Non-Confidential, Redacted Version
HEARTLAND CORN PRODUCTS
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Phone: 507-647-5000 • Fax: 507-647-5010

May 13, 2014

Re: Method 2A Application-- Excluding Confidential Business Information

California Air Resources Board
Stationary Source Division
Criteria Pollutants Branch - 6th Floor
1001 I Street
P.O. BOX 2815
Sacramento, CA 95812

To: The Executive Officer

Herewith, please find our application and supporting documents for a fuel lifecycle GHG emissions pathway 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 a pathway for Heartland Corn Products (HCP) located near Winthrop, Minnesota. At our facility, we produce ethanol from locally grown corn. Our facility uses natural gas for its process energy and electricity from the local grid. All of our distillers grains co-product is dried and sold as distillers grains solubles (DDGS). Some of the corn oil in the distillers grains is extracted and recovered for use as animal feed and other uses. xxxx No lime is used to treat the soil used to grow our corn feedstock because the soil conditions create a naturally high pH environment.

xxxx

The CARB LCFS regulations stipulate that only pathways lower in carbon intensity value than the main pathway that they deviate from can use the Method 2A application. Our pathway is a sub-pathway of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway because, except for the points of deviation summarized above, 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]

We have used the CA-GREET Model 1.8b to calculate the lifecycle greenhouse gas emissions from this sub-pathway. Based on the input changes to the model described in the attachments, the carbon intensity value of this new pathway is **85.34** gCO2e/MJ. This CI intensity value 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 a new pathway 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 and shall not be disclosed to the public. If the electronic file does not contain any confidential business information the file name includes the word "PUBLIC".

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

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:

Affiliation:	Heartland Corn Products	Houston BioFuels Consultants LLC
Name:	Scott Blumhoefer	Mr. Logan Caldwell, Consultant
Telephone number:	1-507-647-5000	1-281-360-8515
e-mail address	scottb@heartlandcorn.com	lc@hbioc.net
Mailing Address	53331 Hwy 19 East Winthrop, MN 55396	5707 Ridge Vista Drive Kingwood, TX 77345

Sincerely,

Scott Blumhoefer
Vice President

Attachments

Attachments

Section Number and Contents

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

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

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

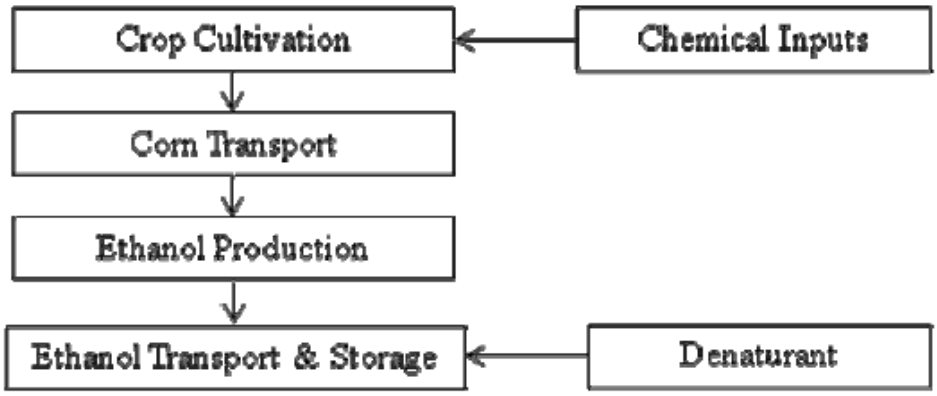

Figure 1. WTT Components for Ethanol Transported to California

[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. Heartland Corn Products Plant Information

Heartland Corn Products Plant Info

1. EPA Facility ID Number - 70089
2. Plant Location – Winthrop, MN
3. History – Heartland Corn Products (HCP) began ethanol production in 1995 with an annual production capacity of xxxx million gallons. By 2006, after a series of projects to expand capacity, the nameplate capacity had increased to xxxx million gallons. xxxx
4. Capacity Notes – Heartland Corn Products' current permitted capacity is xxxx million gallons per year of undenatured per the Minnesota Pollution Control Agency. Heartland is currently operating at xxxx million gallons per year undenatured production.
5. Technology – xxxx

   xxxx

   xxxx

6. Feedstock – HCP is cooperatively owned by xxx local farmers. Each equity share stipulates that its holder provide one bushel of corn to HCP each year. xxxx

Table 1: xxxx

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

Figure 2: HCP Winthrop, Minnesota Plant and Surrounding xxxx Counties

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7. Product – denatured fuel grade ethanol
8. Co-Products - dried distillers grains with soluble, crude corn oil
9. Process fuel – natural gas
10. Power supply – Great River Energy via McLeod County Cooperative REA
11. Please find the latest version of the plant's air permits in a separate document/electronic file accompanying this application due to its size. These permits contain information about the equipment in the plant that generates emissions from the combustion of fuel.
12. Process Flow Description – please refer to the following diagram. The process of producing ethanol from whole kernel corn begins with the grinding of the corn into flour through the hammer milling system. The flour is then conveyed to the slurry tank where the cooking process begins. The flour is aggressively blended with primarily recycled water sources to begin the starch breakdown process. Roughly xxxx of the weight of corn is starch. Starch is a very large carbohydrate molecule made up of thousands of glucose (simple sugar) units. Yeast has the ability to consume and ferment glucose, but not starch. The purpose of the cooking process is to begin the enzymatic breakdown of the starch.

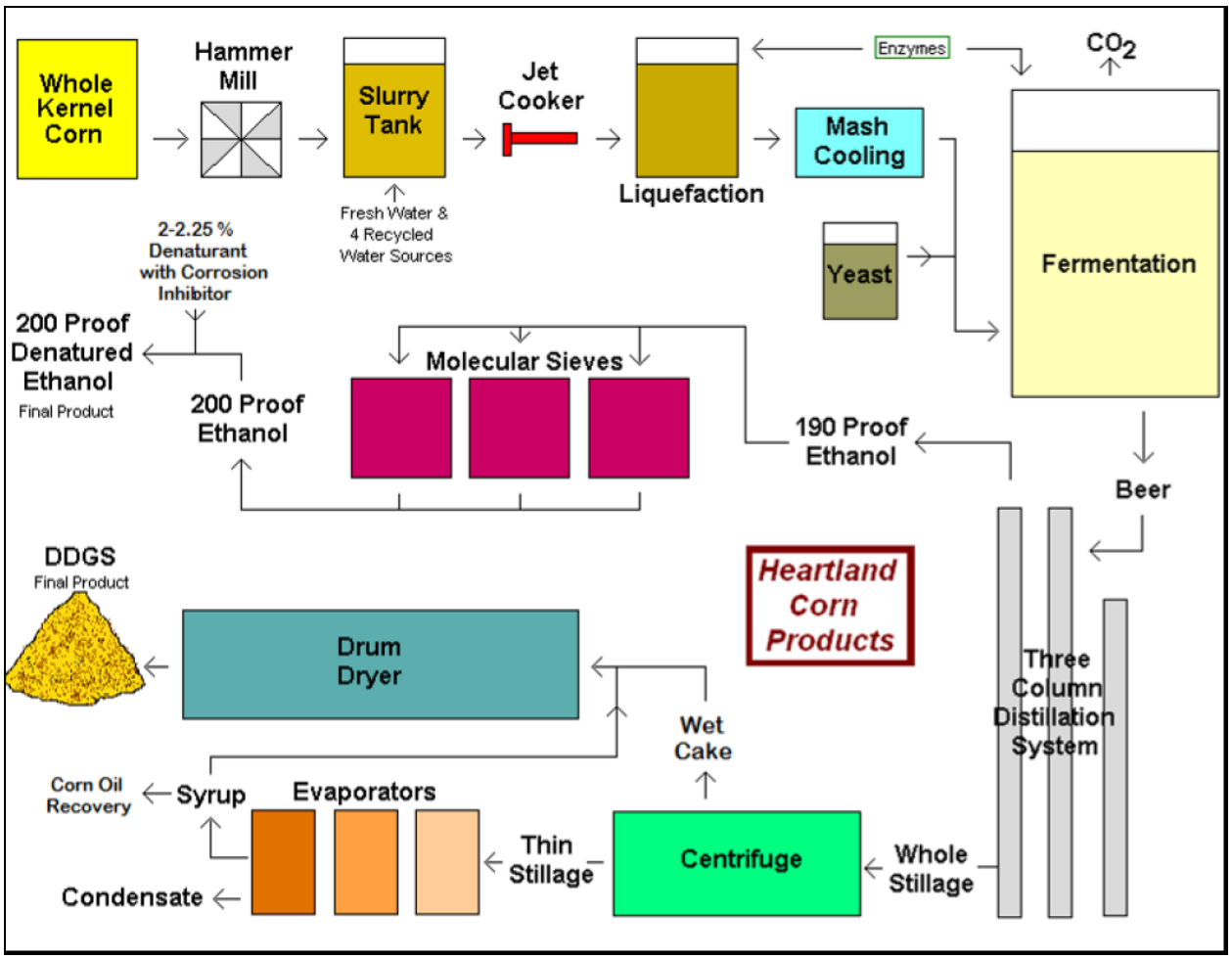
    Once the "corn mash" has been adequately cooked and mixed with alpha amylase enzymes through a series of cooking vessels, the mash is cooled to a temperature appropriate for the yeast fermentation to occur and pumped into one of the large fermentation vessels. Here the yeast and additional enzymes (gluco-amylase) are added. This process is allowed to proceed for about xxxx hours, giving the yeast ample time to consume the glucose, producing the liquid ethanol and CO2 gas fermentation products.

The distillation system, used to separate the ethanol from the water and remaining corn solids, is a three column vacuum system yielding 190 proof (95%) ethanol vapor. This is further dehydrated to a 200 proof product through a three bottle molecular sieve system. This system functions by the use of heat and vacuum/pressure changes in the sieve bottles that allows the ceramic bead fill to absorb the water yielding the nearly anhydrous ethanol product. Once condensed and cooled the ethanol is blended with an approved denaturant at mandated levels for storage and shipping.

The remainder of the process involves the de-watering of the left over fermentation product that has had the ethanol removed from it (whole stillage). It is basically water and the non-starch components of the corn kernel, thus giving it high nutritional value. The whole stillage is first de- watered mechanically through centrifuges yielding a liquid stream (thin stillage), which is primarily water with dissolved solids, and a wet cake. The thin stillage is further dewatered, "thickened," through a series of evaporators into a heavier, more viscous syrup. The syrup can then be passed through a separate system to remove a portion of the corn oil. Finally the wet cake and partially de-oiled syrup are dried down to 10% moisture through drum dryer systems yielding our DDGS (Dry Distillers Grain with Solubles) which is marketed as a high protein livestock feed product.

13. Process Block Flow Diagram, Source: Heartland Corn Products LLC

Figure 5: Process Block Flow Diagram of HCP Ethanol Plant



14. Energy and Material Balance - **Confidential Business Information**

This diagram is considered Confidential Business Information and

is not included in this non-confidential, redacted version of the application.

III. Table of CA-GREET Model Inputs for Heartland Corn Products Pathway

Table 2: CA-GREET Model Inputs for the Heartland Corn Products Pathway

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Heartland Corn Products Pathway Value	Units	Description	Comments
Fuel_Prod_TS	L277	36,000	Confidential Business Information	btu/gal	Corn Ethanol Plant Energy Use, Dry Mill	With modern plant, energy use
Fuel_Prod_TS	D277	2.72	Confidential Business Information	gal/bu	Ethanol yield of Corn Ethanol Plant, Dry Mill	With modern plant, higher yield
Fuel_Prod_TS	T263	1202	Confidential Business Information	CaCO3 grams/bu	Lime fertilizer Used for Corn Farming	Soil does not need lime due to soil chemistry
Inputs	C247	10.19%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use

IV. Basis for the Input Values

The input values presented in this application are based on the HCP ethanol plant production data from February 2012 through January 2013, the "Production Period".

Table 3: Calculation of the Input Values

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

Xxxx

Xxxx

The soil where the corn is grown that is used as feedstock by HCP has a naturally high pH. As a consequence lime is not applied to the soil. This is explained it the accompanying letter with the file name: *No lime use letter CONFIDENTIAL 20Sep13.pdf*, from Xxxx. Xxxx

In response to the ARB staff request for additional supporting documentation from a state, federal, or university entity that lime is not being used to fertilize land used to grow corn where HCP sources its corn, please refer to the letter from Xxxxx This file accompanies is part of the application package. Xxxx

V. CA-GREET Model Output and Analysis of Results

The Heartland Corn Products pathway carbon carbon intensity value is a sub-pathway of the Midwest, Dry-Mill, 100% DDGS Co-product, 100% natural gas fuel ethanol plant pathway. The carbon intensity value of the base pathway is 98.4 gCO2e/MJ. The carbon intensity value of the Heartland Corn Products ethanol plant ethanol is **85.34** gCO2e/MJ.

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

CARB Lookup Table Reference Pathway: Midwest Dry Mill Ethanol Plant, 100% DDGS, 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	Midwest Location	Corn w/loss	Total corn + EtOH		
Total energy		187,247	1,469,428	187,342	1,656,770		
VOC		16.8	55.5	17	72		
CO		151.3	31.4	151	183		
CH4	25	17.4	73.7	17	91	2,276.8	2.16
N2O	298	41.7	0.4	42	42	12,564.9	11.91
CO2	1	15,064	41,354	15,071	56,426	56,425.9	53.48
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						71,267.6	67.55
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							68.35
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							98.35
Note: The calculated result of this pathway prior to making the input changes for the HCP ethanol plant is 67.55 gCO2e/MJ. This matches the Corn Ethanol WTW Analysis result of 67.6 gCO2e/MJ (Table B. GHG Emissions Summary for Dry and Wet Mill Corn Ethanol, page 5) before the denaturant and light vehicle combustion factor of 0.8 gCO2e/MJ is added.							

Table 5: HCP Winthrop, Minnesota Ethanol Plant CI Calculation based on the CA-GREET Model Output

Heartland Corn Products Ethanol Plant, Midwest Dry Mill Ethanol Plant Sub-Pathway, NG Fuel Pathway, 100% DDGS, No Lime Use							
		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% DDGS	Corn w/ loss	Total Corn + EtOH		
Total energy		155,402	1,336,333	155,481	1,491,814		
VOC		16.373	54.481	16	71		
CO		148.487	25.226	149	174		
CH4	25	14.137	58.070	14	72	1,805.4	1.71
N2O	298	41.534	0.313	42	42	12,476.6	11.83
CO2	1	10,794	32,457	10,800	43,256	43,256.3	41.00
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						57,538.2	54.54
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							55.34
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							85.34

VI. Production Range of Heartland Corn Products Pathway - Confidential Business Information

The new pathway is applicable to the Heartland Corn Products facilities for at least 116.9% to 123.69% of Nameplate Capacity. This corresponds to 98.2 million to 103.9 million gallons.

Discussion
Xxxx

VII. Sustainability of Heartland Corn Products Pathway

The Heartland Corn Products 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; Dry 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 6: Summary of Inputs and Outputs during "Production Period"

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

On the following page, please find a letter from HCP attesting to the accuracy of the information used in the preparation of this application.

Documents authenticating the natural gas and electricity consumption shown in the table above are included with this application in separate CONFIDENTIAL pdf files.