Mid America Agri Products
Wheatland, LLC

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Re: Method 2A Application- Excluding Confidential Business Information

California Air Resources Board
Industrial Strategies Division
Transportation Fuels Branch
Fuels Evaluation Section
1001 I Street
Sacramento, CA 95812

To: The Executive Officer

Herewith, please find our application and supporting documents for two new fuel lifecycle GHG emissions pathways using the Method 2A application process described in "Establishing New Fuel Pathways under the California Low Carbon Fuel Standard Procedures and Guidelines for Regulated Parties" report by ARB (California Air Resources Board) issued on March 25, 2010.

We seek these two new pathways for our Mid America Agri Products/Wheatland, LLC ("MABE") ethanol plant located near Madrid, Nebraska. At our facility, we produce ethanol from locally grown corn. A negligible amount of lime (CaCO3) is used on the ground used to grow the corn used as feedstock due to the type of soil (particularly its pH) in our area. Our facility uses natural gas for its process energy and electricity from the local grid. We simultaneously produce a distillers grains co-product comprised of 100 % wet distillers grains solubles (WDGS).

The CARB LCFS regulations stipulate that only pathways lower in carbon intensity value than the main pathway they deviate from can use the Method 2A application. Our pathway is a sub-pathway of the Corn Ethanol (Midwest; Dry Mill; Wet DGS, NG) Pathway because, except for the points of deviation summarized below, our pathway is identical to the Corn Ethanol (Midwest; Dry Mill; Dry/Wet DGS, NG) Pathway described in the Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis.[1]

[1] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Version 2.1, published February 27, 2009.

We have used the CA-GREET Model 1.8b to calculate the lifecycle greenhouse gas (GHG) emissions for the new pathway. Based on the input changes to the model described in the attachments, the carbon intensity value of our pathway with negligible/no lime use is **78.68 gCO2e/MJ**, and the carbon intensity of pathway for feedstock for which there is lime use is **82.76 gCO2e/MJ**. For both these pathways, we have used the most recent 24-months of ethanol plant operating data as the basis of the CI calculations. The following table summarizes the two pathways being requested.

Table 1: Summary of New Corn Ethanol Pathways Requested by MABE

Summary of Requested Corn Ethanol Pathways in MABE Method 2A Application		
Pathway Number	Decscription	Carbon Intensity Value, gCO2e/MJ
1	Corn feedstock, negligible/no-lime use, NG fuel, 100% WDGS co-product and corn oil recovery	78.68
2	Corn feedstock, default lime use, NG fuel, 100% WDGS co-product and corn oil recovery	82.76

The new pathway CI values and our production volumes more than meet the "5-10" substantiality rule and the other requirements of a new pathway.

The following sections to this application provide the details and documentation of our application for new pathways under Method 2A. Portions of the following information are considered confidential business information and each page with "Contains Confidential Information" in the page header should be considered to contain confidential business information. Pages that have been redacted to remove confidential business information have "Non-Confidential, Redacted Version" in the header. Where redaction has occurs in the text, it is marked with one or more "x" symbols. The number of "x" symbols has no meaning. Each electronic file that includes the word "CONFIDENTIAL" in the file name should be considered to contain confidential business information. If the electronic file does not contain any confidential business information the file name includes the word "PUBLIC".

We request your approval and would be glad to answer any questions you may have about our application. Following please find the names and contact information of the persons who are available to answer any questions about our application. Please note that Houston BioFuels Consultants, LLC are assisting us with the application and may be contacted if you have questions or comments about our application

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Robert Barnhouse, Controller

Attachments

Attachments

Section Number and Contents

I. WTW Diagram of MABE Sub-Pathway of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway

II. MABE Plant Information

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I. WTW Diagram of MABE Sub-Pathway of the Midwest Corn Ethanol Pathway

Figure 1: WTW Components of the MABE Pathway are Identical to the Corn Ethanol (Midwest; Dry/Wet Mill; Wet DGS, NG) Pathway[2]

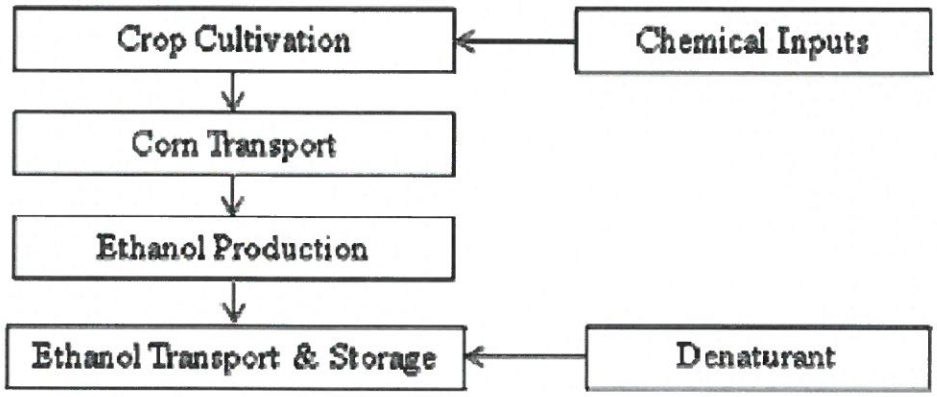


Figure 1. WTT Components for Ethanol Transported to California

[2] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Page 4, Version 2.1, published February 27, 2009.

II. MABE Plant Information

Mid America Agri Products/Wheatland, LLC (MABE) Plant Info

1. EPA Facility ID Number - 70153
2. Plant Location - 76080 RD 338, Madrid, Nebraska 69150
3. History – Construction ground breaking for the plant started in January of 2006 and commenced operation in August of 2007.
4. Capacity Notes – 40 million gals per year nameplate, permitted for 54 million gals / year.
5. Technology – Delta-T process technology
6. Feedstock Type - Corn
7. Product – denatured ethanol
8. Co-Products – WDGS and corn oil
9. Process fuel – Natural gas via pipeline
10. Power supply - Electricity from local power grid

11. Process Flow Description – The following description and diagram of the dry mill process is from the ICM Inc. web site.

Delivery/Storage
Grain is delivered by truck or rail to the ethanol plant where it's loaded in storage bins designed to hold enough grain to supply the plant for 6-8 days.

Milling
The grain is screened to remove debris and ground into course flour.

Cooking (Hot Slurry, Primary Liquefaction, and Secondary Liquefaction)
During the cook process, the starch in the flour is physically and chemically prepared for fermentation.

Hot Slurry
The milled grain is mixed with process water, the pH is adjusted to about 5.8, and an alpha-amylase enzyme is added. The slurry is heated to 180–190°F for 30–45 minutes to reduce viscosity.

Primary Liquefaction
The slurry is then pumped through a pressurized jet cooker at 221°F and held for 5 minutes. The mixture is then cooled by an atmospheric or vacuum flash condenser.

Secondary Liquefaction
After the flash condensation cooling, the mixture is held for 1–2 hours at 180–190°F to give the alpha-amylase enzyme time to break down the starch into short chain dextrins. After pH and temperature adjustment, a second enzyme, glucoamylase, is added as the mixture is pumped into the fermentation tanks.

Simultaneous Saccharification Fermentation
Once inside the fermentation tanks, the mixture is referred to as mash. The glucoamylase enzyme breaks down the dextrins to form simple sugars. Yeast is added to convert the sugar to ethanol and carbon dioxide. The mash is then allowed to ferment for 40-50 hours, resulting in a mixture that contains about 15% ethanol as well as the solids from the grain and added yeast.

Distillation
The fermented mash is pumped into a multi-column distillation system where additional heat is added. The columns utilize the differences in the boiling points of ethanol and water to boil off and separate the ethanol. By the time the product stream is ready to leave the distillation columns, it contains about 95% ethanol by volume (190-proof). The residue from this process, called stillage, contains non-fermentable solids and water and is pumped out from the bottom of the columns into the centrifuges.

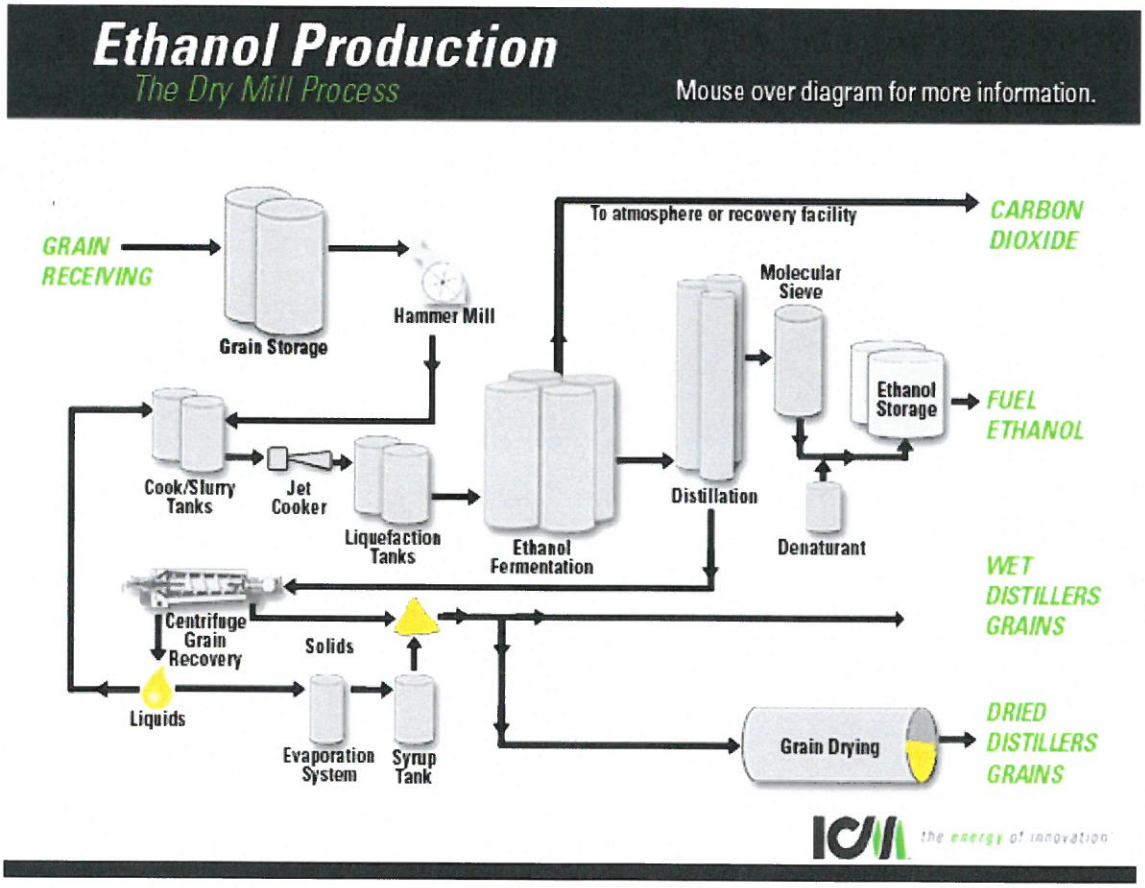
Dehydration
The 190-proof ethanol still contains about 5% water. It's passed through a molecular sieve to physically separate the remaining water from the ethanol based on the different sizes of the

molecules. This step produces 200-proof anhydrous (waterless) ethanol.

Ethanol Storage
Before the ethanol is sent to storage tanks, a small amount of denaturant is added, making it unfit for human consumption. Most ethanol plants' storage tanks are sized to allow storage of 7–10 days' production capacity.

12. Process Block Flow Diagram (No DGS Driers at MABE)

Source: ICM Inc.



Energy and Material Balance - For legibility, the energy and material balance for the MABE ethanol plant is contained in a separate pdf file accompanying the electronic version of this application.

The file name is: *MABE Energy and Material Diagram CONFIDENTIAL 18Dec14.pdf*

13. Latest version of the plant's air permits.

The air permit is divided into five pdf files with the following file names:

1. *NDEQ Operating Air Permit 1 of 3 Public 2Dec14.pdf*
2. *NDEQ Operating Air Permit 2a of 3 3-11-11.pdf*
3. *NDEQ Operating Air Permit 2b of 3 3-11-11.pdf*
4. *NDEQ Operating Air Permit 3a of 3 3-11-11.pdf*
5. *NDEQ Operating Air Permit 3b of 3 3-11-11.pdf*

III. Table of CA-GREET Model Inputs for MABE Pathway

Table 2: CA-GREET Model Inputs for the two MABE Pathways

CA-GREET Model Sheet Name	Cell number	Default Pathway Value (100% WDGS)	Input Values common to both MABE Pathways	Units	Description	Comments
Fuel_Prod_TS	L277	26,100	Confidential Business Information	btu/gal	Corn Ethanol Plant Energy Use, Dry Mill, 100% WDGS	With modern plant, lower power use
Fuel_Prod_TS	D277	2.72	Confidential Business Information	gal/bu	Ethanol yield of Corn Ethanol Plant, Dry Mill	With modern plant, optimized yield
Inputs	C247	14.06%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use
Additional Input Value for the No/Negligible Lime Pathway						
Fuel_Prod_TS	T263	1202	Confidential Business Information	CaCO3 grams/bu	Lime fertilizer Used for Corn Farming	No Lime use needed

IV. Basis for the Input Values

The input values presented in this application are based on the period from November 2012 through October 2014, the "Production Period".

Table 3: Calculation of the Input Values for the MABE Pathways

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

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V. CA-GREET Model Output and Analysis of Results

The MABE pathways are sub-pathways of the Midwest, Dry-Mill, 100% WDGS Co-product, 100% natural gas fuel ethanol plant pathway. The carbon intensity value of the base pathway is 90.1 gCO2e/MJ.

Table 4: CI of Existing Midwest Dry Mill, 100% WDGS, 100% Natural Gas Fuel Pathway

CARB Lookup Table Reference Pathway: Midwest Dry Mill Ethanol Plant, 100% WDGS, NG Fuel Pathway							
		CA-GREET Model Output					
	IPPC factors	Corn	Ethanol	Calculations to convert Output to g/CO2e/MJ			
	gCO2e/g	*Btu or Grams per mmbtu of Fuel Throughput*				gCO2e/mmbtu	**gCO2e/MJ**
		US Avg Corn	100% WDGS	Corn w/loss	Total corn + EtOH		
Total energy		187,247	1,330,561	187,342	1,517,902		
VOC		16.768	54.446	17	71		
CO		151.276	26.942	151	178		
CH4	25	17.400	56.800	17	74	1,855.2	1.76
N2O	298	41.743	0.350	42	42	12,550.1	11.90
CO2	1	15,064	33,113	15,071	48,184	48,184.4	45.67
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						62,589.7	59.33
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							60.13
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							90.13
Note: The calculated result of this pathway prior to making the input changes for the subpathway ethanol plant is 59.33 gCO2e/MJ. This matches the Corn Ethanol WTW Analysis result of 67.6 gCO2e/MJ 59.3 gCO2e/MJ (Table C. GHG Emissions Summary for the Various Corn Ethanol Scenarios, page 6) before the denaturant and light vehicle combustion factor of 0.8 gCO2e/MJ is added.							

The carbon intensity value of the MABE ethanol plant ethanol with negligible/no-lime use is 78.68 gCO2e/MJ. The pathway with default pathway lime use is 82.76 gCO2e/MJ.

Table 5: MABE Pathway with Negligible/No-Lime Use, 100% WDGS

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

For reference see CA-GREET 1.8b file:
MABE ca_greet1.8b No Lime Use CONFIDENTIAL 2Jan15.xls

The carbon intensity value of the MABE ethanol plant ethanol with default lime use is 82.76 gCO2e/MJ.

Table 6: MABE Pathway with Default Lime Use, 100% WDGS

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For reference see CA-GREET 1.8b file:
MABE ca_greet1.8b Default Lime Use CONFIDENTIAL 2Jan15.xls

VI. Production Range of MABE Pathway

The new pathway should be applicable to the MABE facilities for at production rates of 40 to 54 MGY.

VII. Sustainability of MABE Pathway

The MABE facility was designed and constructed using well-established modern designs and equipment and is managed by professional staff well-qualified to assure that over time the energy efficiency of and emissions from the facility do not deteriorate. Any deterioration would result in a less profitable business. Thus the sustainability of the plant is well aligned with the business objectives of the owners.

VIII. Impact on Land Use

There is negligible difference between the land use of this sub-pathway and that of the Corn Ethanol (Midwest; Dry Mill; Wet DGS, NG) Pathway described in the Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis.[3].

[3] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Version 2.1, published February 27, 2009.

IX. Documentation of Annual Quantities of Feedstock, Utilities and Production

Table 7: Summary of Inputs and Outputs during 24 Month Reference Production Period

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The utilities quantities in the preceding table showing the actual monthly utility use are documented by the utility invoices with the files named:

- *MABE NG Invoices 1st year CONFIDENTIAL 9Dec14.pdf*
- *MABE NG Invoices 2nd year CONFIDENTIAL 9Dec14.pdf*
- *MABE Electricity Invoices 1 of 2 CONFIDENTIAL 11Dec14.zip*
- *MABE Electricity Invoices 2 of 2 CONFIDENTIAL 11Dec14.zip*

The natural gas invoices are on a calendar month basis and there is only one invoice amount per month. The electricity invoices are on not on a calendar month basis and there are multiple invoice amounts for each invoice. The electricity invoice amounts have been reconciled to a calendar month basis in an Excel spreadsheet that accompanies this application with the following name:

- *Generic Electricity Use Monthly Invoice Reconciliation CONFIDENTIAL 31Dec14.xls*

The accuracy and authenticity of all the data in this new pathway application are attested to in a letter from Mr. Robert Lundeen, CEO of Mid America Bio Energy & Commodities, LLC in an accompanying file named:

- *MABE Transmittal Letter Attesting to Accuracy of Data PUBLIC 12Jan15.pdf.*