HERON LAKE
BIO ENERGY
Integrating Energy & Environment

Heron Lake BioEnergy, LLC
91246 390th Avenue
Heron Lake, MN 56137-3175

October 23, 2013

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

RE: California Air Resources Board- Low Carbon Fuel Standard
Alternative Carbon Index Pathway Method 2A Application
Heron Lake BioEnergy, LLC, Heron Lake, MN

Dear Sir/Madam:

Enclosed, please find our application and supporting documentation for a fuel lifecycle Greenhouse Gas (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 the California Air Resources Board (CARB) dated August 2, 2010.

Heron Lake BioEnergy, LLC (HLBE) is requesting a new pathway for the corn-based, dry-mill ethanol manufacturing facility located in Heron Lake, MN. This pathway would be established as a sub-pathway of the existing Low Carbon Fuel Standard (LCFS) Lookup Table pathway: Ethanol from Corn, Midwest; Dry-Mill, Dry DGS, NG. The fuel lifecycle pathway of the HLBE facility is based on the referenced pathway; however, HLBE's power demand and energy consumption is lower than the standard pathway. Additionally, the facility produces a mix of co-products in addition to ethanol, including Dried Distiller's Grain and Solubles (DDGS) and Modified Distiller's Grain and Solubles (MDGS), and occasionally Wet Distiller's Grain and Solubles (WDGS or Wetcake). The facility also extracts corn oil and a liquid feed product. The HLBE process regarding co-products is also somewhat unique in that syrup is extracted prior to the drying of the DGS lowering the overall weight of products dried by roughly 6%. This further reduces energy demand.

The CARB LCFS regulations stipulate that the reference pathway must have a carbon intensity (CI) value at least five grams of carbon dioxide equivalent per Mega joule (5 gCO2e/MJ) higher than the proposed pathway in order to meet substantiality requirements for the Method 2A application. HLBE's pathway is a sub-pathway of the Corn Ethanol (Midwest; Dry Mill, Dry DGS, NG) Pathway because, except for the points previously noted, this pathway is identical to the Corn Ethanol (Midwest; Dry Mill, Dry DGS, NG) Pathway described in the Detailed

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California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis (February 2009).

The application has been prepared using the CA-GREET Model 1.8b to calculate the lifecycle GHG emissions from this sub-pathway. Based on the input changes to the model described in the attachments, the CI value of this new pathway for HLBE is 88.69 gCO2e/MJ. This CI value satisfies the minimum requirement of a 5 gCO2e/MJ reduction in the substantiality rule and other requirements for a new pathway under Method 2A.

The following attachments provide the details and documentation of the application for a new fuel-pathway under Method 2A. Portions of the following information that we consider Confidential Business Information have been clearly marked as such on each page. As such, HLBE has provided two (2) copies of this application for your use. However, in this version of the application, the points where elements of Confidential Business Information have been removed from the text or accompanying tables are indicated so as to inform the public that the complete application to CARB contained additional information to support this application, but documents that information is proprietary.

HLBE requests your approval and would be happy to answer any questions that may arise during review of these application materials. Should you have any questions or concerns, please contact me directly at the facility at 507-793-0077 or via email at schristensen@granitefallsenergy.com. If you have technical questions regarding this application, you may contact Brent Pavelko, HLBE Environmental Health and Safety Manager at 507-793-0077 or via email at brentp@heronlakebioenergy.com.

Sincerely,
Heron Lake BioEnergy, LLC

Steve A. Christensen

Steve A. Christensen
Chief Executive Officer/General Manager

cc: B. Pavelko, HLBE Environmental Health & Safety Manager
B. McKeown, HLBE Plant Manager
J. Buckley, RTP Environmental Associates, Inc.

Attachments

ATTACHMENTS

A. Facility Information

B. Summary of Fuel Combustion Equipment at the Facility

C. Energy and Material Balance

D. WTW Diagram of Company Sub-Pathway

E. CA-GREET Model Inputs for HLBE Pathway & Basis for Inputs
   - E-1. Table of CA-GREET Model Inputs for HLBE Pathway
   - E-2. Basis for Input Values

F. Production Data and Documents supporting the Monthly and Annual Quantities used in CA-GREET Model
   - F-1. Summary of Inputs and Outputs during the "Production Period"
   - F-2. Summary of Corn Oil, Syrup and DDGS Production Data and Moisture Content
   - F-3. Natural Gas Usage Invoices for the Previous Two (2) Years
   - F-4. Electricity Usage Invoices for the Previous Two (2) Years

G. CA-GREET Model Output and Analysis of Results

H. Data Certification Letter (sent to CARB 10/23/13)

I. HLBE RFS2 Engineer Audit Report

ATTACHMENT A

HLBE Facility Information

Heron Lake BioEnergy, LLC (HLBE) is a denatured ethanol manufacturing facility located approximately 2 miles to the northeast of the City of Heron Lake in Jackson County, Minnesota. The site is located at 91246 390th Avenue, Heron Lake, MN. The facility started operation on September 21, 2007 with a capacity of 55 million gallons per year (MMGPY) of denatured ethanol (10% above nameplate) using a Fluid Bed Boiler (FBB) as primary steam-generating unit for the facility. The facility was approved to increase production to 59.9 MMGPY in January 2010. The new pathway should be applicable to the HLBE Ethanol Plant facilities for at least 100% to 145% of Nameplate Capacity (50 MGY to 72.25 MGY).

Initially, the FBB was primarily coal-fired; however, HLBE ceased coal operations in November 2011 and amended operations to use only natural gas in the combustor. Facility design was originally completed by ICM, Inc. however improvements were made by CPL to increase energy efficiency. The facility is currently developing an air permit modification application to remove all coal emission units. The facility is a dry-mill, corn-based ethanol manufacturing facility; however the facility is currently applying for flexibility to process alternative feed stocks. As part of the process, the facility will produce animal feed as a co-product. The animal feed, known as distiller's grain and solubles (DGS) can be sold as is (wet cake), dried completely (DDGS), or partially dried (modified wet cake). Additional co-products include corn oil and a liquid feed product. Approximately 62% of all corn oil sold has been used as a feed product while the remaining 38% has been sold for use as biodiesel.

Natural Gas is used as a process fuel and is supplied by Constellation Energy. Energy to operate the facility is supplied by Interstate Power and Light, an Alliant Energy Company. Corn is received by truck from local Midwest growers. Ethanol is shipped via rail to distant customers and by truck to local customers.

The natural gas combustor combined with a Heat Recovery Steam Generator (HRSG) supplies steam to support ethanol production and related processes. This unit was formerly fueled

primarily by coal; however, in November 2011 the facility elected to cease use of coal and use natural gas in the combustor. A HRSG is attached to the combustor and results in energy absorption of approximately 165 MMBtu/hr or 79% of heat input. An Air Permit Modification Application is being prepared to remove coal as an available fuel source and remove all coal related equipment that was taken out of service as a result of this change. The onsite Regenerative Thermal Oxidizer (RTO) will consume propane or natural gas but will not provide energy for plant processes. The combustor will also accept process gases as well as the RTO. The emissions from the dryers are controlled by the RTO or the Natural Gas Combustor.

The HLBE facility purchases feedstock (corn) and receives it at the facility by truck or rail. A high efficiency baghouse collects and controls particulate emissions associated with grain unloading operations. Mechanical conveyors move the grain from receiving to storage, storage to milling, and milling to the mixer. High efficiency baghouses are connected to these conveyors to ensure particulate emission controls for grain processing areas. Collected grain dust is returned to the process. A hammermill is a dry milling process used to mill the grain into a powder. Hammermill particulate emissions are controlled by a high efficiency baghouse. Dust collected by the milling baghouse is directed to the process.

In the mixer (slurry tanks), the powder is mixed with recycled process water from the cook water tank to form a slurry. The slurry is cooked to liquefy and breakdown the starch to sugars. The slurry is cooled with non-contact cooling water and conveyed to fermenter process vessels where yeast and enzymes are added. The fermentation process converts the sugars to ethanol and carbon dioxide (CO_2) and produces a fermented mash or slurry called beer. The beer is pumped from the fermenters to the beer well. The beer well is a process tank that provides continuous flow of beer slurry to the distillation (rectifier) column. The CO_2 from the fermenters and the beer well passes through a high efficiency water scrubber to remove residual amounts of ethanol, and other volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) before the CO_2 is exhausted through the scrubber stack. The water from the fermentation scrubber is pumped to the cook water tank and recycled in the process.

The beer contains about 12-14% ethanol in addition to non-fermentable corn solids. The ethanol is separated from the beer by distillation and leaves the distillation process as 190 proof ethanol. The 190 proof ethanol is stored in an internal floating roof tank. At this point in the process, the

ethanol contains residual water. To remove the excess water, the 190 proof ethanol is passed through molecular sieves resulting in 200 proof ethanol. The 200 proof ethanol is sent to a condenser and then to another internal floating roof storage tank. Prior to shipment of the ethanol, denaturant (natural gasoline) is added to create a mixture of approximately 98% ethanol and 2% denaturant. Denaturant is also stored within an internal floating roof tank. The denatured ethanol is stored in one of two internal floating roof tanks. Loading of liquid product to both trucks and railcars is controlled with the use of an industrial flare. Vapors from the various process equipment and vents (DDGS dryers, mixer, slurry, cook water, yeast and centrate tanks; clean-in-place (CIP) screen and CIP tank; and condensers) are vented to either the RTO or the natural gas combustor for emission control.

The distillation process removes the non-fermentable corn solids and water from the process stream. The residue mash leaving distillation, called whole stillage, is transferred from the base of the distillation column to the stillage processing area. The whole stillage passes through a centrifuge to remove the majority of the water. The underflow from the centrifuge is called wet distillers grain and solubles (WDGS) or wet cake. Syrup is also removed from the stillage to further reduce the moisture content and total weight of the WDGS. The facility has the option to handle WDGS in three ways, at this point in the process:

1.) The WDGS can be loaded directly to trucks and transported to customers as a high quality feed (about 65% moisture). The WDGS can be stored on a pad, typically for 2 to 3 days until transport.

2.) The WDGS can be partially dried to create a product known as modified wet distillers grain and solubles (MWDGS) or modified wet cake. The product is approximately 50% moisture. One benefit of modified wet cake is a slightly longer shelf life in storage.

3.) The WDGS can be further dried to create a product known as dried distillers grains and solubles (DDGS). WDGS are dried via two (2) steam tube dryers. Steam is generated by the natural gas combustor that also produces steam to support ethanol production. The DDGS are about 11-13% moisture and can be stored for long periods of time. Upon leaving the drying system, the DDGS must

be cooled prior to storage or loadout. The DDGS cooling system is vented through a high efficiency baghouse collection system. DDGS are stored in one of two silos. The DDGS storage and loadout system is ventilated to a high efficiency baghouse for emissions control.

The overflow from the centrifuge, called thin stillage, enters an evaporator to reduce water content. The concentrated stream from the evaporators is mixed with the centrifuge underflow stream (or added later) before entering the dryer. The water stream from the evaporators is recycled back into the process. No process water is discharged to the environment.

The facility is equipped with a 4-cell water cooling tower that provides non-contact cooling for various process cooling needs. The facility is also equipped with several emergency generators. There is a diesel fired emergency fire water pump, a diesel fired emergency generator for the administration building and a propane fired boiler feed water pump emergency generator.

Finally, the facility is equipped with several storage and loading facilities for products. The denatured ethanol is stored in a series of tanks after production of 200 proof ethanol. Denaturant is added to the ethanol to create a fuel grade product which is stored onsite prior to shipment. Fuel grade ethanol is shipped via railcar or tanker truck. The dried distiller grains or wet cake product is also stored on site prior to shipment via truck or railcar. Wet cake is stored on a pad while DDGS is stored in silos.

The HLBE Ethanol 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 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.

A process flow diagram from latest air permit application is provided below. The current Minnesota Pollution Control Agency Air Permit for the HLBE facility has also been attached to this application as supporting documentation as a separate file.

ATTACHMENT B

Summary of Combustion Equipment at the Facility: Confidential Business Information

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

ATTACHMENT C

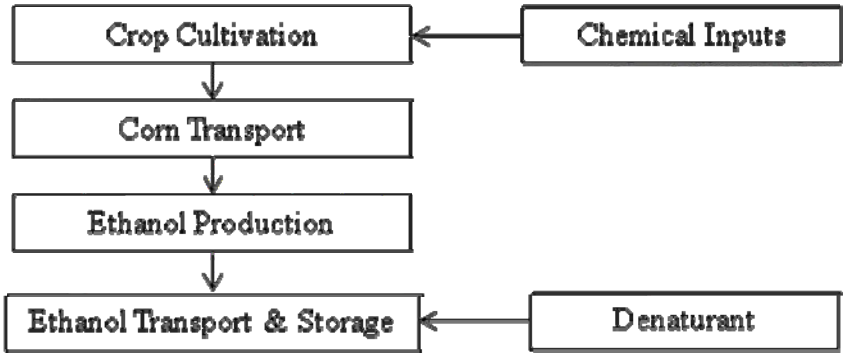
Energy and Material Balance: Confidential Business Information

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

ATTACHMENT D

WTW Diagram of Company Sub-Pathway

The Wheel-to-Well (WTW) components of the proposed HLBE sub-pathway are identical to the reference pathway for Midwest, dry-mill, corn ethanol with 100% dry DGS, using natural gas as a fuel source. The figure below outlines the discrete components that comprise the corn ethanol reference pathway, from corn farming to ethanol transport and distribution. This figure was taken directly from the *Detailed California-Modified GREET Pathway for Corn Ethanol* Well-to-Wheel (WTW) lifecycle analysis, pg 4, Version 2.1, published February 27, 2009.



ATTACHMENT E

CA-GREET Model Inputs for HLBE Pathway & Basis for Inputs

Attachment E-1– Confidential Business Information

Table of CA-GREET Model Inputs for HLBE Pathway

These files compare the existing sub-pathway to the new, proposed sub-pathway for the HLBE facility.

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

Attachment E-2– Confidential Business Information

Basis for Input Values

The input values presented in this application are based on the period September 2012 through August 2013, the "Production Period".

These tables are considered Confidential Business Information and are not included in this non-confidential version of the application.

ATTACHMENT F

Production Data and Documents supporting the Monthly and Annual Quantities used in CA-GREET Model

Attachment F-1– Confidential Business Information

Summary of Inputs and Outputs during the "Production Period"

Attachment F-2– Confidential Business Information

Summary of Corn Oil, Syrup and DDGS Production Data and Moisture Content

Attachment F-3– Confidential Business Information

Natural Gas Usage Invoices for the Previous Two (2) Years

Attachment F-4– Confidential Business Information

Electricity Usage Invoices for the Previous Two (2) Years

The documents referenced above authenticating the inputs to the model (including the natural gas and utility invoices) were provided in support of the application. However, these documents are considered Confidential Business Information and are not included with this non-confidential version of the application.

ATTACHMENT G

CA-GREET Model Output and Analysis of Results- Confidential Business Information

The HLBE Ethanol Plant pathway 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 HLBE Ethanol Plant ethanol is 88.69 gCO2e/MJ. 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, Version 2.1, published February 27, 2009.

This table and these modeling documents were provided in support of the application. However, these documents are considered Confidential Business Information and are not included with this non-confidential version of the application.

ATTACHMENT H

Data Certification Letter (sent to CARB 10/23/13)

A letter certifying that the data used in this application is true and accurate was submitted electronically to CARB on October 23, 2013 and a hard copy was sent on October 24, 2013 and has been attached below in support of this application.

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Heron Lake BioEnergy, LLC
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October 23, 2013

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

RE: California Air Resources Board- Low Carbon Fuel Standard
Validity of Data Used in Method 2A Application
Heron Lake BioEnergy, LLC, Heron Lake, MN

To: The Executive Officer

This letter is to certify that the production range chosen for the Heron Lake BioEnergy, LLC (HLBE) ethanol manufacturing facility proposed sub-pathway is true and accurate. HLBE's nameplate rate is 50,000,000 gallons per year (50 MMGPY) and the current permitted rate is 59.9 MMGPY; however, HLBE is currently in the process of submitting a modification to the Air Permit to increase production capacity to 72.25 MMGPY. This range is 100% to 150% of the nameplate rate. This range should be sufficient for the proposed pathway. HLBE anticipates better efficiency with a similar amount of steam and energy demand with greater product output. Further, I certify that all data presented in support of this application is true and accurate.

If you should have any questions or require additional information, please contact me or Mr. Brent Pavelko, HLBE Environmental Health & Safety Manager, at 507-793-0077.

Sincerely,
HERON LAKE BIOENERGY, LLC

Steve A. Christensen

Steve. A. Christensen
General Manager/Chief Executive Officer

cc (via email):

B. Pavelko, HLBE EH&S Manager
J. Buckley, RTP Environmental Associates, Inc.

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ATTACHMENT I

HLBE RFS2 Engineer Audit Report– Confidential Business Information

This document is considered Confidential Business Information and is not included with this non-confidential version of the application.