Biorefinery Assistance Program, 1400 Independence Avenue, SW., Mail Stop 3225, Washington, DC 20250–3225; *telephone:* 202–720–1400.

For general information regarding the DOE National Environmental Policy Act (NEPA) process contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, U.S. Department of Energy, 1000 Independence Avenue, SW., GC–20, Washington, DC 20585; e-mail *AskNEPA@hq.doe.gov;* telephone 202–586–4600; or leave a message at 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

Background: In September 2007, pursuant to the Energy Policy Act of 2005 (EPAct 2005) Section 932, DOE granted an initial award of approximately $15 million to ABBK to advance the conceptual design, initiate the permitting process, and support an environmental review under NEPA for a proposed biomass-to-ethanol and energy facility that would be located adjacent to and west of the city of Hugoton, Stevens County, Kansas. DOE requires completion of the design, permitting, and environmental review obligations prior to deciding whether to co-fund the final design, construction and start-up phases of the project.

On August 25, 2008, DOE initiated the environmental review process by publishing a Notice of Intent in the **Federal Register** (''Notice of Intent to Prepare an Environmental Impact Statement and Notice of Wetlands Involvement for the Abengoa Biorefinery Project Near Hugoton, KS,'' 73 FR 50001). However, based on changes in the scope of the project proposed by ABBK and also ABBK's decision to solicit loan guarantees from DOE's Loan Guarantee Program pursuant to Title XVII of EPAct 2005 and from USDA–RD Biorefinery Assistance Program, DOE published an Amended Notice of Intent in the **Federal Register** on April 29, 2009 (''Amended Notice of Intent To Modify the Scope of the Environmental Impact Statement for the Abengoa Biorefinery Project Near Hugoton, KS'', 74 FR 19543). Public comments were accepted on the original scope of the EIS from August 25 through October 9, 2008, and then on the revised scope from April 29 through May 29, 2009. An initial public scoping meeting was held in Hugoton, KS on September 10, 2008, and an additional public scoping meeting was held on May 19, 2009 to address the revised scope. DOE received both oral and written scoping comments. DOE identified 16 scoping comments and grouped them into three categories reflecting the nature of the individual comments: (1) Support for the project, (2) requests for specific information or analyses and (3) statements of no negative environmental impacts. All requests for specific information are addressed in the Draft EIS.

Proposed Action: DOE's Proposed Action analyzed in the Draft EIS is to provide Federal funding to support the design, construction, and start up of the integrated biorefinery proposed by ABBK. DOE would negotiate an agreement with ABBK to provide approximately $85 million (2008 dollars) for the final design, construction and start up of the biorefinery. The estimated total project cost is approximately $300 million (2008 dollars). At this time, DOE is not considering issuing a loan guarantee for the proposed project. The Abengoa Biorefinery facility would use lignocellulosic biomass (biomass) as feedstock to produce biofuels. Biomass such as corn stover, wheat straw, milo stubble, switchgrass, and other available materials would be harvested as feedstock and fermented to produce ethanol. The biorefinery would also produce electricity.

Under the Proposed Action, the Abengoa Biorefinery would process approximately 2,300 dry metric tons per day of feedstock, which would be obtained from producers within 50 miles of the Abengoa Biorefinery Project site. The biorefinery would produce up to 18 million gallons of denatured ethanol per year using a one-step feedstock hydrolysis and fermentation process. The biorefinery also would produce 92 megawatts of electricity, and 117,000 dry short tons per year of lignin-rich stillage cake. Electricity would be produced via a high-pressure, steam-condensing turbine generator. Seventy megawatts of electricity would be sold commercially. The lignin-rich stillage cake could be sold to a lignin producer, processed and lignin-poor stillage cake would be returned to the biorefinery and burned in the solid fuel boiler.

Action Alternative: For the Action Alternative, DOE would provide Federal funding for an integrated biorefinery that would produce approximately 12 million gallons per year of denatured ethanol, 45,000 dry short tons per year of lignin-rich stillage cake, and 20 megawatts of electricity for use at the facility (none sold commercially).

Under the Action Alternative, the integrated biorefinery would use a two-stage process to pretreat, hydrolyze and ferment sugars for ethanol production, and would produce syngas using a gasification system. A syngas boiler as well as the biomass boilers would produce steam. Steam would be used for ethanol production processes and electricity production. The biomass boilers and the turbines would be used to generate electricity solely to operate the plant (no electricity would be sold commercially) and would be smaller than those for the Proposed Action.

No Action Alternative: Under the No Action Alternative, DOE would not provide Federal funding to ABBK to support the final design, construction, and start-up of the Abengoa Biorefinery Project. Under the No Action Alternative, the Draft EIS presumes that ABBK would not build a biorefinery. The Department recognizes, however, that ABBK could pursue alternative sources of capital for development of the biorefinery.

Preferred Alternative: The Proposed Action is DOE's Preferred Alternative.

Following the end of the public comment period, November 9, 2009, DOE will consider and respond to the comments received, and issue the Final Abengoa Biorefinery EIS. DOE will issue a Record of Decision no sooner than 30 days after the U.S. Environmental Protection Agency issues a Notice of Availability of the Final EIS in the **Federal Register**.

Issued in Golden, CO on September 15, 2009.

Steve Blazek,

NEPA Compliance Officer, Golden Field Office.

[FR Doc. E9–22920 Filed 9–22–09; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. NJ08–5–003]

Bonneville Power Administration; Transmission Service Terms and Conditions; Notice of Filing

September 16, 2009.

Take notice that on September 14, 2009, Bonneville Power Administration (BPA), pursuant to 18 CFR 35.28(e) and 18 CFR 385.207, filed certain amendments to Attachment K to its Open Access Transmission Tariff in response to the Commission's July 16, 2009 Order, *United States Department of Energy—Bonneville Power Administration,* 128 FERC ¶ 61,065 (2009). BPA also request a declaratory order accepting their proposed Attachment K as revised, finding that it satisfies the Commission's standards for reciprocity.

Any person desiring to intervene or to protest this filing must file in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211, 385.214). Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a notice of intervention or motion to intervene, as appropriate. Such notices, motions, or protests must be filed on or before the comment date. Anyone filing a motion to intervene or protest must serve a copy of that document on the Applicant and all the parties in this proceeding.

The Commission encourages electronic submission of protests and interventions in lieu of paper using the ''eFiling'' link at *http://www.ferc.gov*. Persons unable to file electronically should submit an original and 14 copies of the protest or intervention to the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426.

This filing is accessible on-line at *http://www.ferc.gov*, using the ''eLibrary'' link and is available for review in the Commission's Public Reference Room in Washington, DC. There is an ''eSubscription'' link on the information on these issues, additional mitigation, financial assurance for reclamation and post-closure monitoring. Rating EC2.

Final EISs

EIS No. 20090206, ERP No. F–NOA–E91026–00, Programmatic EIS—Fishery Management Plan for Regulating Offshore Marine Aquaculture in the Gulf of Mexico, To Increase the Maximum Sustainable Yield (MSY) and Optimum Yield (OY), Implementation.

Summary: EPA expressed environmental concern about the potential for excess nutrients to cause organic loading within the water column.

EIS No. 20090228, ERP No. F–CGD–E03019–FL, Port Dolphin LLC Liquefied Natural Gas Deepwater Port License Application, Proposes to Own, Construct and Operate a Deepwater Port, Outer Continental Shelf, Manatee County, FL.

Summary: EPA does not object to the proposed action.

Dated: September 22, 2009.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E9–23227 Filed 9–24–09; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–8597–6]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–1399 or *http://www.epa.gov/compliance/nepa/*.

Weekly receipt of Environmental Impact Statements

Filed 09/14/2009 through 09/18/2009.

Pursuant to 40 CFR 1506.9.

EIS No. 20090324, Draft EIS, AFS, 00, Nebraska National Forests and Grassland Travel Management Project, Proposes to Designate Routes and Areas Open to Motorized Travel, Buffalo Gap National Grassland, Oglala National Grassland, Samuel R. McKelvie National Forest, and the Pine Ridge and Bessey Units of the Nebraska National Forest, Fall River, Custer, Pennington, Jackson Counties; SD and Sioux, Dawes, Cherry, Thomas and Blaine Counties, NE, Comment Period Ends: 11/09/2009, Contact: Mark Reichert, 530–841–4422.

EIS No. 20090325, Draft EIS, NHT, 00, Corporate Average Fuel Economy (CAFÉ) Standards Passenger Car and Light Trucks Model Years 2012–2016, To Reduce National Energy Consumption by Increasing the Fuel Economy of Passenger Car and Light Trucks sold in the United States, Implementation, Comment Period Ends: 11/09/2009, Contact: Jessica GT Wilson, 202–366–0176.

EIS No. 20090326, Final EIS, USN, FL, Naval Surface Warfare Center Panama City Division (NSWC PCD), Capabilities to Conduct New and Increased Mission Operations for the Department of Navy (DON) and Customers within the three Military Operating Area and St. Andrew Bay (SAB), Gulf of Mexico, FL, Wait Period Ends: 10/26/2009, Contact: Carmen Ferrer, 850–234–4146.

EIS No. 20090327, Final EIS, STB, AK, Northern Rail Extension Project, Construct and Operate a Rail Line between North Pole and Delta Junction, AK, Wait Period Ends: 10/26/2009, Contact: Dave Navecky, 202–245–0294.

EIS No. 20090328, Final EIS, FRC, 00, Phase VIII Expansion Project, Proposed to Construct, Own, Operate, and Maintain New Interstate National Gas Pipeline, Compressor, and Ancillary Facilities in Alabama and Florida, Wait Period Ends: 10/26/2009, Contact: Julia Bovey 1–866–208–3372.

EIS No. 20090329, Draft EIS, DOE, KS, Abengoa Biorefinery Project, To Support the Design, Construction, and Startup of a Commercial-Scale Integrated Biorefinery, Federal Funding, Located near the City Hugoton, Stevens County, KS, Comment Period Ends: 11/09/2009, Contact: Kristin Kerwin, 303–275–4968.

EIS No. 20090330, Draft EIS, USN, CA, Marine Corps Base Camp Pendleton Basewide Utilities Infrastructure Construct and Operate Six Utility Infrastructure Project, San Diego County, CA, Comment Period Ends: 11/09/2009, Contact: Jesse Martinez, 619–532–3844.

EIS No. 20090331, Final EIS, COE, CA, San Pedro Waterfront Project, Proposed Specific Development Project and Associated Infrastructure Improvements on Approximately 400 Acres, Currently Operated by Los Angeles Harbor Department (LAHD), Located along the West Side of Los Angeles Harbor's Main Channel, from the Vincent Thomas Bridge to Cabrillo Beach, US Army Section 10 and 404 and Section 103 Marine Protection, Research, and Sanctuaries Act Permits, (MPRSA) City of Los Angeles, CA, Wait Period Ends: 10/26/2009, Contact: Dr. Spencer D. MacNeil, 805–585–2152.

Amended Notices

EIS No. 20090267, Draft EIS, AFS, MT, Bitterroot National Forest Travel Management Planning, To Address Conflicts between Motorized and Non-Motorized Users, Ravalli County, MT, Comment Period Ends: 11/09/2009, Contact: Dan Ritter, 406–777–5461. Revision to FR Notice Published 08/07/2009: Extending Comment Period from 09/21/2009 to 11/09/2009.

EIS No. 20090272, Draft EIS, UAF, 00, Modification of the Condor 1 and Condor 2 Military Operation Areas, 104th Fighter Wing of the Massachusetts Air National Guard Base (ANG) Proposes to Combine the Condor 1 and Condor 2 MOA, ME and NH, Comment Period Ends: 01/01/2010, Contact: Jay Nash, 703–614–0346. Revision to FR Notice Published 08/07/2009: Extending Comment Period from 09/21/2009 to 11/09/2009.

EIS No. 20090277, Draft EIS, AFS, CO, Hermosa Park/Mitchell Lakes Land Exchange Project, Proposed Land Exchange between Federal and Non-Federal Lands, Implementation, Federal Land in LaPlata County and Non-Federal Land in San Juan County, CO, Comment Period Ends: 10/30/2009, Contact: Cindy Hockelberg, 970–884–1418. Revision to **Federal Register** Notice Published 08/17/2009: Extending Comment Period from 10/01/2009 to 10/30/2009.

EIS No. 20090311, Final EIS, USN, WA, Naval Base Kitsap—Bangor, Construct and Operate a Swimmer Interdiction Security System (SISS), Silverdale Kitsap County, WA, Wait Period Ends: 10/13/2009, Contact: Shannon Kasa, 619–553–3889. Revision to FR Notice Published 09/11/2009: Correction to Telephone Number.

Dated: September 22, 2009.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. E9–23228 Filed 9–24–09; 8:45 am]

BILLING CODE 6560–50–P

Appendix H

Distribution List

CONTENTS

H. DISTRIBUTION LIST

The U.S. Department of Energy (DOE or the Department) is providing copies of this Abengoa Biorefinery Project EIS to federal, state, and local elected and appointed officials and agencies of government; American Indian groups; and other interested groups and individuals. Copies will be provided to other interested parties upon request.

H.1 United States Congress

H.1.1 UNITED STATES SENATORS FROM KANSAS

The Honorable Samuel "Sam" Brownback
U.S. Senator

The Honorable Pat Roberts
U.S. Senator

H.1.2 UNITED STATES REPRESENTATIVE FROM KANSAS

The Honorable Jerry Moran
U.S. Representative
District 1 of Kansas

H.1.3 UNITED STATES SENATE COMMITTEES

Senate Committee on Energy and Natural Resources

The Honorable Jeff Bingaman
Chairman

The Honorable Lisa Murkowski
Ranking Member

Senate Committee on Appropriations

The Honorable Daniel K. Inouye
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The Honorable Thad Cochran
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Senate Committee on Agriculture, Nutrition and Forestry

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Senate Committee on Environment and Public Works

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The Honorable James M. Inhofe
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The Honorable Joe Barton
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House Committee on Energy & Commerce, Subcommittee on Energy and the Environment

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Chairman

The Honorable Fred Upton
Ranking Member

House Committee on Agriculture

The Honorable Collin C. Peterson
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The Honorable Frank D. Lucas
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House Committee on Appropriations

The Honorable David Obey
Chairman

The Honorable Jerry Lewis
Ranking Member

House Committee on Appropriations, Subcommittee on Energy and Water Development

The Honorable Ed Pastor
Chairman

The Honorable Rodney Frelinghuysen
Ranking Member

Select Committee on Energy Independence and Global Warming

The Honorable Edward J. Markey
Chairman

The Honorable F. James Sensenbrenner, Jr.
Ranking Minority Member

H.2 Federal Agencies

Joe Cothern
NEPA Coordination Team Leader
U.S. Environmental Protection Agency
Region VII

Dr. Ronald Hammerschmidt, Director
Environmental Services Division
U.S. Environmental Protection Agency
Region VII

Mike LeValley
U.S. Fish and Wildlife Service

Dr. Robert Fireovid
National Program Leader for Bioenergy
Agricultural Research Service
U.S. Department of Agriculture

Reid Nelson
Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation

Matthew Ponish
Farm Service Agency
U.S. Department of Agriculture

Sarah Reznicek
U.S. Army Corps of Engineers

Ken Sessa
Regional Environmental Officer
DHS/FEMA Regions VII

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State Conservationist
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U.S. Department of the Interior

Dan Jantzen
Natural Resources Conservation Service

John "Matthew" Harrington
National Environmental Coordinator
Natural Resources Conservation Service

J. Michael Bowen
Division Administrator
Kansas Division
Federal Highway Administration

Mark Matusiak
Civil Works Policy and Policy Compliance Division
Office ow Water Project Review
U.S. Army Corps of Engineers

Steve Graber
Natural Resources Conservation Service

H.3 State of Kansas

H.3.1 STATE ELECTED OFFICIALS

The Honorable Mark Parkinson
Governor of Kansas

The Honorable Steve Morris
Kansas State Senate
District 39

The Honorable Bill Light
Kansas State House of Representatives
District 124

H.3.2 STATE AND LOCAL AGENCIES AND OFFICIALS

John Mitchell
Director, Division of Environment
Kansas Department of Health and Environment

Eric Johnson
Kansas Department of Wildlife and Parks

Adrian Polansky
Secretary of Agriculture
Kansas Department of Agriculture

Gary Baker
Kansas Water Authority

Larry L. Thompson
Kansas Department of Transportation

Jennie Chinn
Kansas State Historical Society

Tia Bell
Farm Service Agency

Kansas Department of Commerce
Southwest Kansas Regional Business Development

The Honorable Dave Bozone
Chairman, Stevens County Commissioner
District 3

The Honorable Gary Baker
Stevens County Commissioner
District 2

Robert Johnson
Stevens County Attorney/Counselor

The Honorable O.D. Littrel
Stevens County Commissioner
District 1

Paul Kitzke
Stevens County Attorney/Counselor

Ted Heaton
Stevens County Sheriff

J.C. Cantrell
County Engineer
Stevens County Road Department

Director
Hugoton Municipal Airport

Neal Gillespie
Director
Stevens County Economic Development

Mike Schechter
Director
Stevens County Emergency Services

Paula Rowden
Stevens County Health Department

Barry Angell
Treasurer
Stevens County Economic Development

Manager
Forewinds Municipal Golf Course

Tony Martin
City Inspector
City of Hugoton

The Honorable Jack Rowden
Mayor
City of Hugoton

Farm Bureau Association – Hugoton

The Honorable Bob Mason
Hugoton City Council

The Honorable Gary Baughman
Hugoton City Council

The Honorable Kim Harper
Hugoton City Council

The Honorable Greg Gill
Hugoton City Council

Wayne Tate
City Attorney
City of Hugoton

The Honorable Mike Eshbaugh
Hugoton City Council

Dean Banker
Outside Utilities Supervisor
City of Hugoton

Thomas Hicks
City Clerk
City of Hugoton

Dawn Maas
Stevens County Hospital

Carol Meyer
Southwest Region Representative
Office of Rural Opportunity

Courtney Leslie
Police Chief
Hugoton Police Department

Mark Crawford
Superintendent of Schools

Gardell Schnable
Principal
Hugoton High School

H.4 Other States and Territories

Colorado
The Honorable Bill Ritter
Governor of Colorado

Texas
The Honorable Rick Perry
Governor of Texas

Denise Stines Francis
State of Texas Single Point of Contact
Governor's Office of Budget, Planning, and Policy; State Grants Team

Other
Doug Larson
Executive Director
Western Interstate Energy Board

Oklahoma
The Honorable Brad Henry
Governor of Oklahoma

Terry Zrubek
State of Texas
Governor's Advisor – Water

Toby Baker
State of Texas
Governor's Advisor – Natural Resources and Agriculture

H.5 American Indian Tribes and Organizations

The Honorable Alonzo Chalepah
Chairman
Apache Tribe of Oklahoma

The Honorable Wallace Coffey
Chairman
Comanche Nation of Oklahoma

The Honorable Billy Evans Horse
Chairman
Kiowa Tribe of Oklahoma

Francis Morris
Pawnee Nation of Oklahoma

Gary McAdams
President
Wichita and Affiliated Tribes

H.6 Other Groups and Individuals

Dr. Thomas Robb
Abengoa Bioenergy

Greg Duncan
Cargill Ag Horizons

Christopher Roach
Abengoa Bioenergy

John Hanney
Seaboard Foods Inc.

Fred Krupp
President
Environmental Defense Fund

David Goldstein
Energy Program Director
Natural Resources Defense Council

Ed Hopkins
Sierra Club

Kassie Siegel
Air and Climate Energy Director
Center for Biological Diversity

Gary Rowden
Power Plant

Ruthie Winget
Hugoton Hermes News

Louis Zeller
Blue Ridge Environmental Defense League

Robert Robinson
Senior Economist
Center for Applied Research

Paul Schwartz
National Policy Coordinator
Clean Water Action

Scott C. Yaich, Ph.D.
Director of Conservation Programs
Ducks Unlimited, Inc.

Ryan Stockwell
Executive Director
The Minnesota Project

Rachel Jacobson
Director of Special Funds
National Fish and Wildlife Foundation

Steve Thomas
Regional Field Director
Northern Plains Office
Sierra Club

Gary and Connie Gold
Private Citizens

Mark Baker
Private Citizen

Warren Spikes
Private Citizen

Paul Simpson
Private Citizen

Bemon and Marilyn Chastine
Private Citizens

Walter Beesley
Private Citizen

Elvas Clark
Private Citizen

G & S Morris
Private Citizen

Jan and Dettra Crawford
Private Citizens

Jim Moss
Private Citizen

Don and Connie Swinney
Private Citizens

B. Moss
Private Citizen

Frank Walker
Private Citizen

Bryan and Aurora Crawford
Private Citizens

H.7 Public Reading Rooms and Libraries

Kevin Haggerty
U.S. Department of Energy
Freedom of Information Act Reading Room
1000 Independence Avenue, SW, 1G-033
Washington, DC 20585

U.S. Department of Energy
Office of Legacy Management
2597 B ¾ Road
Grand Junction, CO 81503

Cindy Sandoval
Golden Field Office
U.S. Department of Energy
DOE Public Reading Room
617 Cole Boulevard, Mail Stop 1501
Golden, CO 80401

Eunice Schroeder
Director
Stevens County Library
500 Monroe
Hugoton, KS 67951

Appendix I

Parameter Values Table

I. PARAMETER VALUES TABLE

The Parameter Values Table contains design and operations data Abengoa Bioenergy supplied to DOE. For example, the Table contains analytical details such as tank sizes, tonnage shipped, flow rates, manpower, and chemical quantities that DOE used to analyze the alternatives. DOE independently evaluated such information and documentation and retained responsibility for determining the appropriateness and adequacy of incorporating such data and analyses in this Final EIS. These data are cited appropriately throughout this EIS.

The Parameter Values Table is grouped alphabetically by resource area (such as accidents, air quality, Biological Resources) and the columns are defined in the table below (from left to right).

Column number	Column heading	Description of content
1	Resource Area	The areas of study that were evaluated for environmental consequences resulting the proposed biorefinery.
2	Parameter Name	Item of interest.
3	Value DEIS PA	The value for the parameter used for the Proposed Action in the Draft EIS.
4	Value FEIS PA	The value for the parameter used for the Proposed Action in the Final EIS.
5	Value FEIS Option (wood)	The value for the parameter used for the Proposed Action with wood waste as a feedstock in the Final EIS.
6	DEIS/FEIS AA	The value for the parameter used for the Action Alternative in the Draft and Final EISs.
7	Scenario 3 (FEIS PA + Starch Plant)	The value for the parameter used for cumulative impact analysis of the future addition of a grain-to-ethanol facility to the biorefinery. The values in Column 7 minus the values in Column 4 equal the incremental changes associated with the addition of a grain-to-ethanol facility to the Proposed Action in the Final EIS.
8 – 10	Source of Value	The sources of the values in Columns 5, 6, and 7.
11 – 13	Rationale/Notes	Information and notes pertaining to the values in Columns 5, 6, and 7.
14	Owner	The entity or person responsible for supplying or calculating the values.

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Accidents																
	Chemical Storage Capacity															
	50% caustic (gal)	10000	15000	15000	9800	15000	Dec09 PTE - F424	Sized for 400 dtpd EH	Dec09 PTE - F546	Dec09 PTE/EPC Proposal	Tank size adjusted for smaller EH Plant	Dec09 PTE/EPC Proposal				ABBK
	20% aqua ammonia (gal) EH	30400	90000	90000	13000	90000	Dec09 PTE - F452 correction	Sized for 400 dtpd EH	Dec09 PTE - F574	Dec09 PTE/EPC Proposal	Tank size adjusted for smaller EH Plant	Dec09 PTE/EPC Proposal				ABBK
	94% sulfuric acid (gal)	50400	45000	45000	32300	45000	Dec09 PTE - F410	Sized for 400 dtpd EH	Dec09 PTE - F532	Dec09 PTE/EPC Proposal	Tank size adjusted for smaller EH Plant	Dec09 PTE/EPC Proposal				ABBK
	42% urea (gal)	13300	0	0	10800	Urea for starch below	**No Urea for EH**	Sized for 400 dtpd EH	**No Urea for EH**	No Urea for EH or Blrs	Tank size adjusted for smaller EH Plant	Urea for Starch below				ABBK
	Cellulase (gal)	53600	(2) 22,500	(2) 22,500	31500	(2) 22,500	Dec09 PTE - F494 + F508	Sized for 400 dtpd EH	Dec09 PTE - F615 + F629	Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal includes only a single tank at 43,200 gallons capacity			ABBK
	Media (e.g., corn syrup, molasses) (gal)	53000	90000	90000	17500	90000	Dec09 PTE - F480	Sized for 400 dtpd EH	Dec09 PTE - F601	Dec09 PTE/EPC Proposal	Tank size adjusted for smaller EH Plant	Dec09 PTE/EPC Proposal				ABBK
	Hydrated Lime silo (cubic feet)	8000	(2) 2000	(2) 2000	10770	(2) 2000	EPI Proposal	Estimated for 300 dptd Gasifier + 240 dtpd boiler	EPI Proposal	EPI Proposal	Estimated based on smaller capacities	EPI Proposal				ABBK
	Limestone (cubic feet)	3000	(2) 2000	(2) 2000	NA	(2) 2000	EPI Proposal	Estimated for 300 dptd Gasifier + 240 dtpd boiler	EPI Proposal	EPI Proposal	Estimated based on smaller capacities	EPI Proposal	EPC Proposal currently does not include a limestone silo			
	Antifoam Tank (gal)	NA	10000	10000	NA	10000	Dec09 PTE - F522	Sized for 400 dtpd EH	Dec09 PTE - F643	Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal currently does not include an anitfoam tank			
	Denaturant (gal)	22,500	22,500	22,500	17,600	150,000 + 22,500	Dec09 PTE - F355	Apr09 PTE for EH and Gas Only	Dec09 PTE - F423 +F438	Denaturant is gasoline.	Denaturant is gasoline.	Denaturant is gasoline.				ABBK
	Corrosion inhibitor (DCI - 11®) (gal)	400	400	400	400	400		Sized for 400 dtpd EH		corrosion inhibitor is received in totes.	corrosion inhibitor is received in totes.	corrosion inhibitor is received in totes.				ABBK
	Denatured ethanol (gal)	460,000	460,000	460,000	420,000	(3) 1,000,000 + (1) 460,000	Dec09 PTE - F340	Apr09 PTE for EH and Gas Only	Dec09 PTE - F363 + F378 + F393 + F408	Dec09 PTE/EPC Proposal	Tank size adjusted for smaller EH Plant	Dec09 PTE/EPC Proposal				ABBK
	Off-spec ethanol (gal)	60,000	45,200	45,200	35,000	(1) 150,000 + (1) 45,200	Dec09 PTE - F396	Apr09 PTE for EH and Gas Only	Dec09 PTE - F518	Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal provides 23,000 gallon tank			ABBK
	Product shift tanks (gal)	(2) 60000	(2) 45,200	(2) 45,200	(2) 35,000	(2) 150,000 + (2) 45,200	Dec09 PTE - F370 + F383	Apr09 PTE for EH and Gas Only	Dec09 PTE - F492 + F505	Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal provides 23,000 gallon tank			ABBK
	50% magnesium hydroxide (gal)	1000	1000	1000	1000	1000	Dec 09 PTE	Sized for 400 dtpd EH	Dec09 PTE	Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal currently does not include this tank			ABBK
	Diammonium phosphate (gal)	500	500	500	500	500		Sized for 400 dtpd EH		Dec09 PTE	Tank size adjusted for smaller EH Plant	Dec09 PTE	EPC Proposal currently does not include this tank			ABBK
	50% caustic (gal) for Starch	0	0	0	0	9800	No Starch Plant	No Starch Plant	Dec09 PTE	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	20% aqua ammonia (gal) Boiler	45000	45000	45000	0	45000	Dec09 PTE - F466		Dec09 PTE - F588	Dec09 PTE		Dec09 PTE				ABBK
	94% sulfuric acid (gal) for Starch	0	0	0	0	32300	No Starch Plant	No Starch Plant	Dec09 PTE	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	42% urea (gal)	0	0	0	0	29076	No Starch Plant	No Starch Plant	Dec09 PTE - F685	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	Phosphoric acid (gal)	0	0	0	0	7050	No Starch Plant	No Starch Plant	Dec09 PTE - F560	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	Alpha-Amylase (gal)	0	0	0	0	12300	No Starch Plant	No Starch Plant	Dec09 PTE - F657	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	Amyloglucosidase (gal)	0	0	0	0	12300	No Starch Plant	No Starch Plant	Dec09 PTE - F671	N/A	N/A	Additional tank for Scenario 3 only				ABBK
	Ethanol storage tank dimensions															
	diameter	45 ft.	43 ft.	43 ft.	45 ft	60ft. (1MM gal tanks)	Dec09 PTE - F348	Apr09 PTE for EH and Gas Only	Dec09 PTE - F386							ABBK
	height	39 ft.	43 ft.	43 ft.	36 ft	48ft. (1MM gal tanks)	Dec09 PTE - F350	Apr09 PTE for EH and Gas Only	Dec09 PTE - F388							ABBK
	wind design	90mph	90mph	90mph	90mph	90mph										ABBK
	seismic design	1.1pga	1.1pga	1.1pga	1.1pga	1.1pga	NRC generic fragilities									EIS Team
	failure frequency	8.8E-4/yr.	8.8E-4/yr.	8.8E-4/yr.	8.8E-4/yr.	8.8E-4/yr.	EPRI ALWR Utility Requirements Document									EIS Team
	Ethanol shift and off-spec tank dimensions															
	shift tank diameter	20 ft.	20 ft.	20 ft.	20 ft.	25ft. (150K gal tanks)	Dec09 PTE - F376	Apr09 PTE for EH and Gas Only	Dec09 PTE - F498							ABBK
	shift tank height	26 ft.	20 ft.	20 ft.	15 ft	41ft (150K gal tanks)	Dec09 PTE - F378	Apr09 PTE for EH and Gas Only	Dec09 PTE - F500							ABBK
	off-spec tank diameter	20 ft.	20 ft.	20 ft.	20 ft.	25ft. (150K gal tanks)	Dec09 PTE - F389	Apr09 PTE for EH and Gas Only								ABBK
	off-spec tank height	26 ft.	20 ft.	20 ft.	15 ft	41ft (150K gal tanks)	Dec09 PTE - F391	Apr09 PTE for EH and Gas Only								ABBK

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Accidents (continued)	**Dimension of berm around ethanol tank farm**															
	width	150ft.	150ft.	150ft.	150ft.	150ft.	scaled from drawing, ftp file 031309, data need #1									P. Davis
	length	175ft.	175ft.	175ft.	175ft.	175ft.	scaled from drawing, ftp file 031309, data need #1									P. Davis
	Hugoton airport															
	distance from plant to runway	1.3mi	1.3mi	1.3mi	1.3mi	1.3mi	from Airnav 2008									EIS Team
	annual aircraft operations	9855	9855	9855	9855	9855	from Airnav 2008									EIS Team
	Town of Hugoton															
	population	3412	3412	3412	3412	3412	City of Hugoton 2008									EIS Team
	population increase due to plant employment	35	35	35	28	98	Data Need 8 / Socioeconomics Section									ABBK
	distance from plant to nearest residence	2600ft.	2600ft.	2600ft.	2600ft.	2600ft.	Scaled from drawing									P. Davis
	Stevens County															
	area	729mi2	729mi2	729mi2	729mi2	729mi2										EIS Team
	tornado frequency	0.38/yr	0.38/yr	0.38/yr	0.38/yr	0.38/yr	Cowleycounty 2008									EIS Team
Air Quality																
										Process Descriptions and flow diagrams						ABBK
										Updated PTE calculations & emission inventories for each of the 3 scenarios						ABBK
										were provided 12/18/09. Information on						
										used by the Jason team for air dispersion modeling and analysis						
										of AQ impacts. Meteorological data was received 3/6/09.						
										ABBK's contractor modeling results and AQ Impact Assessment						ABBK
										Report issued in January 2010.						
										Air pollution control equipment vendor guarantees are expected						ABBK
										in April 2010.						
										ABBK's PSD AQ Construction Permit						ABBK
										January 2010.						

		Value	Value	Value			Source of Value			Rationale/Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Air Quality (continued)																
										Updated GREET model results for each of the 3 scenarios were						ABBK
										provided in March 2010						
							Appendix F to the EIS will be the Jason team air dispersion modeling analysis									
	Uncontrolled Facility-wide emissions (tons/year)															
	(50% DDGS production for Scenario 3)															
	PM	4,820.53	13,398.71	13,398.71	528.95	14,396.01	Dec09 PTE Scenario 1 Uncontrolled G94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled G94							ABBK
	PM 10	3,923.22	11,605.95	11,605.95	343.16	12,489.30	Dec09 PTE Uncontrolled H94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled H94							ABBK
	NOx	1,985.11	1,952.10	1,412.45	1,955.86	2,032.66	Dec09 PTE Uncontrolled J94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled J94							ABBK
	SO2	1,657.27	2,568.68	2,306.06	464.3	2,569.84	Dec09 PTE Uncontrolled K94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled K94							ABBK
	CO	1,065.54	1,217.37	1,181.68	216.78	1,310.86	Dec09 PTE Uncontrolled L94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled L94							ABBK
	VOC	2,779.56	7,929.86	7,929.86	2,602.90	17,534.73	Dec09 PTE Uncontrolled M94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled M94							ABBK
	PM 2.5	3,256.70	9,900.56	9,900.56	254.42	10,232.69	Dec09 PTE Uncontrolled I94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled I94							ABBK
	single HAP	1,853.96	2,487.28	1,371.56	233.68	2,487.28	Dec09 PTE HAPs Uncontrolled G195	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled N94							ABBK
	total HAPs	2,009.06	2,698.66	1,582.94	268.37	3,220.29	Dec09 PTE Uncontrolled O94	Apr09 PTE EH and Gas Only	Dec09 PTE Scenario 3 Uncontrolled O94							ABBK
	Uncontrolled Facility-wide emissions (tons/year)															
	(100% WDGS production for Scenario 3)															
	PM	NA	NA	NA	NA	14,167.49			Dec09 PTE Scenario 3 Uncontrolled G95							ABBK
	PM 10	NA	NA	NA	NA	12,274.53			Dec09 PTE Scenario 3 Uncontrolled H95							ABBK
	NOx	NA	NA	NA	NA	2,016.85			Dec09 PTE Scenario 3 Uncontrolled J95							ABBK
	SO2	NA	NA	NA	NA	2,569.63			Dec09 PTE Scenario 3 Uncontrolled K95							ABBK
	CO	NA	NA	NA	NA	1,282.12			Dec09 PTE Scenario 3 Uncontrolled L95							ABBK
	VOC	NA	NA	NA	NA	16,661.69			Dec09 PTE Scenario 3 Uncontrolled M95							ABBK
	PM 2.5	NA	NA	NA	NA	10,024.43			Dec09 PTE Scenario 3 Uncontrolled I95							ABBK
	single HAP	NA	NA	NA	NA	2,487.28			Dec09 PTE Scenario 3 Uncontrolled N95							ABBK
	total HAPs	NA	NA	NA	NA	3,147.06			Dec09 PTE Scenario 3 Uncontrolled O95							ABBK
	Controlled Facility-wide emissions (tons/year)															
	(50% DDGS production for Scenario 3)															
	PM	232.88	377.82	377.82	32.3	404.26	Dec09 PTE Scenario 1 Controlled G94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled G151							ABBK
	PM 10	215.13	349.50	349.50	26.44	373.28	Dec09 PTE Controlled H94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled H151							ABBK
	NOx	993.21	1270.91	920.13	313.92	1,351.46	Dec09 PTE Controlled J94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled J151							ABBK
	SO2	166.06	257.56	231.3	46.5	258.73	Dec09 PTE Controlled K94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled K151							ABBK
	CO	1,065.54	1,217.37	1,181.68	216.78	1,310.86	Dec09 PTE Controlled L94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled L151							ABBK

		Value	Value	Value			Source of Value			Rationale/Notes						Owner
Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3				
Air Quality (continued)	VOC	157.45	233.11	233.11	58.27	367.93	Dec09 PTE Controlled M94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled M151							ABBK
	PM 2.5	205.68	328.46	328.46	24.29	351.46	Dec09 PTE Controlled I94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled I151							ABBK
	single HAP	18.54	124.36	68.58	4.67	124.36	Dec09 PTE HAPs Controlled G195	Apr09 PTE EH and Gas Only	Dec09 PTE HAPs Controlled G195							ABBK
	total HAPs	32.37	158.05	102.26	7.81	170.26	Dec09 PTE Controlled O94	Apr09 PTE EH and Gas Only	Dec09 PTE Controlled O151							ABBK
	Controlled Facility-wide emissions (tons/year)															
	100% WDGS production for Scenario 3)															
	PM	NA	NA	NA	NA	385.59			Dec09 PTE Controlled G152							ABBK
	PM 10	NA	NA	NA	NA	355.42			Dec09 PTE Controlled H152							ABBK
	NOx	NA	NA	NA	NA	1,335.66			Dec09 PTE Controlled J152							ABBK
	SO2	NA	NA	NA	NA	258.51			Dec09 PTE Controlled K152							ABBK
	CO	NA	NA	NA	NA	1,282.12			Dec09 PTE Controlled L152							ABBK
	VOC	NA	NA	NA	NA	352.35			Dec09 PTE Controlled M152							ABBK
	PM 2.5	NA	NA	NA	NA	333.83			Dec09 PTE Controlled I152							ABBK
	single HAP	NA	NA	NA	NA	124.36			Dec09 PTE HAPs Controlled G195							ABBK
	total HAPs	NA	NA	NA	NA	168.87			Dec09 PTE Controlled O152							ABBK
	Uncontrolled total direct CO2	1,654,938	3,609,877	3,620,996	426,917	4,144,871	Dec09 PTE Scenario 1 Uncontrolled P153	Apr09 PTE EH and Gas Only	Dec09 PTE Uncontrolled P151			50% DDGS				ABBK
	plus CO2 equiv.					(50% DDGS)										
	(tons/year)															
	CO2 capture (%)	0	0	0	0	100	Dec09 PTE	Apr09 PTE	Dec09 PTE							ABBK
Biological Resources																
							DN16	DN16	DN16	Feedstock harvesting and storage information is included in						ABBK
										the Land Use section. Received responses from ABBK to the 3/2/09						
										clarification requests for DN16 on 3/6/09.						
							DN17	DN17	DN17	Buffer will be used to grow experimental biomass crops and						ABBK
							DN62	DN62	DN62	a portion may be leased for crop farming. The buffer area						ABBK
							DN63	DN63	DN63	will be irrigated with non-contact cooling wastewater. The						ABBK
										winter cooling water storage basin will not be located on						
										the buffer area. No biomass will be stored on the buffer area.						

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3				
Biological Resources (continued)										Structures will not be constructed on the buffer area. Wastewater						
										treatment plant sludge will NOT be applied on the buffer area.						
										These are all clarifications made by ABBK on the 3/3/09						
										conference call.						
										The majority of data used in analysis of impacts to biological						
										resources such as T&E species, critical habitat, flora, fauna,						
										managed lands, high quality natural lands, etc. fall under other						
										primary resource areas such as land use, transportation, and						
										aesthetics. Primary impacts would be anticipated from land						
										disturbance, noise, vibration, changed land use, and changed						
										traffic volume and patterns.						
	USFWS correspondence						Appendix H	Appendix H	Appendix H							EIS Team
	KDWP correspondence						Appendix H	Appendix H	Appendix H							EIS Team
Cultural Resources																
	KS SHPO correspondence						Appendix H	Appendix H	Appendix H							EIS Team
	KS State Historic Register						Appendix G	Appendix G	Appendix G							EIS Team
	National Historic Register						Appendix G	Appendix G	Appendix G							EIS Team
	Cultural Resources Study						Appendix E	Appendix E	Appendix E							EIS Team
	EDR Reports						Appendix G	Appendix G	Appendix G							EIS Team
										The majority of data used in analysis of impacts to cultural						
										resources such as historical structures, buildings of historical						
										significance, historic register sites, graves, American Indian						
										concerns, etc. fall under other primary resource areas such as						
										land use, transportation, air quality, and aesthetics. Primary						
										impacts would be anticipated from land disturbance, noise,						
										vibration, changed land use, changed traffic volume and						
										patterns, and air emissions.						

Abengoa EIS Project Analytical Parameter Values

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Groundwater Hydrology																
	Operational Water Supply Need															
	Design demand	1600 gpm	2320 gpm	2320 gpm	750 gpm	3070 gpm	Purchased Water Rights	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev0B ST_EH_CG			Additional Water Rights are required				ABBK
	Normal demand	870 gpm	1872 gpm	1872 gpm	430 gpm	2777 gpm	ABHK Water Balance Rev 0B	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev0B ST_EH_CG			Additional Water Rights are required				ABBK
	Peak demand	1320 gpm	2176 gpm	2176 gpm	590 gpm	3077 gpm	ABHK Water Balance Rev 0B	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev0B ST_EH_CG			Additional Water Rights are required				ABBK
	Water Supply Demand for Construction Purposes															
	(gpd)	63000	63000	63000	63000	72000	DN67	DN67	DN67							ABBK
	Structural fill															
	(cubic yards)	225000	225000	225000	210000	300000	DN48	DN48	DN48							ABBK
	Water Resource Study						Appendix C	Appendix C	Appendix C							EIS Team
										Additional demand on the Hugoton water supply during						
										construction and long-term operations for each of the 3						
										scenarios needs to be calculated based on the number of						
										construction workers and construction worker families. This						
										is addressed in the UEM section.						
Health and Safety																
	Maximum workforce during construction	250	250	250	224	398	DN8	DN8	DN8							
	Workforce during construction	207	207	207	187	339	DN8	DN8	DN8	calculated	calculated	calculated	Note: FTEs were calculated by first summing the			
	Workforce during operation for biorefinery activities	31.75	31.75	31.75	31.75	30.5	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	Biorefinery workforce= 43 - 9 - 2.25	Biorefinery workforce= 34 - 2.25	Biorefinery workforce= 117 - 9 - 74 - 3.5	personnel present on site for all weeks to create a total man-weeks value. The man-weeks value was multiplied by 40 to create a total man-hours. The man-			
	Workforce during operation for cogeneration activities	9	9	9	0	9	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	Cogeneration workforce: = Scenario 1 workforce - Scenario 2 workforce	No Cogeneration	Cogeneration workforce: = Scenario 1 workforce - Scenario 2 workforce				
	Workforce for grain ethanol plant	0	0	0	0	74	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	ABBK Operating Personnel Budget Scenario	No grain ethanol plant	No grain ethanol plant	Ethanol plant workforce: = Scenario 3 workforce - Scenario 1 workforce				
	Workforce during operation for milling and grinding operations	2.25	2.25	2.25	2.25	3.5	Email: Data Need 8, 1 of 3	Email: Data Need 8, 2 of 3	Email: Data Need 8, 3 of 3							
	Total Operation	43	43	43	34	117	ABBK Operating Personnel Budget Scenario 1	ABBK Operating Personnel Budget Scenario 2	ABBK Operating Personnel Budget Scenario 3							

Abengoa Bioenergy Project Analytical Parameter Values

		Value	Value	Value			Source of Value			Rationale/Notes						Owner
Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3				
Land Use																
	metric ton to short ton conversion	1.1023113	1.102311309	1.102311309	1.10231131	1.102311309										Peterson
	short ton to pounds conversion	2000	2000	2000	2000	2000										Peterson
	wet weight = dry weight / (1 - (% moisture/100))															
	dry weight = wet weight X (1 - (% moisture/100))															
	Feedstock Demand															
	Nominal Biomass Dry metric tons/day	2,268	2,268	1,544	700	2,268	Proforma 3/5/10 @ 1000 kpph, 1000F	Apr09 PTE EH and Gas Only	Proforma 3/5/10 @ 1000 kpph, 1000F							ABBK
	Nominal Wood Dry Metric tons/day	0	0	727	0	0	Proforma 3/5/10 @ 1000 kpph, 1000F	No wood	Proforma 3/5/10 @ 1000 kpph, 1000F							ABBK
	Operating days	350	350	350	350	350	DN9	Apr09 PTE EH and Gas Only	DN9							ABBK
	Total Dry metric tons/year	793,800	793,800	794,850	245,000	793,800	calculated	calculated	calculated							Peterson
	Total Dry short tons/year	875,015	875,015	876,172	270,066	875,015	calculated	calculated	calculated							Peterson
	Nominal Biomass Dry short tons/day	2,500	2,500	1,702	772	2,500	calculated	calculated	calculated	ABBK estimated 1,750 in DN 16 response.						Peterson
	Nominal Wood Dry short tons/day	0	0	801	0	0	calculated		calculated							
	Average % moisture, biomass	15%	15%	15%	15%	15%										
	Average % moisture, wood			25%												
	Average % moisture	15%	15%	18%	15%	15%	calculated	DN16	calculated	DN 22: Corn 15.5%, Sorghum 12.0%, Wheat 13.5%.						ABBK
	Wet short tons per year biomass	1,029,429	1,029,429	700,811	317,725	1,029,429		calculated								
	Wet short tons per year wood			373,977	0											
	Total Wet short tons per year	1,029,429	1,029,429	1,074,788	317,725	1,029,429	calculated	calculated	calculated	ABBK estimated 751,100 in DN 16 response.						Peterson
	Bushels grain/year	0	0	0	0	31,698,000	No grain	No grain	Dec09 PTE	Verbal from ABBK during 3/3/09 conference call.						ABBK
	Feedstock Demand by Process															
	Enz. Hydrolysis	610 DMTD	544 DMTD	544 DMTD	400 DMTD	544 DMTD	Dec09 PTE F134	DN9	Dec09 PTE F134							ABBK
	Gasification	0 DMTD	0 DMTD	0 DMTD	300 DMTD	0 DMTD	Dec09 PTE F148	DN9	Dec09 PTE F148							ABBK
	Cogeneration	1658 DMTD	1724 DMTD	727 DMTD Wood + 1000 DMTD Biomass	0	1724 DMTD	Proforma 3/5/10 @ 1000 kpph, 1000F	DN9	Proforma 3/5/10							ABBK
	Starch ethanol						note									ABBK
	Bushels corn outside ROI	0	0	0	0	7 MM				Verbal from ABBK during 3/3/09 conference call. Same as previous PA.						ABBK
	Bushels corn inside ROI	0	0	0	0	2.7 MM				Verbal from ABBK during 3/3/09 conference call. Same as previous PA.						ABBK
	Bushels grain sorghum	0	0	0	0	21.3 MM				Verbal from ABBK during 3/3/09 conference call. Same as previous PA.						ABBK
	Biomass Procurement															
	Harvesting						DN16	DN16	DN16	Harvesting technique is the same for all 3 scenarios. Includes windrower, baler, bale accumulator, bale sqeeze, and flatbed trucks.						ABBK
	Bale Dimension (ft)	3'X4'X8'	3'X4'X8'	3'X4'X8'	3'X4'X8'	3'X4'X8'	DN16	DN16	DN16							ABBK
	Bale size (ft.^{3})	96	96	96	96	96	calculated	calculated	calculated							Peterson
	Wet bale weight (lb)	1,000	1,000	1,000	1,000	1,000	DN16	DN16	DN16	Conservative estimate. Harvest testing in Hugoton averaged 1,300.						ABBK
	Wet short tons per bale	0.5	0.5	0.5	0.5	0.5	calculated	calculated	calculated	Conservative estimate. Harvest testing in Hugoton averaged 0.65.						Peterson
	Dry short tons per bale	0.425	0.425	0.425	0.425	0.425	calculated	calculated	calculated							Peterson
	bale wet density (pcf)	10.42	10.42	10.42	10.42	10.42	DN16	DN16	DN16	Conservative estimate. Harvest testing data results in 13.54 pcf.						ABBK

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3	FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3				
Land Use (continued)	bales per year	2,058,858	2,058,858	1,401,621	635,450	2,058,858	calculated	calculated	calculated	1,078,170	488,808	1,583,737	using 0.65 wet tons per bale			Peterson
	Biomass Storage															
	bales per stack	180	180	180	180	180	DN 16	DN 16	DN 16	6 bales wide x 3 bales tall x 10 bales deep						ABBK
	stack footprint (sq.ft.)	1,920	1,920	1,920	1,920	1,920	calculated	calculated	calculated	(6 bales wide x 4 ft per bale) X (10 bales deep x 8 ft. per bale)						Peterson
	stack volume (cu.ft.)	17,280	17,280	17,280	17,280	17,280	calculated	calculated	calculated	9 feet tall						Peterson
	stack spacing (ft)	25	25	25	25	25	DN 16	DN 16	DN 16	Fire code minimum is 20 feet.						ABBK
	stack effective area (sq.ft.)	5,145	5,145	5,145	5,145	5,145	calculated	calculated	calculated	by allocating half of spacing distance to all four sides						Peterson
	stacks per acre	8.5	8.5	8.5	8.5	8.5	calculated	calculated	calculated							Peterson
	wet short tons per stack	90	90	90	90	90	DN 16	DN 16	DN 16	117 using harvest data. Fire code limits stacks to 100 tons.						ABBK
	wet short tons per acre	762	762	762	762	762	calculated	calculated	calculated	ABBK estimated 756 in DN 16 response.						Peterson
	total biomass in storage (%)	80	80	80	80	80	DN 16	DN 16	DN 16	due to harvest windows, don't need storage for 100 %						ABBK
	total biomass in storage (wet short tons)	823,543	823,543	560,649	254,180	823,543	calculated	calculated	calculated							Peterson
	acres needed	1,081	1,081	736	334	1,081	calculated	calculated	calculated	ABBK estimated 795 acres in DN 16 response.						Peterson
	acres per depot	160	160	160	160	160	DN 16	DN 16	DN 16							ABBK
	depots needed	7.0	7.0	5.0	3.0	7.0	calculated	calculated	calculated	Use ABBK estimated 5 depots needed in DN 16 response.						Peterson
	Onsite Storage, bale only (acres)	10	11	11	10	11										ABBK
	Days of Storage Capacity, bales	2.6	2.8	4.2	2.5	2.8				Peterson: calculates to 4 acres of storage per day						ABBK
	Days of Storage Capacity, wood			36.4	0					4 acres/day X 350 days = 1,400 acres needed.						
										Don't rely on acres/day ratio for other calcs.						
	Offsite Storage (acres)	800	800	800	800	800	DN16,23	DN16, 23	DN16, 23	7 satellite storage areas, 160 acres per satellite.						ABBK
	Transportation															
	Field to ABBK (mi.)	25	25	25	25	25	Biomass Procurement Logistics									ABBK
	Field to Depot (mi.)	15	15	15	15	15	Biomass Procurement Logistics									ABBK
	Depot to ABBK (mi.)	30	30	30	30	30	Biomass Procurement Logistics									ABBK
	Bales/Semi	42	36	36	42	36	Biomass Procurement Logistics									ABBK
	Wet Short Tons/Semi	21	18	18	21	18	Biomass Procurement Logistics			27.3 using 0.65 wet tons per bale from harvest testing.						ABBK
	Dry Short Tons/Semi	17.85	15.30	15.30	17.85	15.30	calculated	calculated	calculated							Peterson
	Semi loads per year	49,020	57,191	38,934	15,130	57,191	calculated	calculated	calculated	29,949	11,638	43,993	using 0.65 wet tons per bale			Peterson
	Field to depot (%)	80	80	80	80	80	Biomass Procurement Logistics									ABBK
	Field to ABBK (%)	20	20	20	20	20	Biomass Procurement Logistics									ABBK
	Semi loads field to ABBK	9,804	11,438	7,787	3,026	11,438	calculated	calculated	calculated	Biomass						Peterson

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Land Use (continued)	Semi loads field to depots	39,216	45,752	31,147	12,104	45,752	calculated	calculated	calculated	Biomass Procurement						Peterson
	Semi loads depot to ABBK	39,216	45,752	31,147	12,104	45,752	calculated	calculated	calculated	Biomass						Peterson
	Biomass Feedstock Breakdown															
added line	Wood			32												ABBK
	Irrigated corn stover (%)	82	82	56	82	82	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Irrigated wheat straw (%)	7	7	5	7	7	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Milo stubble (%)	7	7	5	7	7	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Switchgrass/CRP (%)	4	4	3	4	4	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Wheat Straw Harvest Season															
	Start date	15-Jun	15-Jun	15-Jun	15-Jun	15-Jun	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Duration (weeks)	2 to 4	2 to 4	2 to 4	2 to 4	2 to 4	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Wet short tons wheat straw	72,060	72,060	33,353	22,241	72,060	calculated	calculated	calculated	Biomass Procurement Logistics: 56,210						Peterson
	Dry short tons wheat straw	61,251	61,251	28,350	18,905	61,251	calculated	calculated	calculated							Peterson
	Number bales/yr	144,120	144,120	66,705	44,482	144,120	calculated	calculated	calculated							Peterson
	Semi loads/yr	3,431	4,003	1,853	1,059	4,003	calculated	calculated	calculated							Peterson
	Semi loads field to ABBK (2-4 weeks)	686	801	371	212	801	calculated	calculated	calculated	Biomass Procurement Logistics: 535						Peterson
	Semi loads field to depots (2-4 weeks)	2,745	3,203	1,482	847	3,203	calculated	calculated	calculated	Biomass Procurement Logistics: 2,141						Peterson
	Semi loads depot to ABBK (all year - nonharvest)	2,745	3,203	1,482	847	3,203	calculated	calculated	calculated	Biomass Procurement Logistics: 2,141						Peterson
	Corn Stover Harvest Season															
	Start date	15-Oct	15-Oct	15-Oct	15-Oct	15-Oct	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Duration (weeks)	8 to 14	8 to 14	8 to 14	8 to 14	8 to 14	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Wet short tons corn stover	844,132	844,132	390,701	260,535	844,132	calculated	calculated	calculated							Peterson
	Dry short tons corn stover	717,512	717,512	332,096	221,454	717,512	calculated	calculated	calculated							Peterson
	Number bales/yr	1,688,264	1,688,264	781,402	521,069	1,688,264	calculated	calculated	calculated	601,079	400,822	1,298,664	using 0.65 wet tons per bale			Peterson
	Semi loads/yr	40,197	46,896	21,706	12,406	46,896	calculated	calculated	calculated	16,697	9,543	36,074	using 0.65 wet tons per bale			Peterson
	Semi loads field to ABBK (8-14 weeks)	8,039	9,379	4,341	2,481	9,379	calculated	calculated	calculated							Peterson
	Semi loads field to depots (8-14 weeks)	32,157	37,517	17,364	9,925	37,517	calculated	calculated	calculated							Peterson
	Semi loads depot to ABBK (all year - nonharvest)	32,157	37,517	17,364	9,925	37,517	calculated	calculated	calculated							Peterson
	Milo Stubble Harvest Season															
	Start date	15-Oct	15-Oct	15-Oct	15-Oct	15-Oct	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Duration (weeks)	8 to 14	8 to 14	8 to 14	8 to 14	8 to 14	DN16	DN16	DN16	Revised Procurement PowerPoint (3/6/09)						ABBK
	Wet short tons milo stubble	72,060	72,060	33,353	22,241	72,060	calculated	calculated	calculated							Peterson
	Dry short tons milo stubble	61,251	61,251	28,350	18,905	61,251	calculated	calculated	calculated							Peterson
	Number bales/yr	144,120	144,120	66,705	44,482	144,120	calculated	calculated	calculated							Peterson
	Semi loads/yr	3,431	4,003	1,853	1,059	4,003	calculated	calculated	calculated							Peterson
	Semi loads field to ABBK (8-14 weeks)	686	801	371	212	801	calculated	calculated	calculated							Peterson
	Semi loads field to depots (8-14 weeks)	2,745	3,203	1,482	847	3,203	calculated	calculated	calculated							Peterson
	Semi loads depot to ABBK (all year - nonharvest)	2,745	3,203	1,482	847	3,203	calculated	calculated	calculated							Peterson

		Value	Value	Value			Source of Value			Rationale / Notes			Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	
Land Use (continued)	**Combined Corn / Milo Stover Harvest**												
	Wet short tons corn/milo stubble	916,192	916,192	424,054	282,775	916,192	calculated	calculated	calculated	Biomass Procurement Logistics: 694,890			Peterson
	Semi loads/yr	43,628	50,900	23,559	13,465	50,900	calculated	calculated	calculated	Biomass Procurement Logistics: 33,090			Peterson
	Semi loads field to ABBK (8-14 weeks)	8,726	10,180	4,712	2,693	10,180	calculated	calculated	calculated	Biomass Procurement Logistics: 6,618			Peterson
	Semi loads field to depots (8-14 weeks)	34,903	40,720	18,847	10,772	40,720	calculated	calculated	calculated	Biomass Procurement Logistics: 26,472			Peterson
	Semi loads depot to ABBK (all year - nonharvest)	34,903	40,720	18,847	10,772	40,720	calculated	calculated	calculated	Biomass Procurement Logistics: 26,472			Peterson
	Switchgrass / CRP Harvest Season												
	Start date	15-Oct	15-Oct	15-Oct	15-Oct	15-Oct				Roach edits to Chapter 2			
	Duration (weeks)	8 to 14	8 to 14	8 to 14	8 to 14	8 to 14				Roach edits to Chapter 2			
	Wet short tons switchgrass/CRP	41,177	41,177	19,059	12,709	41,177	calculated	calculated	calculated				Peterson
	Dry short tons switchgrass/CRP	35,001	35,001	16,200	10,803	35,001	calculated	calculated	calculated				Peterson
	Number bales/yr	82,354	82,354	38,117	25,418	82,354	calculated	calculated	calculated				Peterson
	Semi loads/yr	1,961	2,288	1,059	605	2,288	calculated	calculated	calculated				Peterson
	Semi loads field to ABBK	392	458	212	121	458	calculated	calculated	calculated				Peterson
	Semi loads field to depot	1,569	1,830	847	484	1,830	calculated	calculated	calculated				Peterson
	Semi loads depots to ABBK	1,569	1,830	847	484	1,830	calculated	calculated	calculated				Peterson
										Additional Resources:			
										DN10 "design calcs" tab for each scenario			
										Responses to questions about DN16, 17, 22, 23, 25, and 26 (3/6/09)			
										Biomass Procurement PowerPoint (harvesting and transport) (3/6/09)			
										Residue Removal Rates and Wind Erosion Powerpoint (3/6/09)			
										Transportation tables			
										Estimated that 80% of biomass packages will go from field to			
										satellite storage depots, then to ABBK. Estimated that 20%			
										of biomass packages will go from field directly to ABBK.			
Noise													
	Average number of trucks passing through Hugoton for material shipments during construction during day time (7 AM to 10 PM)	69	69	69	61	80	calculated	calculated	calculated	Calculated on transportation PVT tab; assumed all trucks go through Hugoton			T. Bartels
	Average number of trucks passing through Hugoton for material shipments during construction during night time (10 PM to 7 AM)	0	0	0	0	0				Based on previous data from 12/19/08 - all trucks during daytime hours			ABBK
	Average number of trucks passing through Hugoton for material shipments during operations during day time (7 AM to 10 PM)	175	202	140	53	466	calculated	calculated	calculated	Calculated on transportation PVT tab; assumed all trucks go through Hugoton			T. Bartels
	Average number of trucks passing through Hugoton for material shipments during operations during night time (10 PM to 7 AM)	0	0	0	0	0				Based on previous data from 12/19/08 - all trucks during daytime hours			ABBK

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Noise (continued)	Distance from highest potential process noise source to the site boundary.	600 ft	600 ft	600 ft	600 ft	1,200 ft	DN 27-30	DN 27-30	DN 27-30	Locations of noise generating equipment in DN 27-30, distance to boundary scaled.						ABBK/EIS Team
	Distance from noise sources to nearest residence	0.6 mi.	0.6 mi.	0.6 mi.	0.6 mi	0.6 mi.	DN 27-30	DN 27-30	DN 27-30	Locations of noise generating equipment in DN 27-30, distance to boundary scaled.						ABBK/EIS Team
	Distance from noise sources to noise sensitive receptors (e.g., churches, libraries, medical facilities, schools, etc.)	2 mi.	2 mi.	2 mi.	2 mi.	2 mi.	scaled	scaled	scaled							EIS Team
	Duration of construction	18 mo.	18 mo.	18 mo.	18 mo.	24 mo.	DN8	DN8	DN8							ABBK
	Maximum sound level from facility during operations (db)	105	105	105	105	108	calculated from DN 27-30	calculated from DN 27-30	calculated from DN 27-30							ABBK/EIS Team
	Number of hours per day noise occurs (e.g., hours of operation)	24	24	24	24	24	DN 27-30	DN 27-30	DN 27-30							ABBK
	Number of Rail cars during operations during day time (7 AM to 10 PM)	1303	1286	6629	730	7606	calculated	calculated	calculated	Calculated on transportation PVT tab						T. Bartels
Odor																
	Odor Control Technology/BACT						DN31, DN13	DN31, DN13	DN31, DN13	See Air Quality. BACT applicable to VOC and SOx emissions						ABBK
										are applicable to odor control. BACT applicable to Scenario 3						
										were provided (DN13). BACT memo applicable to new boilers						
										(all scenarios) was provided (DN13). BACT specific to Scenario 1						
										is being developed and expected May 09 (DN13). Also refer to						
										DN10. Revised PTE spreadsheets specific to each scenario were						
										received on 6/24/09.						
	VOC Destruction Efficiencies						DN32	DN32	DN32	See Air Quality. Equipment vendor information is being						ABBK
										developed and is expected in September 09 (DN13). Also refer						
										to DN10. Revised PTE spreadsheets specific to each scenario						
										were received on 6/24/09.						
	Odor Monitoring						DN33	DN33	DN33	Odor monitoring results from other active ethanol production						ABBK
										plants was not provided. A typical odor control plan was						
										provided.						
	Meteorological Data						DN10	DN10	DN10	See Air Quality. KDHE meteorolgical data was provided on 3/6/09.						ABBK
	Revised PSD Permit Application						DN10	DN10	DN10	The revised PSD construction permit application is expected						ABBK
	Uncontrolled VOC Production (tons/year)															
	Grain Fermentation	NA	NA	NA	NA	7,577.40			Dec09 PTE Uncontrolled M49 + M50	50% DDGS production for Scenario 3						ABBK
	Grain Distillation	NA	NA	NA	NA	963.6			Dec09 PTE Uncontrolled M51							ABBK
	Biomass Fermentation	2,240.81	7,586.50	7,586.50	2,240.81	7,586.50	Dec09 PTE Uncontrolled M50	Apr09 PTE EH and Gasification Only	Dec09 PTE Uncontrolled M50							ABBK

		Value	Value	Value			Source of Value			Rationale/Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Odor (continued)	Biomass Distillation	344.6	175.3	175.3	268.02	175.3	Dec09 PTE Uncontrolled M51	Apr09 PTE EH and Gasification Only	Dec09 PTE Uncontrolled M51							ABBK
	DDGS Drying	NA	NA	NA	NA	874.95			Dec09 PTE Uncontrolled M60							ABBK
	Mixed Fuel-fired Boilers	122.64	148.92	148.92	25.13	157.6	Dec09 PTE Uncontrolled Sum(M70:M73)	Apr09 PTE EH and Gasification Only	Dec09 PTE Uncontrolled Sum(M85.M95)							ABBK
	Ethanol Loadout Fugitives	7.35	17.73	17.73	15.12	90.88	Dec09 PTE Uncontrolled sum(M54.M61)	Apr09 PTE EH and Gasification Only	Dec09 PTE Uncontrolled Sum(M60.M75)							ABBK
Socioeconomics																
	Construction															
	Description	Scenario 1	Scenario 1	Scenario 1	Scenario 2	Scenario 3										
	Workforce characterization															
	Number of workers onsite during peak construction period[a]	250	250	250	224	398	DN8	DN8	DN8							
	Workforce migration															
	Percent of workforce migrating into region of influence	75%	75%	75%	75%	75%										
	Total number of workers migrating into region of influence during peak construction period	188	188	188	168	299	Calc	Calc	Calc							
	Families															
	Percent of in-migrating workers who bring families	70%	70%	70%	70%	70%	Malhotra and Manninen 1981	Malhotra and Manninen 1981	Malhotra and Manninen 1981							
	Percent of workers who do not bring families	30%	30%	30%	30%	30%	Malhotra and Manninen 1981	Malhotra and Manninen 1981	Malhotra and Manninen 1981							
	Number of in-migrating workers who bring families into region of influence	131	131	131	118	209	Calc	Calc	Calc							
	Number of in-migrating workers who do not bring families into region of influence	56	56	56	50	90	Calc	Calc	Calc							
	Average worker family size (worker, spouse, children, etc)	3.25[b]	3.25[b]	3.25[b]	3.25[b]	3.25[b]	USCB 2000									
	Total in-migration – families and unaccompanied workers															
	Total number of workers who bring families migrating into the region of influence	131	131	131	118	209	Calc	Calc	Calc							
	In-migrating workers' family members (131 ´ 2.25)	295	295	295	265	470	Calc	Calc	Calc							
	Total in-migrating workers with families, plus family members	427	427	427	382	679	Calc	Calc	Calc							
	Total number of workers not bringing families into the region of influence	56	56	56	50	90	Calc	Calc	Calc							
	Total number of workers and family members migrating into the region of influence (induced population increase)	483	483	483	433	769	Calc	Calc	Calc							
	School-age children															
	Number of school-age children per family[c]	0.8	0.8	0.8	0.8	0.8	Malhotra and Manninen 1981	Malhotra and Manninen 1981	Malhotra and Manninen 1981							
	Total number of school-age children	105	105	105	94	167										
	a. Source: Roach 2009 DR # 8															
	b. Source: USCB 2000.															
	c. Source: Malhotra and Manninen 1981.															
	Demographics	Scenario 1	Scenario 1	Scenario 1	Scenario 2	Scenario 3										
	Peak construction workforce (Table 4.9-1) as revised	250	250	250	224	398	DR8	DR8	DR8							
	Number of construction workers who migrate into region of influence (75% of peak construction workforce) (Table 4.9-1) As revised	188	188	188	168	299	Calc	Calc	Calc							
	Indirect jobs resulting from in-migrating construction workers (Direct ´ 0.4434[a])	83	83	83	74	132	BEA 2006 and Calc			RIMS Multipliers						
	Number of unemployed persons in the region of influence labor force, 2007 (Subsection 3.10.2.1)	776	776	776	776	776										
	Estimated number of unemployed persons available to fill indirect jobs (20% x 776)	155	155	155	155	155	Calc	Calc	Calc							
	Number of working-age adults accompanying in-migrating workers during construction who bring families (assuming 1 other adult per worker)	131	131	131	118	209										
	Percent of working-age adults accompanying in-migrating workers during construction available to work[b]	52%	52%	52%	52%	52%	USCB 2007b									
	Number of working-age adults accompanying in migrating workers with families available to work (52% of in-migrates)	68	68	68	61	109	Calc	Calc	Calc							
	Number of adults available to fill indirect jobs (unemployed and adults accompanying in-migrating workers who bring families)	223	223	223	216	264	Calc	Calc	Calc							
	Indirect jobs that need to be filled by adults currently residing outside of 50-mile radius	0	0	0	0	0	Calc	Calc	Calc							
	a. BEA 2006.															
	b. USCB 2007b.															
	Construction Duration	76 weeks	76 weeks	76 weeks	76 weeks	106 weeks	DN8	DN8	DN8							

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Socioeconomics (continued)	**Operations**															
	Description	Scenario 1	Scenario 1	Scenario 1	Scenario 2	Scenario 3										
	Workforce characterization															
	Number of workers onsite during the operations phase[a]	43	43	43	34	117	DN8	DN8	DN8							
	Workforce migration															
	Percent of operations workforce migrating into region of influence	25%	25%	25%	25%	25%										
	Number of operations workers migrating into region of influence during the operations phase (No. workers x 25%)	11	11	11	9	30	Calc	Calc	Calc							
	Families															
	Percent of in-migrating workers who bring families	100%	100%	100%	100%	100%	Malhotra and Manninen 1981	Malhotra and Manninen 1981	Malhotra and Manninen 1981							
	Number of in-migrating workers who bring families into region of influence	11	11	11	9	30	Calc	Calc	Calc							
	Average worker family size (worker, spouse, children)	3.25[b]	3.25[b]	3.25[b]	3.25[b]	3.25[b]	USCB 2000									
	Total in-migration – families and workers															
	Number of in-migrating operations workers	11	11	11	9	30	Calc	Calc	Calc							
	In-migrating workers family members (No. workers x 2.25)	24	24	24	19	68	Calc	Calc	Calc							
	Total in-migrating induced population increase in region of influence (workers, plus family members)	35	35	35	28	98	Calc	Calc	Calc							
	School-age children															
	Number of school-age children per family[c]	0.8	0.8	0.8	0.8	0.8	Malhotra S. and Manninen 1981									
	Total number of school-age children (0.8 x No. families)	9	9	9	7	24	Calc	Calc	Calc							
	a. Source: Roach 2009 DR # 8.															
	b. Source: USCB 2000.															
	c. Source: Malhotra S. and Manninen 1981.															
	Demographics	Scenario 1	Scenario 1	Scenario 1	Scenario 2	Scenario 3										
	Operations Workforce (Table 4.9-3) Revised	43	43	43	34	117	DN8	DN8	DN8							
	Number of operations workers in- migrating to region of influence (25% of operations workforce) (Table 4.9-3) Revised	11	11	11	9	30	Calc	Calc	Calc							
	Indirect jobs resulting from in-migrating operations workers (No. in-migrates x 0.2.1111[a])	23	23	23	18	63	BEA 2006 and Calc									
	Number of unemployed persons in the ROI labor force, 2007 (Subsection 3.10.2.1)	776	776	776	776	776										
	Estimated number of unemployed persons available to fill indirect jobs (20% x 776)	155	155	155	155	155	Calc	Calc	Calc							
	Number of working-age adults accompanying in-migrating workers during operations who bring families (assuming 1 other adult per worker)	11	11	11	9	30										
	Percent of working-age adults accompanying in-migrating workers during operations available to work[b]	52%	52%	52%	52%	52%	USCB 2007b									
	Number of working-age adults accompanying in migrating workers with families available to work (52% of in-migrates)	6	6	6	5	16	Calc	Calc	Calc							
	Number of adults available to fill indirect jobs (unemployed individuals and adults accompanying in-migrating workers) (155 + accompanying adults)	161	161	161	164	171	Calc	Calc	Calc							
	Indirect jobs that need to be filled by adults currently residing outside of 50-mile radius	0	0	0	0	0	Calc	Calc	Calc							
	a. Source: BEA 2006.															
	b. Source: USCB 2007b.															
Surface Water Hydrology																
	Area disturbed during construction	66 acres	66 acres	66 acres	61 acres	71 acres	DN47	DN47	DN47	Listed in DN47 attachment						ABBK
	Area changed post construction	~ 30 acres	~ 30 acres	~ 30 acres	~ 30 acres	~ 60 acres	DN42	DN42	DN42	Estimated from Gen. Pavement Layouts for scenarios						ABBK
										Represents buildings, paved, non-vegetated areas for additional						
										runoff potential						
	Stormwater Retention - Construction						DN43	DN43	DN43	Using natural drainage features per drawings for DN43						ABBK
										No basin construction						

Resource Area	Parameter Name	Value DEIS PA	Value FEIS PA	Value FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	Source of Value FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3	Rationale/Notes FEIS Option (Wood)	DEIS/FEIS AA	Scenario 3				Owner
Surface Water Hydrology (continued)	Stormwater Retention - Operation						DN1, 44	DN1, 44	DN1, 44	Area shown in conceptual plot plans from DN1 and 44 update (3/6/09)						ABBK
										CRR - natural depression will be used as Stormwater retention,						
										without modification.						
	Non-contact waste water detention (gal)	29,160,000	58,752,000	58,752,000	#######	96,768,000	ABHK Water Balance Rev 4	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev 4 ST_EH_CG	Area shown in Jan 2010 Non-contact wastewater engineering report.						ABBK
	Watershed size (square miles)	1,720	1,720	1,720	1,720	1,720	USGS	USGS	USGS	HUC drainage area per USGS Water Supply Paper 2294						EIS Team
Utilities, Energy, and Materials																
	Construction materials - list and quantities															
	Structural steel (tons)	2,500	2,500	2,500	2,200	5,000	DN #48	DN #48	DN #48							ABBK
	Steel for field erected tanks (tons)	2,400	2,400	2,400	2,400	6,300	DN #48	DN #48	DN #48							ABBK
	Concrete (cubic yards)	50,000	50,000	50,000	35,000	110,000	DN #48	DN #48	DN #48							ABBK
	Earthwork - fill (cubic yards)	225,000	225,000	225,000	210,000	300,000	DN #48	DN #48	DN #48							ABBK
	Asphalt paving (square feet)	38,000	38,000	38,000	38,000	75,000	DN #48	DN #48	DN #48							ABBK
	Storm sewer piping (linear feet)	2,000	2,000	2,000	2,000	2,500	DN #48	DN #48	DN #48							ABBK
	Internal/external water piping (linear feet)	35,000	35,000	35,000	35,000	61,000	DN #48	DN #48	DN #48							ABBK
	Railway tracks (linear feet)	9,000	9,000	9,000	9,000	41,000	DN #48	DN #48	DN #48							ABBK
	Rock sub-ballast (cubic yards)	6,000	6,000	6,000	6,000	25,000	DN #48	DN #48	DN #48							ABBK
	Mechanical process piping (linear feet)	51,000	51,000	51,000	45,000	101,000	DN #48	DN #48	DN #48							ABBK
	Painting (square feet - of coverage)	40,000	40,000	40,000	22,500	45,000	DN #48	DN #48	DN #48	Updated 6/12/09 by ABBK "PVT Questions."						ABBK
	Electrical and control cables (linear feet)	166,000	166,000	166,000	155,000	333,000	DN #48	DN #48	DN #48							ABBK
	Cable trays (linear feet)	13,000	13,000	13,000	12,000	25,000	DN #48	DN #48	DN #48							ABBK
	Fencing (linear feet)	20,000	20,000	20,000	20,000	20,000	DN #48	DN #48	DN #48							ABBK
	Gravel (cubic yards)	56,000	56,000	56,000	48,000	85,000	DN #48	DN #48	DN #48							ABBK
	Firewater piping (linear feet)	6,000	6,000	6,000	6,000	8,000	DN #48	DN #48	DN #48							ABBK
	Electrical capacity of incoming and outgoing transmission lines to be constructed and/or installed															
	Electrical demand during operation															
	Gross peak (megawatts)	-70	-120	-120	15	-120	GE STG w/ entire facility operating gross hourly average; Proforma 3/5/10	DN #46	GE STG w/ entire facility operating gross hourly average; Proforma 3/5/10	Scenarios 1 and 3 provide electrical power to the grid, when plant demand is at a peak, the amount to the grid decreases.						ABBK
	Net annual average/nominal (megawatts)	-60	674743 MWhrs (77 MW)	686456 MWhrs	10	580293 MWhrs	Proforma 3/5/10	DN #46	Proforma 3/5/10	Annual net power to grid (78.4 MW)		Annual net power to grid (66.2 MW)				ABBK
	Natural gas demand during operation - peak and average/nominal															
	peak (million cubic feet/day)	2.25	3.52	3.52	1.4	14.2	Single Boiler S/U + Ash pelletizer	Gasifier S/U	EH + DDGS Dryer + NG Boilers	Updated 6/1/09 by ABBK						ABBK
	average/nominal (million cubic feet/day)	1.0	0.2	0.2	0.2	9.0	Ash Pelletizer		EH + DDGS Dryer + NG Boilers	Updated 6/1/09 by ABBK						ABBK
	Petroleum product needs during operation - standby or emergency generators only															
	peak (gallons/hr)	43.2	43.2	43.2	79.3	79.3	DN #46	DN #46	DN #46							ABBK
	average/nominal (gallons/hr)	0	0	0	0	0	DN #46	DN #46	DN #46							ABBK
	Sewage produced during construction and the proposed disposal method (total gallons)	1,365,000	1,365,000	1,365,000	1,176,000	2,340,000	DN #41	DN #41	DN #41							ABBK
	Sewage produced during operation and the proposed disposal method															
	gallons/day	2,250	2,250	2,250			DN #41									ABBK
	rate - gallons/day*worker	25	25	25			DN #41									ABBK
	Diesel Fuel including rolling stock (gal/yr)	1,786,944	1,786,944	1,786,944	793,647	1,786,944				Roach email 4/1/09						ABBK
	Transmission line materials									Note to ABBK: It is assumed the materials listed here are not included in the list of construction materials. Can it be assumed that applicable co-gen equipment for Scenarios 1 and 3 are included in the list of construction materials?						ABBK

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Utilities, Energy, and Materials (continued)																
	Description (in kilo-volts)	115	115	115	none	115	Roach email 4/1/09	Roach email 4/1/09	Roach email 4/1/09							
	Poles (number of wooden poles, each 2-3 feet in diameter)	18	18	18	0	18	Roach email 4/1/09	Roach email 4/1/09	Roach email 4/1/09							
	Steel overhead shield wire (length in miles)	2	2	2	0	2	Roach email 4/15/09	Roach email 4/15/09	Roach email 4/15/09							
Visual																
	Visual Impacts Mitigation						DN50	DN50	DN50	No committed strategies to mitigate impacts to visual resources.						ABBK
	Conceptual Renderings of Facilities						DN51	DN51	DN51	37 computer generated renderings were provided depicting all						ABBK
										3 scenarios.						
	Facility Design Descriptions						DN52	DN52	DN52	Facility design layout drawings were provided for each of the						ABBK
										3 scenarios. The drawings show facility layout and average,						
										minimum, and maximum heights of facility components.						
	Photographs of Existing Example Facilities						DN53	DN53	DN53	Four photographs of existing ethanol production facilities were						ABBK
										provided. Photos of facilities with cogeneration are pending.						
	Fugitive Dust During Construction						DN10	DN10	DN10	See Air Quality.						ABBK
	Facility Emissions Opacity Limits						DN10	DN10	DN10	See Air Quality.						ABBK
Wastes, Byproducts, and Hazardous Materials																
	WDGS Produced (wet tons/year)	0	0	0	0	921,000	No WDGS Produced	No WDGS Produced	Dec09 PTE F762							ABBK
	DDGS Produced (10%wt moisture tons/year)	0	0	0	0	231,000	No DDGS Produced	No WDGS Produced	Dec09 PTE F747	Zero if 100% WDGS (worst case)						ABBK
	Maximum Distiller's Biomass Produced (dry tons/year)	116,550	120,450	120,450	45,000	120,450	Dec09 PTE F180	Apr09 PTE EH and Gasification Only	Dec09 PTE F180	333 dry tons/day for 350 days/yr	333 dry tons/day for 350 days/yr	333 dry tons/day for 350 days/yr				ABBK
	Distiller's Syrup (dry tons/year)	25,550	0	0	0	0	No syrup	No syrup	No syrup							
	Gasification Ash Produced (tons/year)	0	0	0	8,524	0	No gasification	Estimated for 300 DMTD Gasifier	No gasification	Gasifier removed from scope	Gasifier removed from scope	Gasifier removed from scope				ABBK
	WWTP Sludge Produced (gpm)	7.5-10.0	7.5-10.0	7.5-10.0	5-7.5	10 to 15	DN54	DN54	DN54	Scaled from Rev F PFD flows						ABBK
	Dirt/Fines Production (tons/year)	33600	41177	28032	8750	41177	DN54	calculated	DN54	4% losses in grinding	4% losses in grinding	4% losses in grinding				ABBK
	Lignin Produced (tons/year)	44,709	38,685	38,685	19,000	38,685	Rev0B PFD As-Demonstrated + 10% overdesign	calculated	Rev0B PFD As-Demonstrated + 10% overdesign	Lignin from EH process only (DN9)						ABBK
	Boiler Ash Produced (tons/year)	79,671	126,420	88,200	11,365	126,420	Rev0B Ash Balance+20% overdesign	calculated	Rev0B Ash Balance+20% overdesign	1100 dry ton/day CS + 335 dry ton/day Distiller's Biomass + 800 dry tons/day Wood	333 dry ton/day Distiller's Biomass + 73 dry tons/day Syrup	1100 dry ton/day CS + 335 dry ton/day Distiller's Biomass + 800 dry tons/day Wood				ABBK
	Hazardous Waste Produced (tons/year)	1	1	1	1	2				Provided by ABBK during 3/3/09 conference call.						ABBK
	Municipal solid waste (plant operations) (lb/day)	189	189	189	150	515	calculated	calculated	calculated							R. Tedlock
	Fluidized bed sand (tons/year)	N/A	N/A	N/A	N/A	N/A				Fluidized Bed Sand discharged in gasifier/boiler ash, not a separate stream.						
	Construction Wastes															
	Ground Excess, Construction/Demolition Debris (cubic feet)	1,980,000	1,980,000	1,980,000	1782000	3,000,000	DN56 + update	DN56 + update	DN56 + update	DN56 update provided by ABBK 3/6/09.						ABBK
	Plastic, Paper, Cartons (pounds)	13,200	13,200	13,200	11880	20,000	DN56 + update	DN56 + update	DN56 + update							ABBK
	Steel Waste, pipes, cables (pounds)	132,000	132,000	132,000	118800	200,000	DN56 + update	DN56 + update	DN56 + update							ABBK

		Value	Value	Value			Source of Value			Rationale / Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Wastes, Byproducts, and Hazardous Materials (continued)	Metal Cans (paint, chemical, oil, etc.) (pounds)	26,400	26,400	26,400	23,760	40,000	DN56 + update	DN56 + update	DN56 + update							ABBK
	Municipal Solids (human organic waste) (gallons)	93,600	93,600	93,600	78,000	156,000	DN56 + update	DN56 + update	DN56 + update							ABBK
	Municipal Solids (inorganic) (pounds)	178,200	178,200	178,200	160,380	270,000	DN56 + update	DN56 + update	DN56 + update							ABBK
	Construction Wastes (total) (tons)	35,000	35,000	35,000	31,500	53,000	calculated	calculated	calculated							R. Tedlock
	Demolition Wastes (total) (tons)	35,000	35,000	35,000	31,500	53,000	calculated	calculated	calculated	Assumed to be the same as construction wastes						R. Tedlock
	Chemical Throughput															
	Sodium hydroxide (caustic) 50% (pounds/year)	2,860,032	2,505,360	2,505,360	949,200	4,890,960	Dec09 PTE F278	Sized for 400 dtpd EH	Dec09 PTE F324 inlcudes Starch CIP	Rev 0B PFD + 10% overdesign		Rev 0B PFD + 10% overdesign				ABBK
	Aqueous ammonia 20% (pounds/year)	13,353,984	41,092,187	41,092,187	3,704,400	44,596,187	Dec09 PTE F287 - 400 lb/hr for ST	Sized for 400 dtpd EH	Dec09 PTE F333	Rev 0B PFD + 10% overdesign		Rev 0B PFD + 10% overdesign				ABBK
	Sulfuric acid 94% (pounds/year)	7,084,224	7,766,616	7,766,616	11,415,600	14,336,616	Dec09 PTE F274 - 750 lb/hr	Sized for 400 dtpd EH	Dec09 PTE F320	Rev 0B PFD + 10% overdesign		Rev 0B PFD + 10% overdesign				ABBK
	Urea 42% (tons/year)	570	0	0	88	3,311	No urea used for EH or Cogen	No urea used for EH	Dec09 PTE F378			0				ABBK
	Phosphoric acid (pounds/year)	0	0	0	0	876,000	No phosporic acid for EH	No phosphoric acid for EH	Dec09 PTE F328							ABBK
	alpha-amylase (enzyme) (pounds/year)	0	0	0	0	1,112,520			Dec09 PTE F365							ABBK
	gluco-amylase (enzyme) (pounds/year)	0	0	0	0	1,340,280			Dec09 PTE F369							ABBK
	gasoline (denaturant) (gallons/day)	2,520	2,417	2,417	1,611	16,054	Dec09 PTE F46	Sized for 400 dtpd EH	Dec09 PTE F480	4.9% denatured EtOH production						ABBK
	cellulase (tons/year)	14,836	8,745	8,745	7,581	8,745	Dec09 PTE F316	Sized for 400 dtpd EH	Dec09 PTE F374	Rev 0B PFD + 10% overdesign		Rev 0B PFD + 10% overdesign				ABBK
	Media (e.g., corn syrup, molasses) (tons/year)	12690.0	5352.8	5352.8	525	0	Dec09 PTE F308	Sized for 400 dtpd EH	Roach email 4/1/09	Rev 0B PFD + 10% overdesign		Starch Plant supplies corn syrup				ABBK
	Hydrated Lime (tons/year)	6,723	8,865	8,865	3,906	8,865	Dec09 PTE F299	Estimated for 330 dtpd Gasifier + 240 dtpd boiler	Dec09 PTE F345	EPI Proposal		EPI Proposal				ABBK
added line	Limestone (tons/year)	7,362	6,266	6,266		6,266	Dec09 PTE F349	Estimated for 330 dtpd Gasifier + 240 dtpd boiler	Dec09 PTE F349	EPI Proposal		EPI Proposal				
added line	Antifoam (pounds/year)		2,163,720	2,163,720		2,163,720	Dec09 PTE F312	Sized for 400 dtpd EH	Dec09 PTE F361	Rev 0B PFD + 10% overdesign		Rev 0B PFD + 10% overdesign				
	corrosion inhibitor (gal/year)	47	47	47	35	320		Sized for 400 dtpd EH		Rev F PFD						ABBK
	denatured ethanol (gpy)	18,000,000	18,884,000	18,884,000	12,000,000	119,600,000	Dec09 PTE F31*1.0468	Sized for 400 dtpd EH	Dec09 PTE F37	Dec09 PTE F31*1.0468		Dec09 PTE F31*1.0468				ABBK
	magnesium hydroxide 50% (lbs/day)	700	3650	3650	555	18250	Dec09 PTE F290	Sized for 400 dtpd EH	Scenario 1 x 5	Rev F PFD + 12% overdesign						ABBK
	diamonium phosphate (lbs/day)	30	156	156	60	780	Dec09 PTE F294	Sized for 400 dtpd EH	Scenario 1 x 5	Rev F PFD + 12% overdesign						ABBK
	Fluidized Bed Sand (tons/yr)	700	160.6	160.6	518	160.6	Dec09 PTE F320	Estimated for 330 dtpd Gasifier + 240 dtpd boiler	Dec09 PTE F380							
	Chemical Storage Tank Sizes									**See Accidents section.**						ABBK
	Other Chemicals															
	Herbicides, Pesticides, Rodenticides during Operations									No use during construction.						
	Fastrac All Weather Blox (0.01% by weight) (pounds/year)	53	53	53	53	53	DN58	DN58	DN58							ABBK
	Rozol Blue Tracking Powder (0.2% by weight) (pounds/year)	22	22	22	22	22	DN58	DN58	DN58							ABBK
	Glyfos Pro Herbicides (2% by weight) (pounds/year)	6	6	6	6	6	DN58	DN58	DN58							ABBK
	Krovar (7-10 pounds/acre) (pounds/year)	14	14	14	14	14	DN58	DN58	DN58							ABBK
	Oust (11/3-3 ounces)/acre (pounds/year)	2.5	2.5	2.5	2.5	2.5	DN58	DN58	DN58							ABBK
	Rodeo (1.5% by weight) (gallons/year)	60	60	60	60	60	DN58	DN58	DN58							ABBK

Appendix I Project Analytical Parameter Values

		Value	Value	Value			Source of Value			Rationale/Notes						Owner
Resource Area	**Parameter Name**	**DEIS PA**	**FEIS PA**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3 (FEIS PA + Starch Plant)**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**	**FEIS Option (Wood)**	**DEIS/FEIS AA**	**Scenario 3**				
Wastewater																
	Process Wastewater Treated in WWTP (pounds/hour)	125,000	246,193	246,193	80,000	369,193	PFD Rev 0B Strm (12016 + 19003)	Sized for 400 dtpd EH	PFD Rev 0B + Vogelbusch Util Summary	Rev0B						
	Normal (gpm)	250.0	492.4	492.4	160	738.4		calculated								ABBK
	Operating Peak (gpm)	300.0	590.9	590.9	192	886.1		calculated		20% overdesign of normal						ABBK
	Equipment Peak (gpm)	360.0	709.0	709.0	230	1063.3		calculated		20% overdesign of peak						ABBK
	Non-contact Waste Water Discharged @ Outfall 1									Land application on 425-acre buffer area.						
	Normal (gpm)	225	370	370	115	526	ABHK Water Balance Rev 0B	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev 0B ST_EH_CG	Note to ABBK: We are using these normal values for analysis. This will impact the						ABBK
	Operating Peak (gpm)	520	465	465	230	619	ABHK Water Balance Rev 0B	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev 0B ST_EH_CG	sizing of the winter storage basin. We assume land application equipment is based on normal discharge rates, and that during peak flows, there will be some diversion to the storage basin.						ABBK
	Equipment Peak (gpm)	680	500	500	320	650	ABHK Water Balance Rev 0B	Apr09 Water Balance for EH and Gasification Only	ABHK Water Balance Rev 0B ST_EH_CG							ABBK
	Quality of Outfall Discharge									See DN41, 60, 61, and 64. See wastewater permit application and associated engineering report (Jan 2010)						
										ABBK stated that there is no substantial difference in the						
										quality of the discharge from scenario to scenario on the						
										3/3/09 conference call.						
	Winter Storage Basin Capacity (days)	90	120	120	90	120	NEPDS Permit			See DN62 and revised DN1. The land application rate and						ABBK
										holding basin size will vary with the outfall volumes for each						
										scenario. The basin will be on the 385-acre biorefinery site.						
	Agronomy Study						DN62, 65	DN62, 65	DN62, 65	completed in November 2009						ABBK
	RO Reject Brine (deep well injection) gpm	0	140	140	0	200	Bancks email 4/14/10	Bancks email 4/14/10	Bancks email 4/14/10							ABBK

Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS PA Option	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	Units	Notes					
Transportation													
Biomass	Field to ABBK	9,804	11,438	7,787	3,026	11,438	Trucks	Calculated (B. Peterson)					
(Shipments)	Field to Depots	39,216	45,752	31,147	12,104	45,752	Trucks	Calculated (B. Peterson)					
	Depot to ABBK	39,216	45,752	31,147	12,104	45,752	Trucks	Calculated (B. Peterson)					
Biomass	Field to ABBK (mi.)	25	25	25	25	25	Miles	Biomass Procurement Logistics (ABBK)					
(Distances)	Field to Depots (mi.)	15	15	15	15	15	Miles	Biomass Procurement Logistics (ABBK)					
	Depot to ABBK (mi.)	30	30	30	30	30	Miles	Biomass Procurement Logistics (ABBK)					
Biomass, wood	Source to ABBK (mi.)	0	0	300	0	0		Ave. from Denver, Garden City, and OK					
	Source to ABBK	0	0	5,343	0	0	Rail Cars	70 wet tons wood per rail car					
Grain	Field to Elevators	0	0	0	0	40,320	Trucks	Transportation Data Needs Request, 04/01/2009 Update					
(Shipments)	Elevators to ABBK	0	0	0	0	40,320	Trucks	Transportation Data Needs Request, 04/01/2009 Update					
	Upper Midwest to ABBK	0	0	0	0	2,750	Rail Cars	Transportation Data Needs Request, 04/01/2009 Update					
Grain	Field to Elevators (mi.)	NA	NA	NA	NA	30	Miles	Transportation Data Needs Request, 04/01/2009 Update					
(Distances)	Elevators to ABBK (mi.)	NA	NA	NA	NA	30	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	Upper Midwest to ABBK (mi.)	NA	NA	NA	NA	1,000	Miles	Transportation Data Needs Request, 04/01/2009 Update					
Chemicals	Sodium hydroxide (caustic) 50% (pounds/year)	2,860,032	2,505,360	2,505,360	949,200	4,890,960		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
(Amounts)	Aqueous ammonia 20% (pounds/year)	13,353,984	41,092,187	41,092,187	3,704,400	44,596,187		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
	Sulfuric acid 94% (pounds/year)	7,084,224	7,766,616	7,766,616	11,415,600	14,336,616		Chris Roach e-mail (4-15-09)	188,000	lb./rail car			
	Urea 42% (tons/year)	570	0	0	88	3,311		Chris Roach e-mail (4-15-09)	24.75	tons/truck			
	Phosphoric acid (pounds/year)	0	0	0	0	876,000		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
	alpha-amylase (enzyme) (pounds/year)	0	0	0	0	1,112,520		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
	gluco-amylase (enzyme) (pounds/year)	0	0	0	0	1,340,280		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
	gasoline (denaturant) (gallons/yr)	882,000	845,845	845,845	563,897	5,618,900		Based on PVT gallons/day and 350 days/yr.	8,500	gal./truck	28,500	gal./rail car	
	cellulase (tons/year)	14,836	8,745	8,745	7,581	8,745		Chris Roach e-mail (4-1-09)	24.75	tons/truck			
	corn syrup (tons/year)	12,690	5,353	5,353	525	0		Chris Roach e-mail (4-1-09)	24.75	tons/truck			
	lime Ca(OH)2 (tons/year)	6,723	8,865	8,865	3,906	8,865		Chris Roach e-mail (4-1-09)	90	tons/rail car			
added line	limestone	7,362	6,266	6,266	0	6,266			90	tons/rail car			
	corrosion inhibitor (gal./yr)	47	47	47	35	320		Chris Roach e-mail (4-1-09)					
	magnesium hydroxide 50% (lb/yr)	245,000	1,277,500	1,277,500	194,250	6,387,500		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
	diamonium phosphate (lb/yr)	10,500	54,600	54,600	21,000	273,000		Chris Roach e-mail (4-15-09)	49,500	lb./truck			
added line	antifoam (lb/yr)	0	2,163,720	2,163,720	0	2,163,720			49,000	lb./truck			
	herbicides, pesticides, rodenticides, other chemicals (lb./yr)	100	100	100	100	100		DN58					
	diesel fuel (gallons/year)	1,786,944	1,786,944	1,786,944	793,647	1,786,944		Chris Roach e-mail (4-1-09)	7,500	gal./truck			
	Fluidized Bed Sand (tons/yr)	700	161	161	518	161			0.9071847	MT/ton	10	MT/truck	
Chemicals	sodium hydroxide (50%)	58	51	51	20	99	Trucks	Calculated					
(Shipments)	aqeuous ammonia (20%)	270	831	831	75	901	Trucks	Calculated					
	sulfuric acid (94%)	38	42	42	61	77	Rail cars	Calculated					
	urea (42%)	24	0	0	4	134	Trucks	Calculated					
	phosphoric acid	0	0	0	0	18	Trucks	Calculated					
	alpha-amylase (enzyme)	0	0	0	0	23	Trucks	Calculated					
	gluco-amylase (enzyme)	0	0	0	0	28	Trucks	Calculated					
	gasoline (denaturant)	104	100	100	67	198	Trucks(1,2)	Calculated					
	cellulase	600	354	354	307	354	Trucks	Calculated					
	corn syrup	513	217	217	22	0	Trucks	Calculated					
	lime Ca(OH)2	75	99	99	44	99	Rail cars	Calculated					
added line	limestone	82	70	70	0	70	Rail cars	Calculated					
	corrosion inhibitor	4	4	4	4	4	Truck	Assume 4 shipments per year by truck.					
	magnesium hydroxide	5	26	26	4	130	Truck	Calculated					
	diamonium phosphate	1	2	2	1	6	Truck	Calculated					
added line	antifoam	0	45	45	0	45	Truck	Calculated					
	herbicides, pesticides, rodenticides, other chemicals	4	4	4	4	4	Truck	Assume 4 shipments per year by truck.					
	diesel fuel	239	239	239	106	239	Truck	Calculated					
	Fluidized Bed Sand	64	15	15	47	15	Truck	Calculated					
Chemicals	sodium hydroxide (50%)	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
(Distances)	aqeuous ammonia (20%)	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	sulfuric acid (94%)	870	870	870	870	870	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	urea (42%)	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	phosphoric acid	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	alpha-amylase (enzyme)	1,000	1,000	1,000	1,000	1,000	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	gluco-amylase (enzyme)	1,000	1,000	1,000	1,000	1,000	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	gasoline (denaturant)	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	cellulase	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	corn syrup	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	lime Ca(OH)2	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
added line	Limestone	400	400	400	400	400	Miles	Assume same as hydrated lime					
	corrosion inhibitor	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	magnesium hydroxide	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	diamonium phosphate	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	herbicides, pesticides, rodenticides	30	30	30	30	30	Miles	Available locally.					

Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS PA Option	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	Units	Notes					
Transportation (continued)	diesel fuel	400	400	400	400	400	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	Fluidized Bed Sand	200	200	200	200	200	Miles	Transportation Data Needs Request, 04/01/2009 Update					
Product	denatured ethanol	18,000,000	18,884,000	18,884,000	12,000,000	119,600,000				gal./year			
(Amounts)													
Product	denatured ethanol- Fort Worth	632	663	663	422	1,360	Rail Cars	Transportation Data Needs Request, 04/01/2009 Update	38,760,000	gal./year			
(Shipments)	denatured ethanol- West Coast	0	0	0	0	1,360	Rail Cars	Transportation Data Needs Request, 04/01/2009 Update	38,760,000	gal./year			
	denatured ethanol- West Coast	0	0	0	0	1,040	Rail Cars	Transportation Data Needs Request, 04/01/2009 Update	29,640,000	gal./year			
	denatured ethanol- Phoenix	0	0	0	0	240	Rail Cars	Transportation Data Needs Request, 04/01/2009 Update	6,840,000	gal./year			
Product	Fort Worth (miles)	500	500	500	500	500		Transportation Data Needs Request, 04/01/2009 Update					
(Distances)	West Coast (miles)	NA	NA	NA	NA	1,172		Transportation Data Needs Request, 04/01/2009 Update					
	West Coast (miles)	NA	NA	NA	NA	1,250		Transportation Data Needs Request, 04/01/2009 Update					
	Phoenix (miles)	NA	NA	NA	NA	850		Transportation Data Needs Request, 04/01/2009 Update					
Waste	Dirt/Fines (tons/yr)	33,600	41,177	28,032	8,750	41,177			0.9071847	MT/ton		10	MT/truck
(Amounts)	Lignin (tons/yr)	44,709	38,685	38,685	19,000	38,685			94	tons/rail car			
	Boiler Ash (tons/yr)	79,671	126,420	88,200	11,365	126,420			0.9071847	MT/ton		10	MT/truck
	Hazardous Waste (tons/yr)	1	1	1	1	2							
	Gasification Ash (tons/yr)	0	0	0	8,524	0			0.9071847	MT/ton		10	MT/truck
	Municipal Solid Waste (tons/yr)	33	33	33	26	90		189 lb/day, 150 lb/day, 515 lb/day; and 350 days/yr	0.9071847	MT/ton		10	MT/truck
	WDGS (tons/yr)	0	0	0	0	782,000			15	tons/truck			
	DDGS (tons/yr)	0	0	0	0	0		100% WDGS is worst case	15	tons/truck			
	Fluidized Bed Sand (tons/yr)	0	0	0	0	0		Chris Roach e-mail (4-15-09), sand included in ash	0.9071847	MT/ton		10	MT/truck
Waste	Dirt/Fines	3,049	0	0	794	0	Trucks	Calculated					
(Shipments)	Lignin	476	412	412	203	412	Rail Cars	Calculated					
	Boiler Ash	7,228	11,469	8,002	1,032	11,469	Trucks	Calculated					
	Hazardous Waste	4	4	4	4	4	Trucks	Assume quarterly shipments to avoid TSD requirements.					
	Gasification Ash	0	0	0	774	0	Trucks	Calculated					
	Municipal Solid Waste	4	4	4	3	9	Trucks	Calculated					
	WDGS	0	0	0	0	52,134	Trucks	Calculated					
	DDGS	0	0	0	0	0	Trucks	Calculated					
	Fluidized Bed Sand	0	0	0	0	0	Trucks	Calculated					
Waste	Dirt/Fines (miles)	30	0	0	30	0	Miles	Grant County Landfill					
(Distances)	Lignin (miles)	1,500	1,500	1,500	1,500	1,500	Miles	Transportation Data Needs Request, 04/01/2009 Update					
	Boiler Ash (miles)	30	30	30	30	30	Miles	Grant County Landfill / or to biomass producers					
	Hazardous Waste (miles)	106	106	106	106	106	Miles	Vendor located in Dodge City					
	Gasification Ash (miles)	30	30	30	30	30	Miles	Grant County Landfill / or to biomass producers					
	Municipal Sold Waste (miles)	3	3	3	3	3	Miles	Stevens County Landfill					
	WDGS (miles)	NA	NA	NA	NA	50	Miles						
	DDGS (miles)	NA	NA	NA	NA	50	Miles						
	Fluidized Bed Sand (miles)	NA	NA	NA	NA	NA		Chris Roach e-mail (4-15-09)					
Construction Materials	Structural steel (tons)	2,500	2,500	2,500	2,200	5,000		DN48	0.9071847	MT/ton		10	MT/truck
(Amounts)	Steel for field erected tanks (tons)	2,400	2,400	2,400	2,400	6,300		DN48	0.9071847	MT/ton		10	MT/truck
	Concrete (cubic yards)	50,000	50,000	50,000	35,000	110,000		DN48	0.7645549	m3/yd3		10	m3/truck
	Earthwork - fill (cubic yards)	225,000	225,000	225,000	210,000	300,000		DN48	0.7645549	m3/yd3		10	m3/truck
	Asphalt paving (square feet)	38,000	38,000	38,000	38,000	75,000		DN48	0.02831685	m3/yd2		10	m3/truck	(Assume 1 ft thick
	Storm sewer piping (linear feet)	2,000	2,000	2,000	2,000	2,500		DN48	1	ft/ft		300	ft/truck	
	Internal/external water piping (linear feet)	35,000	35,000	35,000	35,000	61,000		DN48	0.3048	m/ft		1000	m/truck	
	Railway tracks (linear feet)	9,000	9,000	9,000	9,000	41,000		DN48	0.0181	MT/ft		10	MT/truck	(Assume 120 lb./yd
	Rock sub-ballast (cubic yards)	6,000	6,000	6,000	6,000	25,000		DN48	0.7645549	m3/yd3		10	m3/truck	
	Mechanical process piping (linear feet)	51,000	51,000	51,000	45,000	101,000		DN48	0.3048	m/ft		1000	m/truck	
	Painting (square feet - of coverage)	40,000	40,000	40,000	22,500	45,000		DN48						
	Electrical and control cables (linear feet)	166,000	166,000	166,000	155,000	333,000		DN48	0.3048	m/ft		1000	m/truck	
	Cable trays (linear feet)	13,000	13,000	13,000	12,000	25,000		DN48	0.3048	m/ft		1000	m/truck	
	Fencing (linear feet)	20,000	20,000	20,000	20,000	20,000		DN48	0.3048	m/ft		1000	m/truck	
	Gravel (cubic yards)	56,000	56,000	56,000	48,000	85,000		DN48	0.7645549	m3/yd3		10	m3/truck	
	Firewater piping (linear feet)	6,000	6,000	6,000	6,000	8,000		DN48	0.3048	m/ft		1000	m/truck	
Construction Materials	Structural steel	227	227	227	200	454	Trucks	Calculated					
(Shipments)	Steel for field erected tanks	218	218	218	218	572	Trucks	Calculated					
	Concrete	3,823	3,823	3,823	2,676	8,411	Trucks	Calculated					
	Earthwork - fill	17,203	17,203	17,203	16,056	22,937	Trucks	Calculated					
	Asphalt paving	108	108	108	108	213	Trucks	Calculated					
	Storm sewer piping	7	7	7	7	9	Trucks	Calculated					
	Internal/external water piping	11	11	11	11	19	Trucks	Calculated					
	Railway tracks	17	17	17	17	75	Trucks	Calculated					
	Rock sub-ballast	459	459	459	459	1,912	Trucks	Calculated					
	Mechanical process piping	16	16	16	14	31	Trucks	Calculated					
	Painting						Trucks	Calculated					
	Electrical and control cables	51	51	51	48	102	Trucks	Calculated					
	Cable trays	4	4	4	4	8	Trucks	Calculated					
	Fencing	7	7	7	7	7	Trucks	Calculated					
	Gravel	4,282	4,282	4,282	3,670	6,499	Trucks	Calculated					
	Firewater piping	2	2	2	2	3	Trucks	Calculated					
	Total	26,435	26,435	26,435	23,497	41,252	Trucks	Calculated					

Resource Area	Parameter Name	DEIS PA	FEIS PA	FEIS PA Option	DEIS/FEIS AA	Scenario 3 (FEIS PA + Starch Plant)	Units	Notes					
Transportation (continued)													
Distance	Wichita to Hugoton (miles)	235	235	235	235	235	Miles	All construction materials shipped from Wichita					
Construction Wastes	Ground Excess, Construction/Demolition Debris (cubic	1,980,000	1,980,000	1,980,000	1,782,000	3,000,000		DN56 + 3-6-09 Update	0.02831685	m3/ft3	10	m3/truck	
(Amounts)	Plastic, Paper, Cartons (pounds)	13,200	13,200	13,200	11,880	20,000		DN56 + 3-6-09 Update	0.00045359	MT/lb.	10	MT/truck	
	Steel Waste, pipes, cables (pounds)	132,000	132,000	132,000	118,800	200,000		DN56 + 3-6-09 Update	0.00045359	MT/lb.	10	MT/truck	
	Metal Cans (paint, chemical, oil, etc.) (pounds)	26,400	26,400	26,400	23,760	40,000		DN56 + 3-6-09 Update	0.00045359	MT/lb.	10	MT/truck	
	Municipal Solids (human organic waste) (gallons)	93,600	93,600	93,600	78,000	156,000		DN56 + 3-6-09 Update	1	gal./gal.	6500	gal./truck	
	Municipal Solids (inorganic) (pounds)	178,200	178,200	178,200	160,380	270,000		DN56 + 3-6-09 Update	0.00045359	MT/lb.	10	MT/truck	
Construction Wastes	Ground Excess, Construction/Demolition Debris	5,607	5,607	5,607	5,047	8,496	Trucks	Calculated					
(Shipments)	Plastic, Paper, Cartons	1	1	1	1	1	Trucks	Calculated					
	Steel Waste, pipes, cables	6	6	6	6	10	Trucks	Calculated					
	Metal Cans (paint, chemical, oil, etc.)	2	2	2	2	2	Trucks	Calculated					
	Municipal Solids (human organic waste)	15	15	15	12	24	Trucks	Calculated					
	Municipal Solids (inorganic)	9	9	9	8	13	Trucks	Calculated					
	Total	5,640	5,640	5,640	5,076	8,546		Calculated					
Construction Wastes	Ground Excess, Construction/Demolition Debris	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
(Distances)	Plastic, Paper, Cartons	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
	Steel Waste, pipes, cables	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
	Metal Cans (paint, chemical, oil, etc.)	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
	Municipal Solids (human organic waste)	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
	Municipal Solids (inorganic)	50	50	50	50	50	Miles	Ave. for Seward, Grant, Finney County Landfills					
	Trucks (operations)	61,191	70,556	48,832	18,398	163,127							
	Trucks/day (operations) based on 350 shipping days/ye	174.832664	201.587155	139.519782	52.5650373	466.075727							
	Trucks (construction)	32075	32075	32075	28573	49798							
	Trucks/day (construction) based on shipping 6 days pe	68.5363248	68.5363248	68.5363248	61.0534188	79.8044872							
	Rail cars (operations)	1303	1286	6629	730	7606							
	Rail cars (construction)	0	0	0	0	0							