Golden Grain Energy
Energy for a Clean Environment

1822 43rd Street SW
Mason City, IA 50401
www.goldengrainenergy.com

Phone: 641-423-8525
Fax: 641-421-8457

May 23, 2013

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 three fuel lifecycle GHG emissions pathways using the Method 2A application process described in "Establishing New Fuel Pathways under the California Low Carbon Fuel Standard (LCFS) Procedures and Guidelines for Regulated Parties" report by ARB (California Air Resources Board) as updated on January 3, 2013, as well as the recently revised LCFS Regulations.

We seek two new pathways for our Golden Grain Energy, LLC ("GGE") ethanol plant located near Mason City, Iowa. At our facility, we produce ethanol from U.S. corn. Our facility uses natural gas for its process energy and electricity from the local grid. We co-produce modified distillers grains solubles (MDGS), dry distillers grains solubles (DDGS) and corn oil.

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 two new pathways are sub-pathways of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway because, except for the points of deviation summarized below, our pathways are identical to 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.[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 emissions from these sub-pathways. Based on the input changes to the model described in the attachments, the carbon intensity value of the new pathway with 100% DDGS production is **88.66** gCO2e/MJ and the carbon intensity value of the new pathway with 100% MDGS production is **82.23** gCO2e/MJ. These CI intensity 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 that we consider Confidential Business Information have been clearly marked as such, *but are not included in this non-confidential version of the application. 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 the ARB contained additional information to support this application, but that such information is considered by us to be Confidential Business Information.*

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.

Contacts:

Affiliation:	Golden Grain Energy, LLC	Houston BioFuels Consultants LLC
Name:	Chad Kuhlers, Plant Manager	Mr. Logan Caldwell, Consultant
Telephone number:	1-641-423-8525	1-281-360-8515
e-mail address	ckuhlers@etoh.us	lc@hbioc.net
Mailing Address	1822 43rd Street S.W.	5707 Ridge Vista Drive
	Mason City, IA 50401	Kingwood, TX 77345

Sincerely,
GOLDEN GRAIN ENERGY, LLC

5/23/13

Chad Kuhlers
Plant Manager

Attachments

Section Number and Contents

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

II. GGE Plant Information

III. Table of CA-GREET Model Inputs for GGE Pathways

IV. Basis for the Input Values

V. CA-GREET Model Output and Analysis of Results

VI. Production Range of GGE Pathway

VII. Sustainability of GGE Pathway

VIII. Impact on Land Use

IX. Documents supporting Annual Quantities of Corn, DGS, Ethanol, Natural Gas and Power

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

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

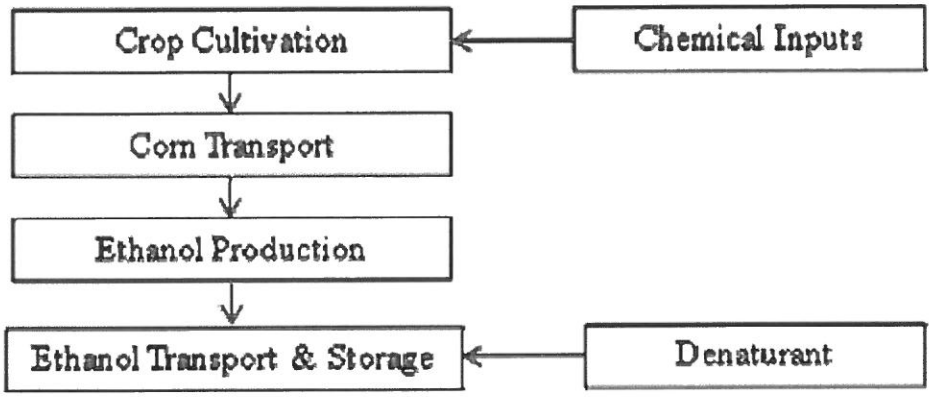


Figure 1. WTT Components for Ethanol Transported to California

[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. GGE Plant Information

Golden Grain Energy Plant Info

1. EPA Facility ID Number - 70691
2. Plant Location – 1822 43rd Street S.W., Mason City, IA 50401
3. Plant History and Capacity Information – Original construction 40 MMGPY plant in 2003, additional 40 MMGPY with an aggregate total to 80 MMGPY and maximum permitted volume of 150 MMGPY (4/19/06)
4. Technology – ICM Inc.
5. Feedstock Type - corn
6. Product – denatured ethanol
7. Co-Products – DDGS, MDGS, corn oil
8. Process fuel – natural gas
9. Power supply – local grid

10. Process Flow Description – please refer to the block flow diagram on the next page –

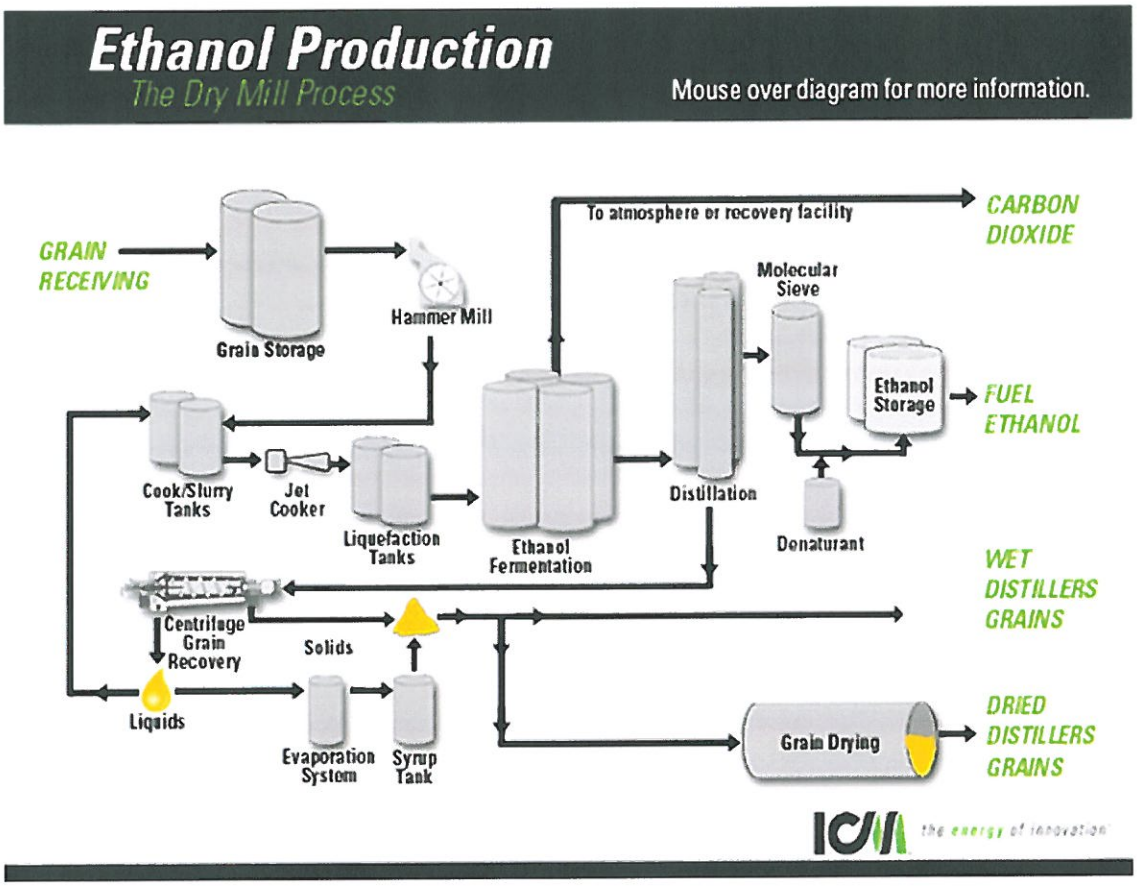
Corn may be received by either truck or railcar. The corn is stored until further processing. The corn is conveyed from storage to a scalper where the corn is screened to remove any unwanted debris. The corn is then ground into flour in a hammer mill. The flour is mixed with water, enzymes and yeast and pumped to one of several fermentation tanks and allowed to ferment. The fermentation tanks operate in parallel as staggered batch processes. The carbon dioxide generated in the fermentation process is cleaned using a water scrubber. The resulting beer is pumped from the fermentation tanks, one at a time, to the beerwell.

The beer is pumped continuously from the beerwell to a three-column distillation process. The distillation process heats the beer and uses the differences in physical properties of the chemicals to separate the ethanol from the other beer constituents. The resulting hydrous ethanol (ethanol with 5 percent water by volume) is further refined using molecular sieves to remove the remaining water. The resulting 200-proof ethanol is stored in storage tanks and blended with denaturant prior to shipment. The bottoms from the first phase of the distillation process, known as whole stillage, is pumped into process storage tanks and then to centrifuges.

The whole stillage is separated at the centrifuges into thin stillage (liquid) and wet cake (solids). The thin stillage is then sent to the corn oil extraction process where the oil from the thin stillage is mechanically separated. The resulting corn oil is stored in tanks and shipped as a crude product. The remaining thin stillage is then sent to evaporators to remove water, resulting in syrup. The wet cake is sent to the dryers along with syrup to make either modified or dry distillers grains with solubles (MDGS or DDGS). The DDGS and MDGS are sold as animal feed.

11. Process Block Flow Diagram.

Source: ICM Inc.



12. Energy and Material Balance. For legibility, the energy and material balance for the GGE ethanol plant is contained in a separate pdf file accompanying the electronic version of this application and is a separate document in the printed, hard copy version of this application. The file name is *GGE energy and material balance CONFIDENTIAL 13May13.pdf* - **However, because it contains Confidential Business Information, it is not included in this non-confidential version of the application.**
13. In a separate document/electronic file accompanying this application due to its size, please find the latest version of the plant's air permit. This permit contains information about the equipment in the plant that generates emissions from the combustion of fuel. The file name of the permit is *GGE Iowa Title V Op Permit 09-TV-002 PUBLIC 13May13.pdf*

III. Table of CA-GREET Model Inputs for GGE Pathways - Confidential Business Information

Table 1: CA-GREET Model Inputs for the GGE 100% DDGS Pathway

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Golden Grain Energy 100% DDGS 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, 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	10.19%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use
Inputs	C254	32,330	Confidential Business Information	btu/gal	Process fuel, 100%	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247
Inputs	C258	1.08	Confidential Business Information	kwh/gal	Electricity used for ethanol production	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247

Table 2: CA-GREET Model Inputs for the GGE Pathway 100% MDGS

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Golden Grain Energy 100% MDGS 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, 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	10.19%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use
Inputs	C254	32,330	Confidential Business Information	btu/gal	Process fuel, 100%	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247
Inputs	C258	1.08	Confidential Business Information	kwh/gal	Electricity used for ethanol production	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247

IV. Basis for the Input Values - Confidential Business Information

The input values presented in this application are based on the 24-month period from April 2011 through March 2013, the "Production Period".

The calculations in the table before are based on the data from the 24-month Production Period and are used to calculate the input values for the two new pathways: 100% DDGS and 100% MDGS.

Table 3: Calculation of the Input Values for the GGE Mixed DGS Pathway (98% DDGS, 2% MDGS) SHOWN HERE FOR REFERENCE ONLY THE MIXED DGS PATHWAY IS NOT A NEW PATHWAY

Table 3 is considered Confidential Business Information and is not included in this non-confidential version of the application.

[Redacted]

Table 4: Calculation of the Input Values for the GGE 100% DDGS Pathway

Table 4 is considered Confidential Business Information and is not included in this non-confidential version of the application.

Table 5: Calculation of the Input Values for the GGE 100% MDGS Pathway

Table 5 is considered Confidential Business Information and is not included in this non-confidential version of the application.

[Redacted]

V. CA-GREET Model Output and Analysis of Results

The GGE 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 existing mixed pathway of 98% DDGS and 2% MDGS shown on the ARB web site has a CI value of 88.92 gCO2e/MJ based on data from April 2010 through March 2011. Based on the most recent 24-month production period from April 2011 through March 2013, which has the same DDGS/MDGS mix of 98%/2%, the CI value is 88.51 gCO2e/MJ indicating GGE has continued to improve its energy efficiency, but has not reduced the CI of this mixed DGS pathway enough to qualify for a new pathway due to the "5-10" substantiality rule.

The carbon intensity values of the two new pathways GGE is applying for in this new pathway application are:

- 100% DDGS: 88.66 gCO2e/MJ
- 100% MDGS: 82.23 gCO2e/MJ.

Table 6: 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	100% DDGS	Corn w/loss	Total corn + EtOH		
Total energy		187,247	1,469,428	187,342	1,656,770		
VOC		16.768	55.519	17	72		
CO		151.276	31.385	151	183		
CH4	25	17.400	73.663	17	91	2,276.8	2.16
N2O	298	41.743	0.400	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 subpathway 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 7: CI Calculation of GGE Mixed DGS Pathway (98% DDGS/2% MDGS)
Based on the 24-month Production Period and Shown for Reference Only

Golden Grain Energy Ethanol Plant, Midwest Dry Mill Ethanol Plant Sub-Pathway, 98% DDGS/2% MDGS, 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	98% DDGS/2% MDGS	Corn w/ loss	Total Corn + EtOH		
Total energy		186,890	1,326,660	186,984	1,513,644		
VOC		16.736	54.403	17	71		
CO		150.988	24.131	151	175		
CH4	25	17.367	57.130	17	75	1,862.6	1.77
N2O	298	41.664	0.293	42	42	12,509.4	11.86
CO2	1	15,035	31,469	15,043	46,512	46,512.1	44.09
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						60,884.1	57.71
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							58.51
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							88.51

Table 8: CI Calculation of GGE Mixed 100% DDGS Pathway

Golden Grain Energy Ethanol Plant, Midwest Dry Mill Ethanol Plant Sub-Pathway, NG fuel, 100% DDGS 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	DDGS only	Corn w/ loss	Total Corn + EtOH		
Total energy		186,890	1,329,157	186,984	1,516,141		
VOC		16.736	54.422	17	71		
CO		150.988	24.211	151	175		
CH4	25	17.367	57.433	17	75	1,870.2	1.77
N2O	298	41.664	0.294	42	42	12,509.6	11.86
CO2	1	15,035	31,618	15,043	46,660	46,660.3	44.23
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						61,040.1	57.86
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							58.66
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							88.66

Table 9: CI Calculation of GGE Mixed 100% MDGS Pathway

Golden Grain Energy Ethanol Plant, Midwest Dry Mill Ethanol Plant Sub-Pathway, NG fuel, 100% MDGS 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	MDGS only	Corn w/ loss	Total Corn + EtOH		
Total energy		186,890	1,220,664	186,984	1,407,648		
VOC		16.736	53.584	17	70		
CO		150.988	20.740	151	172		
CH4	25	17.367	44.259	17	62	1,540.9	1.46
N2O	298	41.664	0.255	42	42	12,498.1	11.85
CO2	1	15,035	25,179	15,043	40,222	40,221.7	38.12
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						54,260.6	51.43
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							52.23
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							82.23

VI. Production Range of GGE Pathway

As stated in the Method 2A application form, the new pathway is applicable to the GGE facilities for at least 80 MGY to 130 MGY of ethanol production.

VII. Sustainability of GGE Pathway

The GGE 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. Documents supporting Annual Quantities of Ethanol, Natural Gas and Power –Confidential Business Information

Table 10: Summary of Inputs and Outputs during "Production Period"

Table 10 is considered Confidential Business Information and is not included in this non-confidential version of the application.

Documents authenticating the amounts shown in the table above are listed below. Utility Invoices are shown in separate pdf files. These are:

The natural gas invoices coincide with the calendar month and are documented in the following file.

- *Apr11_Mar12 NG Invoices CONFIDENTIAL 23Apr13.pdf*
- *Apr12_Mar13 NG Invoices CONFIDENTIAL 23Apr13.pdf*

However, because these files contain Confidential Business Information, they are not included in this non-confidential version of the application.

The monthly electricity invoices are documented in the following file.

- *Apr11_Mar12 Electricity invoices CONFIDENTIAL 23Apr13.pdf*
- *Apr12_Mar13 Electricity invoices CONFIDENTIAL 23Apr13.pdf*

However, because these files contain Confidential Business Information, they are not included in this non-confidential version of the application.

The monthly electricity invoices do not coincide with the calendar months and have been pro-rated across the months each invoice covers to put the electricity consumption on a calendar month basis. The table calculating the calendar month basis of the electricity usage can be found in an Excel spreadsheet named: *Power Invoice Reconciliation CONFIDENTIAL 13May13.xlsx.* **However, because this file contain Confidential Business Information, it is not included in this non-confidential version of the application.**

By separate file named *GGE Accuracy of Data Attestation Letter PUBLIC 14May13.pdf*, please find a letter from Mr. Chad Kuhlers, plant manager of GGE attesting to the accuracy and authenticity of the data used in this new pathway application.