

# **RFS-2 Independent Third-Party Engineering Review**

**POET-DSM Project Liberty, LLC**  
Emmetsburg, Iowa

**Final**  
February 20, 2014



**Stanley Consultants** INC.

A Stanley Group Company  
Engineering, Environmental and Construction Services - Worldwide

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I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.



Raymond J. Lukkarinen - License Number 18978 2/20/14

My license renewal date is December 31, 2015.

Pages or sheets covered by this seal: Entire Report



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## Executive Summary

STANLEY CONSULTANTS, INC. (ENGINEER), has performed an independent third-party engineering review of renewable fuel production at POET-DSM PROJECT LIBERTY, LLC (PRODUCER) in Emmetsburg, Iowa, to fulfill RFS-2 requirements, as described in §80.1450(b)(2). This review is part of the RFS-2 registration process that will allow PRODUCER to produce Renewable Identification Numbers (RINs).

The verifications conducted for this report were carried out by a Stanley Consultants' Iowa-licensed chemical engineer, Ray Lukkarinen, P.E. Mr. Lukkarinen conducted a site visit to PRODUCER's Emmetsburg, Iowa, facility (FACILITY) on January 27, 2014.

PRODUCER intends to operate a cellulosic biomass processing facility to produce industrial ethanol. This engineering review pertains exclusively to renewable fuel production from FACILITY.

PRODUCER broke ground for the facility in March 2012 and expects to complete construction in early 2014. The FACILITY is expected to begin producing ethanol in June 2014.

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### Professional Licensed Engineer Qualifications

Raymond Lukkarinen is licensed by Iowa Professional Licensing Bureau to practice as a Professional Engineer in Iowa, license number 18978, expiration December 31, 2015. Documentation of professional license is included in Appendix C. Mr. Lukkarinen has experience in the fuel ethanol industry, as well as other processes. Below is a reference to a few relevant projects Mr. Lukkarinen has been involved in.

- **Regenerative Thermal Oxidizers; Grain Processing Corporation; Washington, IN--** Project Engineer for an \$8 million capital project to reduce plant Volatile Organic Compound (V.O.C) emissions by 98 percent in a corn wet milling facility. Project required installation of a 100-foot long by 75-foot wide by 2-foot high mat concrete foundation, two, five-chamber Regenerative Thermal Oxidizer (R.T.O.) units, a 96-inch diameter by 100-foot tall stainless steel exhaust stack, multiple high volume induced draft (ID) and forced draft (FD) fans, extensive 3/16-inch thick 316L stainless steel ductwork up to 72 inches in diameter, and insulation, as well as controls equipment. Responsible for preparation of technical bid specification packages. Responsible for procurement of equipment and materials; review of all technical documents and drawings for accuracy; and management of field construction, project schedule, and budget.
- **Starch Waste Recovery; Grain Processing Corporation; Washington, IN--** Project Engineer for a \$2.1 million capital project to recover starch from a high strength waste stream for incremental alcohol capacity in a corn wet milling facility. Project required installation of a block foundation, centrifuge/decanter, and structural steel and equipment

hoists; mechanical piping, pumps, product tanks and agitators; and insulation, as well as control equipment. Responsible for preparation of technical bid specification packages; procurement of equipment and materials; review of all technical documents and drawings for accuracy; and management of field construction, project schedule, and budget.

- **Prefermenter #3; Grain Processing Corporation; Washington, IN**--Project Engineer for a \$1.2 million dollar capital project to install a 325,000-gallon stainless steel tank and peripheral equipment for incremental pre-fermentation capacity in a corn wet milling facility. Project required installation of an octagonal ring wall foundation, a 325,000-gallon field erected stainless steel tank, two centrifugal pumps, a wet scrubber, and a large heat exchanger, as well as mechanical piping, structural steel, insulation, and controls equipment. Responsible for preparation of technical bid specification packages; procurement of equipment and materials, design of air sparging system for tank; review of all technical documents and drawings for accuracy; and management of field construction, project schedule, and budget.
- **Waste Heat Recovery; Grain Processing Corporation; Muscatine, IA**--Project Engineer for a \$500,000 capital project to reclaim waste heat from a mechanical recompression (MR) evaporator to utilize for pre-heating air for a gas-fired dryer. Project required installation of two slab concrete foundations, a titanium plated heat exchanger, two sets of air coils, a FD fan capable of 80,000 ACFM, ductwork, a 15,000-gallon CS tank, centrifugal pump, stainless steel and carbon steel pipe and fittings, stainless steel ductwork, insulation, and controls equipment. Responsible for preparation of technical bid specification packages; procurement of equipment and materials; review of all technical documents and drawings for accuracy; and management of field construction, project schedule, and budget.
- **Secondary CO<sub>2</sub> Scrubber; Grain Processing Corporation; Muscatine, IA**--Project Engineer for a \$300,000 capital project to install a new wet scrubber to eliminate CO<sub>2</sub> emissions created during fermentation at a corn wet milling facility. Project required installation of a new mat concrete foundation, structural steel, a wet scrubber and exhaust stack, ductwork, centrifugal pump, pipe and fittings, and several large butterfly dampers. Responsible for preparation of technical bid specification packages; procurement of equipment and materials; review of all technical documents and drawings for accuracy; and management of field construction, project schedule, and budget.

## Section 2

### Third-Party Independence

ENGINEER is not operated by PRODUCER or any subsidiary or employee of the renewable fuel producer.

ENGINEER is free of any interest in PRODUCER's business.

PRODUCER is free of all interest in ENGINEER's business.

### Verifications, Exceptions or Discrepancies

ENGINEER has reviewed and verified the information provided by PRODUCER to the EPA. ENGINEER's evaluations are outlined in the corresponding sections below. No exceptions were discovered between ENGINEER's findings and information provided by PRODUCER.

#### **Description of Renewable Fuels**

The type of renewable fuel that PRODUCER intends to produce, and will be capable of producing without significant modification to the existing facility, is Ethanol from Cellulosic Biomass that would qualify for a D code of "3."

ENGINEER evaluated the accuracy of this information through site observation of the specific unit operations required to produce fuel grade ethanol, including:

- Water/ethanol separation through distillation.
- Ethanol dehydration through molecular sieves.
- Ethanol storage and denaturing.

ENGINEER agrees with the information provided regarding the types of renewable fuels that PRODUCER intends to produce and will be capable of producing.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings in regards to the types of renewable fuels that PRODUCER intends to produce and will be capable of producing.

## Feedstocks

Feedstocks that PRODUCER is capable of utilizing, without significant modification to the existing facility, include Cellulosic Biomass, comprised primarily of corn stover, but may also include other agricultural residues, annual cover crops, or switchgrass.

ENGINEER evaluated the accuracy of this information through site observation of the specific unit operations required to prepare cellulosic biomass for conversion to ethanol, including:

- Cellulosic biomass material handling equipment.
- Grinding equipment for shredding cellulosic biomass.

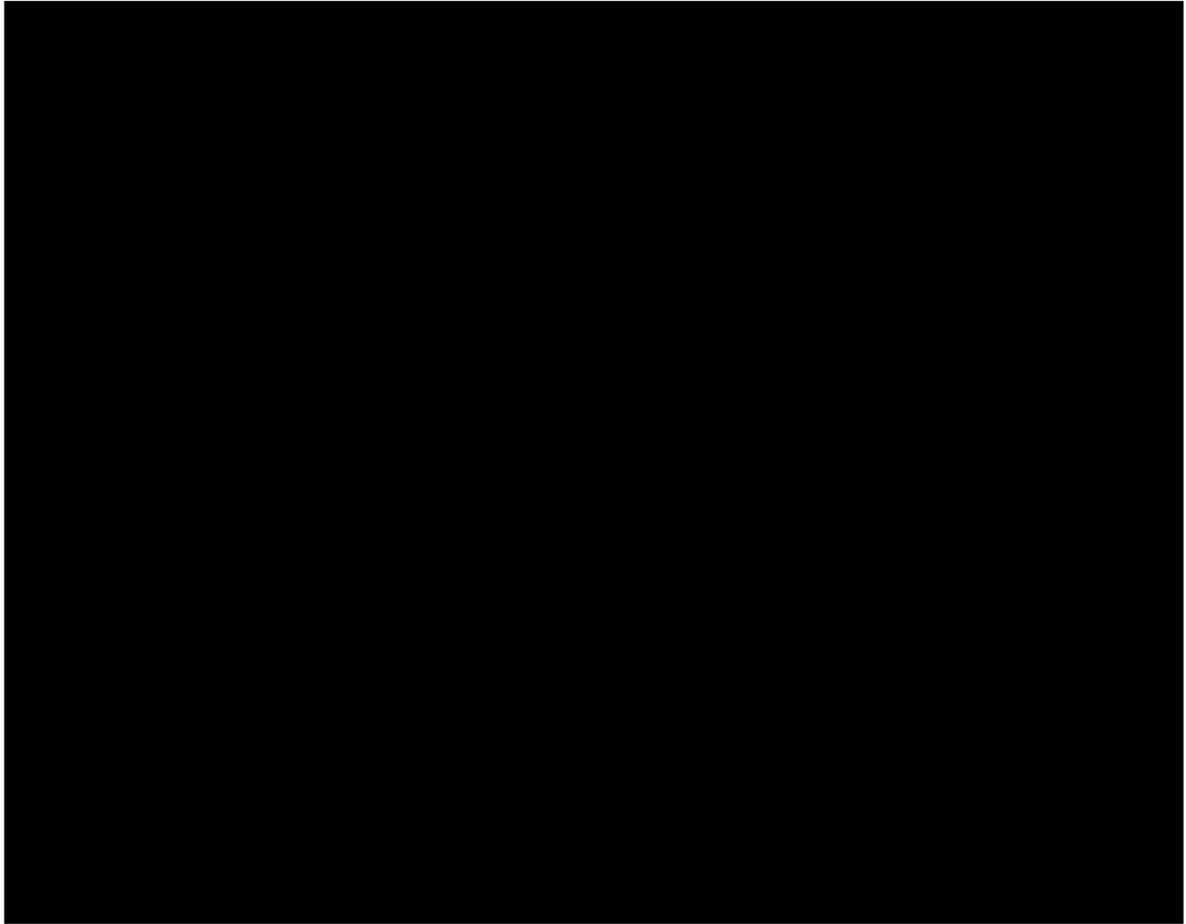
ENGINEER agrees with the information provided regarding the types of feedstocks that PRODUCER will be capable of utilizing for renewable fuel production.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings in regards to the types of feedstocks that PRODUCER will be capable of utilizing for renewable fuel production.

## Process Description

PRODUCER's process description for renewable fuel production is as follows:

- **Cellulosic Ethanol:** The cellulosic process utilizes biomass made up of corn cob with some amount of associated leaves and husks (agricultural residue) or other biomass feedstocks to produce ethanol. Biomass material is first pretreated to begin the biomass decomposition into monomer sugars. Remaining biomass solids after pretreatment are further hydrolyzed to glucose, using cellulose enzymes. Xylose and glucose sugars are then fermented into ethanol using yeast. The fermented mixture is pumped to a distillation system to separate the ethanol from water and solids. The water and solids remaining after distillation are sent to filter presses to produce filter cake and filtrate. Filter cake serves as fuel in a boiler to produce steam energy for the cellulosic ethanol plant as well as the neighboring starch-to-ethanol plant, while the filtrate provides feed for anaerobic digestion. Anaerobic digestion produces biogas to be used in place of natural gas at the cellulosic ethanol plant as well as the neighboring starch-to-ethanol plant.



### **Facility Process Flow Diagram Figure 3-1**

ENGINEER evaluated the accuracy of the process description through site observation of the major unit operations identified in Figure 3-1. Unit operations observed included:

- Biomass receiving and material handling.
- Grinding equipment.
- Pre-treatment.
- Liquefaction, Saccharification and Fermentation tanks.
- Distillation columns.
- Molecular sieves.
- Ethanol storage tanks.
- Filter presses.
- Evaporators.
- Anaerobic digestion system and biogas processing equipment.

Construction for the unit operations listed above is not complete, but installation has progressed to the extent that ENGINEER can ascertain their viability and PRODUCER's intent to complete construction. The vast majority of vessels, tanks, reactors, columns, evaporators, and other unit operations have been installed. The majority of the components required to complete installation of the above systems are currently on site.

ENGINEER agrees with the process description provided by PRODUCER.

No exceptions were identified between the process description provided by PRODUCER and ENGINEER's findings.

### **Co-Products**

PRODUCER's facility will not initially produce any co-products for sale. The FACILITY will produce several by-products as a result of the renewable fuel production process that have the potential to become co-products in the future should markets develop for them. Potential co-products that will be produced as a result of the renewable fuel production process include:

- Biogas
- Ash
- Sulfur Cake
- Granular Anaerobic Sludge
- Lignin Cake
- Mineral Syrup
- Steam

Biogas will either be flared or used as a process heat fuel at the FACILITY, or at the PRODUCER's adjacent dry corn-milling starch-to-ethanol facility. Ash and sulfur cake will be land applied or otherwise disposed of. Granular anaerobic sludge will either be disposed of or be combined with lignin cake and used as a process heat fuel in the FACILITY's solid fuel boiler. Lignin cake and mineral syrup will be utilized by the FACILITY as a process heat fuel or disposed of. Excess steam generated at the FACILITY will be delivered to the PRODUCER's adjacent dry corn-milling starch-to-ethanol facility.

ENGINEER evaluated the accuracy of this information through site observation of the unit operations necessary for the storage and loadout or production of the various potential co-products, including:

- Biogas handling.
- Ash storage and loadout.
- Sulfur cake storage and loadout.
- Anaerobic digestion and sludge handling.
- Filter presses and lignin cake handling.
- Evaporation and syrup handling.

- Solid Fuel Boiler.

Construction for the systems listed above is not complete, but installation has progressed to the extent that ENGINEER can ascertain their viability and PRODUCER's intent to complete construction. The majority of the components required to complete installation of the above systems are currently on site. ENGINEER agrees with the information provided regarding the types of potential co-products that PRODUCER will be capable of producing as a result of renewable fuel production.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings in regards to potential co-products that will be produced with the renewable fuel.

### **Process Heat Fuel Supply Plan**

PRODUCER will use natural gas as a startup/emergency process heat fuel. Once the FACILITY is at steady-state, natural gas will not be required for production of renewable fuel.

The natural gas will be supplied to the FACILITY by:

- Voyager Ethanol, LLC dba POET Biorefining – Emmetsburg, 4724 380<sup>th</sup> ST, Emmetsburg, IA 50536.

PRODUCER will use biogas produced on site as a result of anaerobic digestion.

PRODUCER will also use multiple by-products/co-products derived on site from the production of cellulosic ethanol, as well as other scrap materials, as its process heat fuels during normal operation of the FACILITY. These include:

- Filter Cake
- Mineral Syrup
- Fines
- Net Wrap

PRODUCER also has the capability to utilize biomass feedstock as a process heat fuel.

ENGINEER evaluated the accuracy of this information through site observation of the unit operations necessary for producing and/or transporting energy, in the form of steam, to the process. Unit operations observed include:

- Filter cake/syrup [REDACTED], heat recovery steam generator (HRSG), and emission control system.
- Multiple fuel delivery systems to the solid fuel boiler (SFB).

Construction for the HRSG, SFB, and associated emission control systems listed above is not complete, but installation has progressed to the extent that ENGINEER can ascertain their viability and PRODUCER's intent to complete construction. The majority of the components required to complete installation of the above systems are currently on site.

ENGINEER agrees with the information provided regarding the types of process energy fuel that will be utilized and the locations from which the fuel will be produced.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings in regards to process energy fuel types and locations from which the fuel will be produced.

### **Records Supporting Baseline Volume**

The baseline annual volume of renewable fuel is specified in the applicable air permit for the PRODUCER, as specified in paragraph §80.1450(b)(1)(v)(B). As defined in §80.1401, baseline volume is the permitted capacity. This capacity is specified in the PRODUCER's Air Quality Construction Permit, dated November 22, 2013.

Copies of air permit(s) can be found in Appendix B.

ENGINEER evaluated the accuracy of this information through observation and examination of the air permits supplied by PRODUCER. Records examined included:

- Air Permit, dated November 22, 2013.

ENGINEER agrees that the documents demonstrating FACILITY's permitted capacity are valid.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings in regards to documents demonstrating permitted capacity.

## Section 4

### Confidential Business Information

PRODUCER has asserted that any information contained in Section 3, Appendix A, and Appendix B of this report is Confidential Business Information (CBI).

## Section 5

### Conclusion

ENGINEER agrees with the information provided by PRODUCER that PRODUCER intends to submit to the EPA for RFS-2 registration requirements.

No exceptions were identified between information provided by PRODUCER and ENGINEER's findings throughout the third-party engineering review of documentation and site visit.

## Appendix A

### Plant Data

## RFS-2 Independent Third-Party Engineering Review Data Request Form

Facility Name: POET-DSM Project LIBERTY, LLC  
Address: 4724 380th St, Emmetsburg, IA 50536

Date: 8/2/2013

Prepared By: Blake Gomer  
Phone: P: (605) 965-6424 C: (605) 310-2938  
Email: Blake.Gomer@POET.com

### Please provide the following registration information as required in §80.1450 (b)(1)

- (i) A list of all the feedstocks the facility is capable of utilizing without significant modification to the existing facility.

70: Cellulosic Biomass – Agricultural Residues

250: Cellulosic Biomass – Annual Cover Crops

80: Cellulosic Biomass – Switchgrass Ethanol and/or Butanol

- (ii) A description of the facility's renewable fuel or ethanol production process. Please attach a Process Flow Diagram for documentation.

The cellulosic process utilizes biomass made up of corn cob with some amount of associated leaves and husks (agricultural residue) or other biomass feedstocks to produce ethanol. Biomass material is first pretreated to begin the biomass decomposition into monomer sugars. Remaining biomass solids after pretreatment are further hydrolyzed to glucose using cellulose enzymes. Xylose and glucose sugars are then fermented into ethanol using yeast. The fermented mixture is pumped to a distillation system to separate the ethanol from water and solids. The water and solids remaining after distillation are sent to filter presses to produce filter cake and filtrate. Filter cake serves as fuel in a boiler to produce steam energy for the cellulosic ethanol plant as well as the neighboring starch to ethanol plant, while the filtrate provides feed for anaerobic digestion. Anaerobic digestion produces biogas to be used in place of natural gas at the cellulosic ethanol plant as well as the neighboring starch to ethanol plant.

## RFS-2 Independent Third-Party Engineering Review Data Request Form

(iii) The type of co-products produced with each type of renewable fuel or ethanol.

Biogas, Ash, Sulfur Cake, Granular Anaerobic Sludge, Lignin Cake, Syrup, Steam

(iv) A process heat fuel supply plan that includes all the following:

(A) For all process heat fuel, provide all the following information:

- (1) Each type of process heat fuel used at the facility.
- (2) Name and address of the company supplying each process heat fuel to facility.

(B) For biogas used for process heat, provide all the following information:

- (1) Locations from which the biogas was produced or extracted.
- (2) Name of suppliers of all biogas the producer purchases for use for process heat in the facility
- (3) An affidavit from the biogas supplier stating its intent to supply biogas to the renewable fuel producer and the quantity and energy content of the biogas.

Lignin Cake

Mineral Syrup

Biomass

Fines

Net wrap

Biogas

Natural Gas

---Voyager Ethanol, LLC dba POET Biorefining – Emmetsburg, LLC

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4724 380TH ST., Emmetsburg, IA 50536

Biogas

(1) 4724 380th St, Emmetsburg, IA 50536

(2) POET-DSM Project LIBERTY

(3) N/A

## RFS-2 Independent Third-Party Engineering Review Data Request Form

(v) The following records that support the facility's baseline volume as defined in §80.1401.

(A) For facilities that haven't been "grandfathered" copies of the most recent applicable air permits issued by the US Environmental Protection Agency, state, local air pollution control agencies.

(B) For "grandfathered" facilities claiming the exemption described in §80.1403(c) or (d), applicable air permits issued by the US Environmental Protection Agency, state, local air pollution control agencies that were:

(1) Issued or revised no later than December 19, 2007, for facilities described in §80.1403(c); or

(2) Issued or revised no later than December 31, 2009, for facilities described in §80.1403(d).

(C) For all facilities, copies of documents demonstrating each facility's actual peak capacity as defined in §80.1401 if the maximum rated annual volume output of renewable fuel is not specified in the applicable air permits.

Air Permit Attached (LIB Fermentation & Distillation Process EU050 (11-27-13).pdf)

2,800 gallons/hr (200-proof ethanol)

$(2,800 \text{ gal/hr}) \times (8,322 \text{ hours/yr}) = 23,301,600 \text{ gallons/year (200-proof)}$

Baseline volume = (permitted capacity + 2.2% denaturant) \* 1.05

25,004,947 gal = (23,301,600 + 512,635 ) \* 1.05

(vi) For "grandfathered" facilities claiming the exemption described in §80.1403(c) or (d), evidence demonstrating the date that construction commenced (as defined in §80.1403(a)(1) including all the following:

(A) Contracts with construction and other companies.

(B) Applicable air permits issued by the US Environmental Protection Agency, state, local air pollution control agencies that governed the construction and/or operation of the renewable fuel facility during construction and when first operated.

## **RFS-2 Independent Third-Party Engineering Review Data Request Form**

**Please provide the following registration update information as required in §80.1450 (d)(3)**

(iii)

A sample set of the renewable fuel producer's calculations used to determine  $V_{RIN}$  of a representative sample of batches of each renewable fuel produced since the last registration. The representative sample shall be selected in accordance with the sample size guidelines set forth in §80.127.

**Please provide the following information as described in §80.1426(f)**

- (1) Provide the D code(s) for your renewable fuel facility according to the pathways in Table 1 to §80.1426, paragraph (f)(6) , or as approved by the Administrator.

D3

List any applicable Advanced Technologies for your renewable fuel facility as described in Table 2 to §80.1426.

## Appendix B

### Air Permit(s)

# Iowa Department of Natural Resources

## Air Quality Construction Permit

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### Permit Holder

**Firm:** Voyager Ethanol, LLC d/b/a POET Biorefining – Emmetsburg  
(POET – DSM Advanced Biofuels Project LIBERTY)

**Contact:**

Ben Gustafson  
Technical Manager

(712) 852-8700

4724 380<sup>th</sup> Street  
P.O. Box 318  
Emmetsburg Iowa 50536

**Responsible Party:**

Daron Wilson  
General Manager

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### Permitted Equipment

**Emission Unit(s):** Liberty Fermentation & Distillation Process, EU050  
(See Permit Condition 11 for list)  
Maximum Capacity = 2800 gallons/hour (200-proof ethanol)

**Control Equipment:** Packed Bed Scrubber, CE031

**Emission Point:** SV036

**Equipment Location:** 4724 380<sup>th</sup> Street  
Emmetsburg, Iowa 50536

**Plant Number:** 74-01-022

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Issuance of this permit shall not relieve the owner or operator of the responsibility to comply fully with applicable provisions of the State Implementation Plan (SIP), and any other requirements of local, state, and federal law.

Permit No.	Proj. No.	Description	Date	Stack Testing
10-A-343-S2	13-379	Modify Stack Characteristics	11/22/13	Yes

## PERMIT CONDITIONS

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### 1. Departmental Review

This permit is issued based on information submitted by the applicant. Any misinformation, false statements or misrepresentations by the applicant or by the applicant's representative(s) shall cause this permit to be void. In addition, the applicant may be subject to criminal penalties according to Iowa Code Section 455B.146A.

This permit is issued under the authority of 567 Iowa Administrative Code (IAC) 22.3. The proposed equipment has been evaluated for conformance with Iowa Code Chapter 455B; 567 IAC Chapters 20 – 35; and 40 Code of Federal Regulations (CFR) Parts 51, 52, 60, 61, and 63 and has the potential to comply.

No review has been undertaken on the engineering aspects of the equipment or control equipment other than the potential of that equipment for reducing air contaminant emissions. The Department assumes no liability, directly or indirectly, for any loss due to damage to persons or property caused by, resulting from, or arising out of the design, installation, maintenance or operation of the proposed equipment.

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### 2. Owner and Operator Responsibility

This permit is for the construction and operation of specific emission unit(s), control equipment, and emission point as described in this permit and in the application for this permit. The permit holder, owner, and operator of the facility shall assure that the installation of the equipment listed in this permit conforms to the design in the application (i.e. type, maximum rated capacity, etc.). No person shall construct, install, reconstruct or alter this emission unit(s), control equipment, or emission point without the required amended permit.

Any owner or operator of the specified emission unit(s), control equipment, or emission point, including any person who becomes an owner or operator subsequent to the date on which this permit is issued, is responsible for assuring that the installation, operation, and maintenance of the equipment listed in this permit is in compliance with the provisions of this permit and all other applicable requirements.

The owner or operator of any emission unit or control equipment shall maintain and operate the equipment and control equipment at all times in a manner consistent with good practice for minimizing emissions, as required by paragraph 567 IAC 24.2(1) "*Maintenance and Repair*".

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### 3. Transferability

As limited by 567 IAC 22.3(3)"F", this permit is not transferable from one location to another or from one piece of equipment to another, unless the equipment is portable. When portable equipment for which a permit has been issued is to be transferred from one location to another, the Department shall be notified in writing at least seven (7) days prior to transferring to the new location unless the equipment will be located in an area which is classified as nonattainment for the National Ambient Air Quality Standards (NAAQS) or is a maintenance area for the NAAQS in which case notification shall be given fourteen (14) days prior to the relocation of equipment<sup>(1)</sup> (See Permit Condition 8.A.2). The owner or operator will be notified at least ten (10) days prior to the scheduled relocation if the relocation will cause a violation of the (NAAQS). In such case, a supplemental permit shall be required prior to the initiation of construction of additional control equipment or modifications to equipment needed to meet the standards.

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<sup>(1)</sup> A list of nonattainment areas and maintenance areas for the NAAQS can be obtained from the Department.

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### 4. Construction

#### A. General Requirements

It is the owner's responsibility to ensure that construction conforms to the final plans and specifications as submitted, and that adequate operation and maintenance is provided to ensure that no condition of air pollution is created.

#### 4. Construction (Continued)

In permit amendments, all provisions of the original permit remain in full force and effect unless they are specifically changed by the permit amendment. If a proposed project is not timely completed, the owner or operator shall seek a permit amendment in order to revert back to the most recent previous version of the permit. The previous, unchanged permit provisions are included in the amendment for your convenience only and are unappealable.

This permit or amendment shall become void if any one of the following conditions occurs:

- (1) the construction or implementation of the proposed project, as it affects the emission point permitted herein, is not initiated within eighteen (18) months after the permit issuance date; or
- (2) the construction or implementation of the proposed project, as it affects the emission point permitted herein, is not completed within thirty-six (36) months after the permit issuance date; or
- (3) the construction or implementation of the proposed project, as it affects the emission point permitted herein, is not completed within a time period specified elsewhere in this permit.

#### B. Changes to Plans and Specifications

The owner or operator shall amend this permit or amendment prior to startup of the equipment if:

- (1) Any changes are made to the final plans and specifications submitted for the proposed project; or
- (2) This permit becomes void.

Changes to the final plans and specification shall include changes to plans and specifications for permitted equipment and control equipment and the specified operation thereof.

#### C. Amended Permits

The owner or operator may continue to act under the provisions of the previous permit for the affected emission unit(s) and emission point, together with any previous amendment to the permit, until one of the following conditions occurs:

- (1) The proposed project authorized by this amendment is completed as it affects the emission unit(s) and emission point permitted herein; or
- (2) This current amendment becomes void.

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### 5. Credible Evidence

As stated in 567 IAC 21.5 and also in 40 CFR Part §60.11(g), where applicable, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any provisions specified in this permit or any provisions of 567 IAC Chapters 20 through 35.

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### 6. Excess Emissions

Per 567 IAC 24.1(1), excess emissions during a period of startup, shutdown, or cleaning of control equipment are not a violation of the emission standard if it is accomplished expeditiously and in a manner consistent with good practice for minimizing emissions except when another regulation applicable to the unit or process provides otherwise. Cleaning of control equipment, which does not require the shutdown of process equipment, shall be limited to one (1) six-minute period per one (1) hour period.

An incident of excess emissions other than the above is a violation and may be subject to criminal penalties according to Iowa Code 455B.146A. If excess emissions are occurring, either the control equipment causing the excess shall be repaired in an expeditious manner, or the process generating the emissions shall be shutdown within a reasonable period of time, as specified in 567 IAC 24.1.

An incident of excess emissions shall be orally reported by telephone, electronic mail or in person to the appropriate field office within eight (8) hours of, or at the start of, the first working day following the onset of the incident (See Permit Condition 8.B.1). A written report of an incident of excess emissions shall be submitted as a follow-up to all required initial reports within seven (7) days of the onset of the upset condition (See Permit Condition 8.B.2).

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## 7. Permit Violations

Knowingly committing a violation of this permit may carry a criminal penalty of up to \$10,000 per day fine and two (2) years in jail according to Iowa Code Section 455B.146A.

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## 8. Notification, Reporting, and Recordkeeping

A. The owner or operator shall furnish the Department the following written notifications:

- (1) Per 567 IAC 22.3(3)"b":
  - (a) The date construction, installation, or alteration is initiated postmarked within thirty (30) days following initiation of construction, installation, or alteration;
  - (b) The actual date of startup, postmarked within fifteen (15) days following the start of operation;
- (2) Per 567 IAC 22.3(3)"f", when portable equipment for which a permit has been issued is to be transferred from one location to another, the Department shall be notified:
  - (a) at least fourteen (14) days before equipment relocation if the equipment will be located in a nonattainment area for the National Ambient Air Quality Standards (NAAQS) or a maintenance area for the NAAQS;
  - (b) at least seven (7) days before equipment relocation.
- (3) Per 567 IAC 22.3(8), a new owner shall notify the Department of the transfer of equipment ownership within thirty (30) days of the occurrence. The notification shall be mailed to:

Air Quality Bureau  
Iowa Department of Natural Resources  
7900 Hickman Road, Suite 1  
Windsor Heights, IA 50324

and include the following information:

- The date of ownership change,
  - The name, address, and telephone number of the responsible official, the contact person, and the owner of the equipment both before and after the ownership change; and
  - The construction permit number(s) of the equipment changing ownership.
- (4) Unless specified per a federal regulation, notification of each compliance test required by Permit Condition 12 shall be done not less than thirty (30) days before the required test or performance evaluation of a continuous emission monitor [567 IAC 25.1(7)]. The notification shall include:
- the time,
  - the place,
  - the name of the person who will conduct the tests,
  - and other information as required by the Department;

If the owner or operator does not provide timely notice to the Department, the Department shall not consider the test results or performance evaluation results to be a valid demonstration of compliance with the applicable rules or permit conditions. Upon written request, the Department may allow a notification period of less than thirty (30) days.

B. The owner or operator shall furnish the Department with the following reports:

- (1) Per 567 IAC 24.1(2), an incident of excess emissions as defined in 567 IAC 20.2 shall be reported within eight (8) hours or at the start of the first working day following the onset of the incident. The report may be made by electronic mail, in person or by telephone.
- (2) Per 567 IAC 24.1(3), a written report of an incident of excess emissions as defined in 567 IAC 20.2 shall be submitted as a follow-up to all required initial reports to the Department within seven (7) days of the onset of the upset condition.
- (3) Operation of this emission unit(s) or control equipment outside of those operating parameters specified in Permit Condition 14 in accordance to the schedule set forth in 567 IAC 24.1.
- (4) Per 567 IAC 25.1(6), the owner or operator of any facility required to install a continuous monitoring system or systems shall provide quarterly reports to the Director, no later than thirty (30) calendar days following the end of the calendar quarter, on forms provided by the Director.

**8. Notification, Reporting, and Recordkeeping (Continued)**

- (5) Per 567 IAC 25.1(7), a written compliance demonstration report for each compliance testing event, whether successful or not, postmarked not later than six (6) weeks after the completion of the test period unless other regulations provide for other notification requirements. In that case, the more stringent reporting requirement shall be met;
- C. All data, records, reports, documentation, construction plans, and calculations required under this permit shall be available at the plant during normal business hours for inspection and copying by federal, state, or local air pollution regulatory agencies and their authorized representatives, for a minimum of two (2) years from the date of recording unless otherwise required by another applicable law (i.e. NSPS, NESHAP, etc.)
- D. The owner or operator shall send correspondence regarding this permit to the following address:

Construction Permit Supervisor  
Air Quality Bureau  
Iowa Department of Natural Resources  
7900 Hickman Road, Suite 1  
Windsor Heights, IA 50324  
Telephone: (515) 725-9549  
Fax: (515) 725-9501

- E. The owner or operator shall send correspondence concerning stack testing to:

Stack Testing Coordinator  
Air Quality Bureau  
Iowa Department of Natural Resources  
7900 Hickman Road, Suite 1  
Windsor Heights, IA 50324  
Telephone: (515) 725-9545  
Fax: (515) 725-9502

- F. The owner or operator shall send reports and notifications to:

Compliance Unit Supervisor Air Quality Bureau Iowa Department of Natural Resources 7900 Hickman Road, Suite 1 Windsor Heights, IA 50324 Telephone: (515) 725-9550 Fax: (515) 725-9502	IDNR Field Office 3 1900 North Grand Avenue Gateway North Mall Spencer, IA 51301 Telephone: (712) 262-4177 Fax: (712) 262-2901
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**9. Appeal Rights**

All conditions within an original permit may be appealed, subject to the appeal rights set forth in 561 IAC Chapter 7. Amended conditions within a permit amendment may be appealed, subject to the appeal rights set forth in 561 IAC Chapter 7. In permit amendments, all provisions of the original permit remain in full force and effect unless they are specifically changed by the permit amendment. The previous, unchanged permit provisions are included in the amendment for your convenience only and are unappealable.

Per 561 IAC 7.4(1), the owner or operator shall file any written notice of appeal within thirty (30) days of receipt of the issued permit. The written notice of appeal shall be filed with the Director of the Department with a copy to the Legal Services Bureau Chief at the following addresses:

Director Iowa Department of Natural Resources 502 East 9 <sup>th</sup> Street Des Moines, IA 50319	Bureau Chief Legal Services Bureau Iowa Department of Natural Resources 502 East 9 <sup>th</sup> Street Des Moines, IA 50319
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## 10. Emission Limits

The following emission limits shall not be exceeded:

Pollutant	lb/hr <sup>(1)</sup>	tons/yr <sup>(2)</sup>	Additional Limits	Reference (567 IAC)
Particulate Matter (PM) – Federal	NA	NA	NA	NA
Particulate Matter (PM) – State	0.20 <sup>(5)</sup>	NA	0.1 gr/dscf	23.4 <sup>(7)</sup>
PM <sub>10</sub>	0.20 <sup>(6)</sup>	NA	NA	NAAQS
PM <sub>2.5</sub>	NA	NA	NA	NA
Opacity	NA	NA	40% <sup>(9)</sup> <sup>(4)</sup>	23.3(2)“d”
Sulfur Dioxide (SO <sub>2</sub> )	NA	NA	NA	NA
Nitrogen Oxides (NO <sub>x</sub> )	NA	NA	NA	NA
Volatile Organic Compounds (VOC)	7.0 <sup>(5)</sup>	NA	NA	Synthetic Minor
Carbon Monoxide (CO)	NA	NA	NA	NA
Lead (Pb)	NA	NA	NA	NA
Carbon Dioxide equivalents (CO <sub>2</sub> e)	NA	NA	NA	NA
(Single HAP)	0.27 <sup>(7)</sup>	9.4 <sup>(8)</sup>	NA	Synthetic Minor
(Total HAP)	0.50 <sup>(7)</sup>	24.4 <sup>(8)</sup>	NA	Synthetic Minor

<sup>(1)</sup> The emission limit is expressed as the average of three (3) runs.

<sup>(2)</sup> The emission limit is a twelve (12) month rolling total.

<sup>(3)</sup> The emission limit is a six (6) minute average.

<sup>(4)</sup> An exceedance of the indicator opacity of “No Visible Emissions” will require the owner or operator to promptly investigate the emission unit and make corrections to operations or equipment associated with the exceedance. If exceedances continue after the corrections, the Department may require additional proof to demonstrate compliance (e.g., stack testing).

<sup>(5)</sup> Emission limit established to restrict potential emissions from this emission point.

<sup>(6)</sup> The limit for PM<sub>10</sub> emissions is established to restrict emissions below levels that predict exceedances of the 24-hour NAAQS and the annual NAAQS for PM<sub>10</sub>.

<sup>(7)</sup> Emission limit required to maintain synthetic minor status for 112(g) and/or any applicable NESHAP. The specific Individual HAP are primarily acetaldehyde, acrolein, formaldehyde, and methanol. The emission limit applies to each individual HAP separately.

<sup>(8)</sup> Plant wide limit on HAP to keep the facility a synthetic minor for 112(g) and/or any applicable NESHAP.

## 11. Emission Point Characteristics

This emission point shall conform to the specifications listed below:

Parameter	Value
Stack Height, (ft, from the ground)	33
Discharge Style	Vertical Unobstructed
Stack Opening (inches, diameter)	16
Exhaust Temperature (°F)	70
Exhaust Flowrate (scfm)	6100

The temperature and flowrate are intended to be representative and characteristic of the design of the permitted emission point. The Department recognizes that the temperature and flow rate may vary with changes in the process and ambient conditions. If it is determined that either the temperature or flowrate above are different than the values stated, the owner or operator shall submit a request to the Department within thirty (30) days of the discovery to determine if a permit amendment is required or submit a permit application requesting to amend the permit.

**11. Emission Point Characteristics (Continued)**

The following equipment vents emissions to the Packed Bed Scrubber, CE031, directly or indirectly, and the associated emission points (SV036 or SV058):

<u>Emission Unit</u>	<u>Maximum Capacity</u>
5 Fermenters	783,000 gallons each
Beerwell	914,000 gallons
3 Seed Fermenters	90,000 gallons each
Slurry Tank	15,500 gallons
4 Liquefaction Tanks	90,000 gallons each
200 Proof Condenser	60 gallons/minute
190 Proof Condenser	16,000 gallons per hour
Regen Tank Vent	na
Distillation Vacuum Vent	na
12 Evaporators	10,000 gallons/hr (each)
3 Molecular Sieves	4,000 gallons/hr (each)
Saccharification (9 tanks)	706,000 gallons each

**12. Compliance Demonstration(s)**

<b>Pollutant</b>	<b>Compliance Demonstration</b>	<b>Compliance Methodology</b>	<b>Frequency</b>
PM – Federal	No	NA	NA
PM – State	No	NA	NA
PM <sub>10</sub>	No	NA	NA
PM <sub>2.5</sub>	No	NA	NA
Opacity	No	NA	NA
SO <sub>2</sub>	No	NA	NA
NO <sub>x</sub>	No	NA	NA
VOC <sup>(2)</sup>	Yes	Stack Test <sup>(1)</sup>	See Footnote (1)
CO	No	NA	NA
Pb	No	NA	NA
CO <sub>2</sub>	No	NA	NA
CH <sub>4</sub>	No	NA	NA
N <sub>2</sub> O	No	NA	NA
CO <sub>2</sub> e	No	NA	NA
Individual HAP <sup>(3)</sup>	Yes	Stack test <sup>(1)</sup>	See Footnote (1)
Total HAP	Yes	Stack test <sup>(1)</sup>	See Footnote (1)

<sup>(1)</sup> Initial stack testing shall be conducted in a manner to verify compliance with all emission limitations with all equipment operating in a worst case scenario. Stack testing shall be required after emissions have been vented through this emission point for 500 hours and for each year that emissions are vented through this emission point for more than 1000 hours/calendar year.

<sup>(2)</sup> VOC compliance testing may be determined using the sum of the Method 320 or Method 18 results.

<sup>(3)</sup> Acrolein, acetaldehyde, formaldehyde and methanol shall be tested for specifically. With the exception of acrolein, acetaldehyde, formaldehyde and methanol, any HAP whose emissions are below the detection limit shall be assumed to be zero.

**If an initial compliance demonstration specified above is testing**, the owner or the owner’s authorized agent shall verify compliance with the emission limitations contained in Permit Condition 10 within sixty (60) days after achieving maximum production rate and no later than one hundred eighty (180) days after the initial startup date of the proposed equipment.

**If subsequent testing is specified above**, the owner or the owner’s authorized agent shall verify compliance with the emission limitations contained in Permit Condition 10 according to the frequency and timeframe noted above.

If testing is required, the owner or the owner’s authorized agent shall use the test method and run time listed in the table below unless another testing methodology is approved by the Department prior to testing.

**12. Compliance Demonstration(s) (Continued)**

<b>Pollutant</b>	<b>Test Run Time</b>	<b>Test Method</b>
PM – Federal	1 hour	40 CFR 60, Appendix A, Method 5
PM – State	1 hour	40 CFR 60, Appendix A, Method 5 40 CFR 51 Appendix M Method 202
PM <sub>10</sub>	1 hour	40 CFR 51, Appendix M, 201A with 202
PM <sub>2.5</sub>	1 hour	40 CFR 51, Appendix M, 201A with 202
Opacity	1 hour	40 CFR 60, Appendix A, Method 9
SO <sub>2</sub>	1 hour	40 CFR 60, Appendix A, Method 6C
NO <sub>x</sub>	1 hour	40 CFR 60, Appendix A, Method 7E
VOC	1 hour	40 CFR 60, Appendix A, Method 18 or 320
CO	1 hour	40 CFR 60, Appendix A, Method 10
Pb	1 hour	40 CFR 60, Appendix A, Method 12
CO <sub>2</sub>	1 hour	40 CFR 60, Appendix A, Method 3
CH <sub>4</sub>	1 hour	40 CFR 60, Appendix A, Method 18
N <sub>2</sub> O	1 hour	40 CFR 60, Appendix A, Method 320
HAP	1 hour	40 CFR 60, Appendix A, Method 18 or 320

Each emissions compliance test must be approved by the Department. Unless otherwise specified by the Department, each test shall consist of three (3) separate runs. The arithmetic mean of three (3) acceptable test runs shall apply for compliance, unless otherwise indicated by the Department.

Per 567 IAC 25.1(7)“a”, at the Department’s request, a pretest meeting shall be held not later than fifteen (15) days before the owner or operator conducts the compliance demonstration. A testing protocol shall be submitted to the Department no later than fifteen (15) days before the owner or operator conducts the compliance demonstration. Representatives from the Department shall attend this meeting, along with the owner and the testing firm, if any. It shall be the responsibility of the owner to coordinate and schedule the pretest meeting. A representative of the Department shall be allowed to witness the test(s). The Department shall reserve the right to impose additional, different, or more detailed testing requirements.

The owner shall be responsible for the installation and maintenance of test ports. The unit(s) being sampled shall be operated in a normal manner at its maximum continuous output as rated by the equipment manufacturer, or the rate specified by the owner as the maximum production rate at which this unit(s) will be operated. In cases where compliance is to be demonstrated at less than the maximum continuous output as rated by the manufacturer, and it is the owner's intent to limit the capacity to that rating, the owner may submit evidence to the Department that this unit(s) has been physically altered so that capacity cannot be exceeded, or the Department may require additional testing, continuous monitoring, reports of operating levels, or any other information deemed necessary by the Department to determine whether this unit(s) is in compliance.

**13. New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) Applicability**

This facility has process units that are subject to NSPS Subpart VV – *Standard of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry*. However, the facility has chosen to comply with the provisions of NSPS subpart VVa (40 CFR Part 60 §60.480a) to satisfy the requirements of NSPS Subpart VV. The facility is also subject to Subpart A (*General Provisions*).

This project is not subject to any National Emission Standards for Hazardous Air Pollutants Area Source Standards at this time.

Failure to include any NSPS or NESHAP requirements as a part of this permit does not relieve the permittee from the requirement to comply with all applicable NSPS or NESHAP requirements.

#### **14. Operating Limits**

Operating limits for this permit shall be:

- A. The owner and operator shall follow the applicable standards of Subpart VVa, 40 CFR 60.480a through 60.489a.
  - B. The scrubber (CE31) shall maintain an average pressure drop across the wet scrubber that is between 2 and 12 inches water column based on a 24-hour averaging period. POET Biorefining shall establish an alarm setting for the purpose of initiating corrective action based on a pressure drop across the wet scrubber of less than 2 inch water column or a pressure drop across the wet scrubber of greater than 12 inches water column.
  - C. The scrubber (CE31) shall have a minimum scrubber liquid (water) flow rate equal to or greater than 20 gallons per minute.
  - D. Any additive added to the scrubber liquid during a compliance test to enhance the efficiency of the scrubber shall be added at a rate greater than or equal to the rate recorded during a previous performance test that demonstrated compliance with all applicable emission limitations.
  - E. The owner or operator shall inspect and maintain the control equipment according to manufacturer's recommendations.
- 

#### **15. Operating Condition Monitoring and Recordkeeping**

Unless specified by a federal regulation, all records as required by this permit shall be kept on-site for a minimum of two (2) years and shall be available for inspection by the Department. Records shall be legible and maintained in an orderly manner. These records shall show the following:

- A. The owner or operator shall keep records of control equipment inspection and maintenance.
  - B. The owner or operator shall keep records for Subpart VVa as required in 40 CFR 60.486a, and reports as required in 40 CFR 60.487a.
  - C. Record the scrubber pressure drop on a continuous basis. On those days when there is an alarm for the pressure drop reaching less than 2 inches water column or greater than 12 inches water column, calculate and record the average pressure drop across the scrubber based on a 24-hour average. This requirement shall not apply on the days that the scrubber is not in operation. If the pressure drop deviates outside the range required, then record the time, date and actions taken to correct the situation and when the pressure drop is back in the average pressure drop range required.
  - D. Record the scrubber liquid (water) flow rate on a continuous basis. If the flow rate deviates below the minimum flow rate required (i.e., 20 gallons per minute), then record the time, date and actions taken to correct the situation and when the flow rate is back above the minimum flow rate required.
  - E. Record the rate of additive added (additive feed rate) to the scrubber liquid on a continuous basis. If the additive feed rate deviates below the rate required (i.e., additive feed rate during a previous performance test that demonstrated compliance), then record the time, date and actions taken to correct the situation and also when the additive feed rate is greater than or equal to the required additive feed rate.
  - F. Maintain onsite a copy of the previous performance tests for each scrubber operating scenario detailing scrubber pressure drop, scrubber liquid flow rate, and additive feed rate measured during each performance test, which demonstrated compliance with Permit Condition 10.
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#### **16. Continuous Emission Monitoring**

Continuous emission monitoring is not required by this permit at this time.

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## 17. Permit History

Permit No.	Proj. No.	Description	Date	Stack Testing
10-A-343	10-141	Original Permit	08/27/10	Yes
10-A-343-S1	12-424	Modify Process	04/03/13	Yes

## 18. Description of Terms and Acronyms

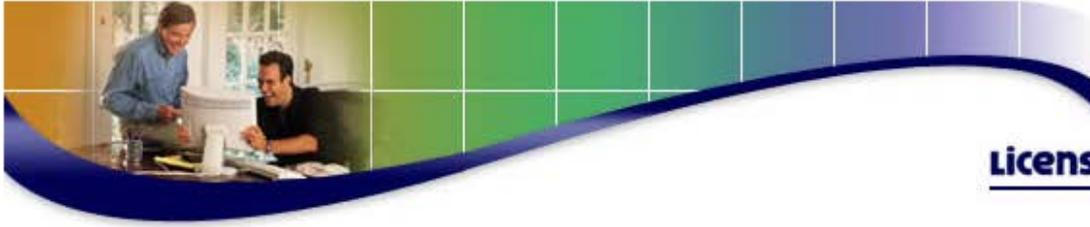
*The descriptions below are meant only as a brief explanation of terms contained within the permit and may not be the exact definition of the term or acronym as contained within the regulations.*

acfm	Actual cubic feet per minute
Applicant	The owner, company official or authorized agent
Btu	British thermal unit
°C	Degrees Celsius
Condensable PM	Material that condenses and/or reacts upon cooling and dilution in the ambient air to form particulate matter immediately after discharge from the stack
CO <sub>2</sub> e	Carbon dioxide equivalent which is the aggregate emissions of greenhouse gas (GHG) emissions based on global warming potentials
Department	Iowa Department of Natural Resources
dia.	Diameter
°F	Degrees Fahrenheit
ft	Foot
GHG	Greenhouse Gas which is defined as being the group of carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF <sub>6</sub> )
g	grams
g/dscm	Grams per dry standard cubic meter
gr	Grains
gr/dscf	Grains per dry standard cubic foot
gr/scf	Grains per standard cubic foot
HAP	Hazardous Air Pollutant(s)
hp	horsepower
hr	Hour
lb	Pound
lb/hr	Pounds per hour
m	Meter
mg	Milligram
MM	Million
MW	Megawatt
NA	Not Applicable
PM <sub>2.5</sub>	Particulate Matter with an aerodynamic diameter equal to or less than 2.5 microns
PM <sub>10</sub>	Particulate Matter with an aerodynamic diameter equal to or less than 10 microns
PM – Federal	Particulate Matter that does not include the condensable PM
PM – State	Particulate Matter that includes condensable PM
ppm	parts per million
ppm <sub>v</sub>	parts per million by volume
ppm <sub>w</sub>	parts per million by weight
scfm	Standard cubic feet per minute
SHAP	Single hazardous air pollutant
THAP	Total hazardous air pollutants
tons/yr	Tons per year
yr	Year

**END OF PERMIT**

## Appendix C

# Professional Engineering License Documentation

[Agencies](#)[Online Services](#)[License Search](#) | [Online Renewal](#)Displaying 1 of 1 [\(View All\)](#)**LUKKARINEN , RAYMOND JOHN**

## Contact Information

## License Information

STANLEY CONSULTANTS  
225 IOWA AVENUE**Number:** 18978  
**Type:** Professional Engineer**Status:** Active **Expires:** 12-31-2015

MUSCATINE, IA 52761

**Original Issue Date:** Professional Engineer: Chemical: 07-15-2008 **Method:** Exam

Phone: 563-264-6592

Fax:

**For additional questions on licensing please call 515-725-9021**

Discipline: Please call 515-725-9024 for discipline information.