STATE OF NEBRASKA

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REVISED CONSTRUCTION PERMIT

PERMIT NUMBER: CP10-005

PERMIT TO CONSTRUCT AN AIR CONTAMINANT SOURCE ISSUED TO:

Green Plains Ord, LLC
48267 Val-E Road
Ord, Nebraska 68862-1988

FOR THE SPECIFIC CONSTRUCTION OF:

A 62,500,000 gallon per year (Denatured) Ethanol Manufacturing Facility (Dry Mill Process)

LOCATED AT:

48267 Val-E Road
Ord, Nebraska 68862-1988

IS HEREBY REVISED AS FOLLOWS:

- Revise stack heights for various emission points
- Decrease CO emission limit from TO/HRSG system stack (S10)
- Require liquefaction tank and slurry tank to be controlled by the TO/HRSG

Pursuant to Chapter 14 of the Nebraska Air Quality Regulations, the public has been notified by prominent advertisement of this proposed construction of an air contaminant source and the thirty (30) day period allowed for comments has elapsed. This revised construction permit approves the proposed revisions to the original construction permit CP05-0021 issued March 14, 2006 (as amended by CP08-018n on May 8, 2008, and CP07-0048 on July 28, 2008) and supersedes the original permit and all amendments.

Compliance with this permit shall not be a defense to any enforcement action for violation of an ambient air quality standard.

This permit is issued with the following conditions:

General Conditions

I. This permit is not transferable to another source or location. (Title 129, Chapter 17)

II. Holding of this permit does not relieve the owner/operator of the source from the responsibility to comply with all applicable portions of the Nebraska Air Quality Regulations and any other requirements under local, State, or Federal law. (Title 129, Chapter 41)

III. Any applicant who fails to submit any relevant facts or who has submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. If the source wishes to make changes at the facility that will result in change(s) to values, specifications, and/or locations of emission points that were indicated in the permit application (or other supplemental information provided by the applicant and reviewed by the Department in issuance of this permit), the source must receive approval from the Department before the change(s) can be made. In addition, any modification which may result in an adverse change to the air quality impacts predicted by atmospheric dispersion modeling (such as changes in stack parameters or increases in emission rates, potential emissions, or actual emissions) shall have prior approval from the Department. The source shall provide all necessary information to verify that there are no substantive changes affecting the basis upon which this permit was issued. Information may include, but not be limited to, additional engineering, modeling and ambient air quality studies. (Title 129, Chapter 17, Sections 006, 007, and 008)

IV. Approval to construct, reconstruct and/or modify the source will become invalid if a continuous program of construction is not commenced within 18 months after the date of issuance of the construction permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable period of time. (Title 129, Chapter 17, Section 012)

V. The owner/operator of the source shall provide a notification to the Department of the date of construction, reconstruction or modification commenced, postmarked no later than 30 days after such date, and of the actual date of initial startup of operation, postmarked within 15 days after such date. (Title 129, Chapter 17, Section 012 & Chapter 7, Section 002.03)

VI. The permittee shall allow the Department, EPA or an authorized representative, upon presentation of credentials to (Title 129, Chapter 8, Section 012.02):

(A) Enter upon the permittee's premises at reasonable times where a source subject to this permit is located, emissions-related activity is conducted or records are kept, for the purpose of ensuring compliance with the permit or applicable requirements;

(B) Have access to and copy, at reasonable times, any records, for the purpose of ensuring compliance with the permit or applicable requirements;

(C) Inspect at reasonable times any facilities, pollution control equipment, including monitoring and air pollution control equipment, practices, or operations, for the purpose of ensuring compliance with the permit or applicable requirements;

(D) Sample or monitor at reasonable times substances or parameters for the purpose of ensuring compliance with the permit or applicable requirements.

VII. Applicable regulations: Title 129 - Nebraska Air Quality Regulations as amended July 21, 2010.

VIII. This permit may contain abbreviations and symbols of units of measure, which are defined in 40 CFR Part 60.3. Other abbreviations may include, but are not limited to, the following: Best Available Control Technology (BACT), Best Management Practices (BMP), Carbon Monoxide (CO), Code of Federal Regulations (CFR), Compilation of Air Pollutant Emission Factors, Volume I, Stationary Point and Area Sources (AP-42), Construction Permit (CP), Continuous Emissions Monitoring System (CEMS), Distillers Grain with Solubles (DGS), Dried Distillers Grain with Solubles (DDGS), Grams per Square Meter (g/m^2), Hazardous Air Pollutant (HAP), Hazardous Air Pollutants (HAPs), Leak Detection and Repair (LDAR), Maximum Achievable Control Technology (MACT), Million Standard Cubic Feet (MMscf), Million British Thermal Units per Hour (MMBtu/hr), Modified Wet Distillers Grain with Solubles (MWDGS), National Ambient Air Quality Standards (NAAQS), New Source Performance Standards (NSPS), Nitrogen Oxides (NO_x), Particulate Matter (PM), Particulate Matter less than or equal to 10 micrometers (PM_{10}), Parts per Million (ppm), Prevention of Significant Deterioration (PSD), Regenerative Thermal Oxidizer (RTO), Standard Industrial Classification (SIC), Sulfur Dioxide (SO_2), Thermal Oxider/Heat Recovery Steam Generator (TO/HRSG), Total Dissolved Solids (TDS), Volatile Organic Compounds (VOC), Wet Distillers Grain with Solubles (WDGS).

IX. Open fires are prohibited except as allowed by Title 129, Chapter 30.

X. The source shall not cause or permit fugitive particulate matter to become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the property line. (Title 129, Chapter 32)

XI. Application for review of plans or advice furnished by the Director will not relieve the source of legal compliance with any provision of these regulations, or prevent the Director from enforcing or implementing any provision of these regulations. (Title 129, Chapter 37)

XII. If and when the Director declares an air pollution episode as defined in Title 129, Chapter 38, Sections 003.01B, 003.01C, or 003.01D, the source shall immediately take all required actions listed in Title 129, App. I until the Director declares the air pollution episode terminated.

Specific Conditions

XIII. Specific terms and conditions of this permit:

(A) The facility shall emit less than the following in any period of twelve (12) consecutive calendar months. At no time during the first eleven (11) calendar months after the startup date shall the sum of all the previous months' emissions equal or exceed the following emission limitations. Compliance with this condition shall be demonstrated using the testing results conducted as specified in Condition XIII.(N) and emission calculations records as specified in Condition XIII.(P)(1) of this permit. (Title 129, Chapters 27, and 28)

(1) 10 tons of any individual HAP

(2) 25 tons of total combined HAPs

(B) The following conditions apply to: GRAIN HANDLING AND MILLING OPERATIONS

(1) PM and PM_{10} emissions from all grain handling and milling operations shall be captured and controlled by the grain receiving baghouse (C20) and the hammermill baghouse (C30). (Title 129, Chapters 4, 19, and 20)

(2) The operations of each baghouse shall be in accordance with the following requirements: (Title 129, Chapters 4, 19, and 20)

(a) The baghouses shall be operated whenever the associated emission units are in operation.

(b) The baghouses shall be properly installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the dry dust collectors shall be kept on site and readily available to Department representatives.

(c) Each baghouse shall be equipped with an operational pressure differential indicator. The pressure differential indicator readings shall be recorded at least once each day that the associated baghouse is operating. The pressure indicator shall be properly installed, operated, calibrated, and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the pressure differential indicator shall be kept on site and readily available to Department representatives.

(d) Baghouse filter bags/cartridges are to be inspected and/or replaced in accordance with the operation and maintenance manual or more frequently as indicated by pressure differential indicator readings or other indication of bag failure.

(e) Routine observations (at least once each day during day light hours of dry dust collector operation) shall be conducted during day light hours to determine whether there are visible emissions from the stack, leaks, noise, atypical pressure differential readings, or other indications, which may necessitate corrective action. Corrective action shall be taken immediately if necessary.

(f) Collected waste material from the dry dust collectors shall be handled, transported, and stored in a manner that ensures compliance with Condition X.

(g) The source shall maintain on-site an inventory of spare bags/cartridges of each type used facility-wide to ensure rapid replacement in the event of bag/cartridge failure.

(3) The emissions from the grain receiving baghouse (C20) shall not exceed the following emission limits (3-hour or test method average). (Title 129, Chapters 4, 19, and 20)

(a) 2.17 pounds per hour PM.

(4) The emissions from the milling baghouse (C30) shall not exceed the following emission limits (3-hour or test method average). (Title 129, Chapters 4, 19, and 20)

(a) 0.98 pounds per hour PM.

(5) In order to demonstrate compliance with Conditions XIII.(B)(3) and (4), the source shall conduct a performance test for PM on stack S20 and S30. The performance test shall be conducted in accordance with Condition XIII.(N). (Title 129, Chapter 34)

(C) The following conditions apply to: FERMENTATION OPERATIONS

(1) PM, PM_{10}, VOC and HAP emissions from the fermentation operations shall be controlled by the CO_2 scrubber (C40) with chemical addition. Chemical addition may not be required provided the requirements of Condition XIII.(C)(2) are met. (Title 129, Chapters 17 and 27)

(2) The source may demonstrate through testing performed in accordance with Condition XIII.(N), or the use of a CEMS, that chemical addition is not necessary. Testing completed after May 8, 2007, and approved by the NDEQ, may be used to demonstrate chemical addition is not necessary. (Title 129, Chapters 17, 27, and 34)

(3) The operation of the scrubber shall be in accordance with the following requirements: (Title 129, Chapters 17 and 27)

(a) The scrubber shall be operating and controlling emissions at all times when the associated emission units are in operation.

(b) The scrubber shall be properly designed, installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the scrubber shall be kept on site and readily available to Department representatives.

(c) The scrubber shall be equipped with devices capable of continuously monitoring operating parameters including, at a minimum, the scrubbing liquid temperature, scrubbing liquid flow rate, chemical addition flow rate, and pressure differential. Except for the scrubbing liquid and chemical addition flow rates, all operating parameter readings shall be recorded at least once each day the scrubber is in operation. The scrubbing liquid flow rate shall be recorded continuously. When chemical is added to the scrubbing liquid, the flow rate of the chemical being added shall be recorded continuously. The devices shall be properly installed, operated, calibrated, and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the operating parameter indicators shall be kept on site and readily available to Department representatives. Operating parameters will be established during source emission testing.

(d) All monitored operating parameters of the scrubber shall be maintained at the levels recorded during the most recent performance test that demonstrated compliance with the permitted emissions limits. Alternative levels may be used provided the facility can justify, through testing or the use of a CEMS, that better emissions control is being achieved. Normal operating parameters or operating parameter ranges that demonstrate compliance with the permitted emissions limits, with appropriate averaging periods, shall be submitted with the source's operating permit application.

(e) Routine observations (at least once each day during daylight hours of scrubber operation) shall be conducted to determine whether there are leaks, noise, atypical operating parameters (e.g., scrubbing liquid flow rate), or other indications that corrective action is necessary. If corrective action is required, it shall occur immediately.

(f) Unless the source has testing data demonstrating chemical addition is not necessary, as provided for in Condition XIII.(C)(2), equipment for continuously recording the scrubbing liquid flow rate and chemical addition flow rate (if chemicals are added) shall have been installed by July 10, 2008.

(4) The emissions from the CO_2 scrubber (C40) shall not exceed the following emission limits (3 one-hour tests or as deemed appropriate by the Department). (Title 129, Chapters 17)

(a) 11.3 pounds per hour VOC

(5) The scrubber shall have a minimum control efficiency of 65 percent for combined HAPs. (Title 129, Chapter 27)

(6) In order to demonstrate compliance with Conditions XIII.(A), (C)(3) and (C)(4) and to verify the assumptions used in the permit application, the source shall conduct a performance test for VOC, PM, and HAP on C40. In addition, the performance test shall determine the HAP control efficiency of the scrubber on C40. The performance test shall be conducted in accordance with Condition XIII.(N) and shall include speciation and quantification of the HAP composition of the emissions. VOC emissions shall be expressed as total mass of VOC. (Title 129, Chapter 34)

(D) The following conditions apply to: THERMAL OXIDIZER/HEAT RECOVERY STEAM GENERATOR (TO/HRSG) SYSTEM

(1) Emissions from the liquefaction tank, slurry tank, DGS dryers while producing MWDGS and/or DDGS, and the distillation process vent shall be controlled by a TO/HRSG System (C10) exhausting through stack S10.

(2) Only natural gas and methane from the biomethanator shall be burned as fuel in the DGS dryers. Only natural gas shall be burned as fuel in the TO/Boiler.

(3) Operation of the TO/HRSG system shall be in accordance with the following requirements: (Title 129, Chapters 4, 19 and 27)

(a) The TO/HRSG system shall be operated at all times when the associated emission units are in operation.

(b) The TO/HRSG system and associated drying, pre-fermentation and distillation equipment shall be properly designed, installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the thermal oxidizer system and associated drying, pre-fermentation and distillation equipment shall be kept on site and readily available to Department representatives.

(c) The TO/HRSG system shall be equipped with a thermocouple or equivalent device capable of continuously monitoring the temperature of the thermal oxidizers. The thermocouple or equivalent device shall monitor temperature on a continuous basis, with the one-hour average temperature recorded once per hour. The thermocouple or equivalent device shall be properly installed, operated, calibrated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the thermocouple or equivalent device shall be kept on site and readily available to Department representatives.

(d) The one-hour average operating temperature of the TO/HRSG system shall be maintained at a minimum 1,400 °F. Upon approval by the Director, the 1,400 °F limitation may be replaced with an alternate minimum operating temperature limitation established based on results of the most recent performance test that demonstrate compliance with Condition XIII.(D)(4).

(e) Routine observations (at least once each day of TO/HRSG system operation) shall be conducted during daylight hours to determine whether there are visible emissions from the stack, leaks, noise, atypical operating parameters (e.g., pressure differential, temperature), or other indications that may necessitate corrective action. Corrective action shall be taken immediately if necessary.

(4) Emissions from the TO/HRSG system stack (S10) shall not exceed the following emission limits (30-day rolling average for NO_x, 3-hour or test method average for other pollutants). (Title 129, Chapters 4 and 19)

(a) 3.67 pounds per hour PM

(b) 9.30 pounds per hour SO_2

(c) 21.5 pounds per hour NO_x

(d) 19.4 pounds per hour CO

(e) 2.85 pounds per hour VOC

(5) In order to demonstrate compliance with Conditions XIII.(A) and (D)(4) and to verify the assumptions used in the permit application, the source shall conduct a performance test for CO, SO_2, VOC, HAPs, and PM (both filterable and condensable) on the TO/HRSG system stack (S10) while all associated controlled units are operating. Separate tests must be performed while producing MWDGS and while producing DDGS. The performance tests shall be conducted in accordance with Condition XIII.(N) and shall include speciation and quantification of the HAP composition of the emissions. VOC emissions shall be expressed as total mass of VOC. (Title 129, Chapter 34)

(6) The requirements of the NSPS in 40 CFR 60, Subparts A and Db (Title 129, Chapter 18, Sections 001.01 and 001.22) apply to the TO/HRSG system. The requirements include, but are not limited to, the following:

(a) NO_x emissions shall not exceed 0.1 lbs/MMBtu (30-day rolling average). This emission limit applies at all times including periods of startup, shutdown or malfunction.

(b) Performance and compliance testing shall be conducted in accordance with Title 129, Chapter 18, NSPS, Section 001.01 General Provisions, and as required by 40 CFR 60.46b(e) and Condition XIII.(N).

(c) The permittee shall install, calibrate, maintain, and operate a CEMS or approved alternative in accordance with the Subpart for the TO/HRSG system measuring the NO_x emissions.

(d) The Requirements for Performance Specifications 2 - Specifications and Test Procedures for SO_2 and NO_X Continuous Emission Monitoring Systems in Stationary Sources found in 40 CFR 60 Appendix B shall be followed for the CEMS required under the Condition XIII.(D)(6)(c).

(e) Quality assurance for the CEMS required under the Condition XIII.(D)(6)(c) shall be conducted according to the requirements of 40 CFR 60 Appendix F. The report of the Relative Accuracy Test Audit required by the 40 CFR 60 Appendix F or a similar procedure shall be submitted to the Department within 45 days of completion of the test.

(f) The source shall record and maintain records of the amount of natural gas combusted during each day unless EPA Region VII approves an alternative record-keeping frequency. (40 CFR 60.48b(d))

(g) The source shall submit notification of the date of construction, anticipated startup, and actual startup, as provided by Title 40 CFR 60.7. (40 CFR 60.49b(a))

(E) The following conditions apply to: DDGS COOLER

(1) The DDGS cooler shall be equipped with a DDGS cooling system (a cyclone with integrated baghouse) (C70). (Title 129, Chapters 4 and 19)

(2) Operation of the cyclone/baghouse system shall be in accordance with the following requirements: (Title 129, Chapters 4 and 19)

(a) The cyclone/baghouse system shall be operated at all times when the associated equipment is in operation.

(b) The cyclone/baghouse system shall be properly designed, installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the cyclone/baghouse system shall be kept on site and readily available to Department representatives.

(c) The cyclone/baghouse system shall be equipped with an operational pressure differential indicator. The pressure differential indicator readings shall be recorded at least once each day that the associated cyclone/baghouse system is operating. The pressure differential indicator shall be installed, operated, calibrated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the pressure differential indicator shall be kept on site and readily available to Department representatives.

(d) Routine observations (at least once each day during daylight hours of cyclone/baghouse system operation) shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, atypical pressure differential readings, or other indications, which may necessitate corrective action. Corrective action shall be taken immediately if necessary.

(e) Baghouse filter bags/cartridges are to be inspected and/or replaced in accordance with the operation and maintenance manual or more frequently as indicated by pressure differential indicator readings or other indication of unit failure.

(f) Collected waste material from the dry dust collectors shall be handled, transported, and stored in a manner that ensures compliance with Condition X.

(g) The source shall maintain on-site an inventory of spare bags/cartridges of each type used to ensure rapid replacement in the event of bag/cartridge failure.

(3) The emissions from the DDGS cooler cyclone/baghouse system (C70) shall not exceed the following emission limits (3 one-hour tests or as deemed appropriate by the Department). (Title 129, Chapters 4 and 17)

(a) 1.23 pounds per hour PM

(b) 2.30 pounds per hour VOC

(4) In order to demonstrate compliance with Conditions XIII.(A) and (E)(3) and to verify the assumptions used in the permit application, the source shall conduct a performance test for VOC, HAPs, and PM (both filterable and condensable) on the DDGS cooler cyclone/baghouse system (C70). The performance test shall be conducted in accordance with Condition XIII.(N) and shall include speciation and quantification of the HAP composition of the emissions. VOC emissions shall be expressed as total mass of VOC. (Title 129, Chapter 34)

(F) The following conditions apply to: SOLID PRODUCT STORAGE AND LOADOUT

(1) PM emissions from DDGS storage and loadout shall be captured and controlled by the DDGS loadout baghouse (C90). (Title 129, Chapters 4 and 19)

(2) The operations of the dry dust collector (baghouse) shall be in accordance with the following requirements: (Title 129, Chapters 4 and 19)

(a) The dry dust collector shall be operated whenever the associated emission units are in operation.

(b) The dry dust collector shall be properly installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the dry dust collectors shall be kept on site and readily available to Department representatives.

(c) Each dry dust collector shall be equipped with an operational pressure differential indicator. The pressure differential indicator readings shall be recorded at least once each day that the associated dry dust collector is operating. The pressure indicator shall be properly installed, operated, calibrated, and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the pressure differential indicator shall be kept on site and readily available to Department representatives.

(d) Dry dust collector filter bags/cartridges are to be inspected and/or replaced in accordance with the operation and maintenance manual or more frequently as indicated by pressure differential indicator readings or other indication of unit failure.

(e) Routine observations (at least once each day during daylight hours of dry dust collector operation) shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, atypical pressure differential readings, or other indications, which may necessitate corrective action. Corrective action shall be taken immediately if necessary.

(f) Collected waste material from the dry dust collector shall be handled, transported, and stored in a manner that ensures compliance with Condition X.

(g) The source shall maintain on-site an inventory of spare bags/cartridges of each type used to ensure rapid replacement in the event of bag/cartridge failure.

(3) The emissions from the DDGS loadout baghouse (C90) shall not exceed the following emission limits (3-hour or test method average). (Title 129, Chapters 4 and 19)

(a) 0.21 pounds per hour PM

(4) In order to demonstrate compliance with Condition XIII.(F)(3), the source shall conduct a performance test for PM on DDGS loadout baghouse (S90). The performance test shall be conducted in accordance with Condition XIII.(N). (Title 129, Chapter 34)

(G) The following conditions apply to: STORAGE TANKS

(1) The requirements of the NSPS in 40 CFR 60, Subparts A and Kb (Title 129, Chapter 18, Sections 001.01 and 001.62) apply to the five (5) storage tank (T61, T62, T63, T64, and T65). The requirements include, but are not limited to, the following:

(a) The tanks shall each be equipped with an internal floating roof, in accordance with the specifications in 40 CFR 60.112b(a)(1).

(b) The tanks shall each be visibly inspected and repaired in accordance with testing and procedures per 40 CFR 60.113b(a).

(c) The owner or operator of the affected tanks shall report and keep records as described in 40 CFR 60.115b – Reporting and recordkeeping requirements and in 40 CFR 60.116b – Monitoring of operations.

(H) The following conditions apply to: LIQUID PRODUCT LOADOUT

(1) The source shall use submerged loading when transferring liquid product from the storage tanks to tanker railcars. (Title 129, Chapters 19 and 27)

(2) Truck loadout of liquid product shall be controlled by a vapor recovery system with a flare (S50) at all times liquid product truck loadout is occurring. (Title 129, Chapters 19 and 27)

(a) The vapor recovery system and flare shall be properly designed, installed, operated and maintained in order to capture 100 percent of the vapor generated during product loadout. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the vapor recovery system and flare shall be kept on site and readily available to Department representatives.

(b) When truck loadout is occurring, a flame shall be present at the flare. The facility must install an appropriate safety device or flame monitoring system to ensure that the loadout operation cannot occur without the

presence of a flame. The safety device or flame monitoring system shall be properly installed, operated, calibrated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the flame monitoring device/system shall be kept on site and readily available to Department representatives.

(3) Loadout of liquid product by truck shall not exceed 30,250,000 gallons in any period of twelve (12) consecutive calendar months. At no time during the first eleven (11) calendar months after July 28, 2008 shall the sum of all the previous months' throughput equal or exceed 30,250,000 gallons by truck loadout. (Title 129, Chapter 17)

(4) The operating hours of the truck loadout flare (S50) shall not equal or exceed 4,380 hours per any period twelve (12) consecutive calendar months. At no time during the first eleven (11) calendar months after the permit issuance date shall the sum of all the previous months' operating hours equal or exceed 4,380 hours. The pilot for the flare may operate continuously. (Title 129, Chapter 19)

(5) Flare S50 shall be equipped with an hour meter to record the operating hours to determine compliance with Condition XIII.(H)(4). The hour meter shall be installed, operated, calibrated, and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the hour meter shall be kept on site and readily available to Department representatives. (Title 129, Chapter 34)

(I) The following conditions apply to: EQUIPMENT LEAKS

(1) The requirements of the NSPS in 40 CFR, Subparts A and VV (Title 129, Chapter 18, Sections 001.01 and 001.14) apply to all affected equipment. The requirements include, but are not limited to, the following:

(a) Equipment subject to 40 CFR 60 Subpart VV shall be each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by Subpart VV. (40 CFR 60.481)

(b) Compliance with NSPS, Subpart VV shall be demonstrated for all equipment within 180 days of initial startup. (40 CFR 60.482-1)

(c) Test methods and procedures shall be consistent with the requirements found in 40 CFR 60.485. The methods include:

(i) Method 21 shall be used to determine the presence of leaking sources. (40 CFR 60.485(b)(1))

(ii) Method 21 shall be used to determine the background level. (40 CFR 60.485(c)(2))

(iii) Procedures that conform to the general methods in ASTM E-260, E-168, E-169 (incorporated by reference – see 40 CFR 60.17)

shall be used to determine the percent VOC content in the process fluid that is contained in or contacts a piece of equipment. (40 CFR 60.485(d)(1))

(iv) Standard reference texts or ASTM D-2879 (incorporated by reference – see 40 CFR 60.17) shall be used to determine the vapor pressure of the components in the liquid in the light liquid service. (40 CFR 60.485(e)(1))

(d) The owner or operator shall report and keep records as described in 40 CFR 60.487 – Reporting requirements and in 40 CFR 60.486 – Recordkeeping requirements. Each owner or operator shall submit semiannual reports to the Department beginning six months after the initial startup date.

(e) Emissions shall be controlled by the Leak Detection and Repair Program as defined in 40 CFR 60.482-1 through 60.482-10.

(J) The following conditions apply to: HAUL ROADS

(1) All on-site haul roads with production-related truck traffic shall be paved. The paved haul roads shall comply with the following conditions: (Title 129, Chapters 4 and 19)

(a) The owner or operator shall develop, maintain, and implement a Best Management Practice (BMP) plan to control emissions from haul roads to comply with Condition X. (Title 129, Chapters 4, 19 and 32)

(b) For each day of operation, the owner or operator shall conduct a survey of the plant property and haul roads to determine if visible fugitive emissions are being generated and leaving plant property. Implementation of fugitive dust controls shall be taken upon observation of visible fugitive emissions leaving plant property. Documentation of all fugitive dust control measures implemented and daily surveys shall be maintained in a log. (Title 129, Chapters 4, 19 and 32)

(2) The haul road silt loading value shall not exceed 1.75 g/m^2.

(a) Compliance with the silt loading limitation in Condition XIII.(J)(2)(a) shall be demonstrated by conducting a series of initial silt loading performance tests. These tests shall be conducted at least once per quarter of the first year after July 28, 2008. The silt load tests shall be conducted in accordance with Specific Condition XIII.(N).

(K) The following conditions apply to: COOLING TOWER

(1) The cooling tower (P80) shall be properly installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the cooling tower shall be kept on site and readily available to Department representatives. (Title 129, Chapters 4 and 19)

(2) The drift loss shall not exceed 0.005 percent. Verification of drift loss shall be by manufacturer's guarantee. Manufacturer's drift loss guarantee shall be kept on site and readily available to Department representatives, upon request. (Title 129, Chapters 4 and 19)

(3) The TDS concentration in the cooling water shall not exceed 3,000 ppm for any single sampling event. A TDS sample shall be collected and tested at a minimum of once per calendar month. (Title 129, Chapters 4 and 17)

(L) The following conditions apply to: BIOMETHANATOR OPERATION

(1) Methane generated from the biomethanator shall be combusted in the biomethanator flare (S60) or the dryers. (Title 129, Chapters 4 and 19)

(2) The biomethanator flare shall not equal or exceed 4,380 operating hours per any period twelve (12) consecutive calendar months. At no time during the first eleven (11) calendar months after the startup date shall the sum of all the previous months' operating hours equal or exceed 4,380 hours. The pilot for the flare may operate continuously. (Title 129, Chapter 19)

(3) The biomethanator flare shall be equipped with an hour meter to record the operating hours to determine compliance with Condition XIII.(L)(2). The hour meter shall be properly installed, operated, calibrated, and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the hour meter shall be kept on site and readily available to Department representatives. (Title 129, Chapter 19)

(4) The biomethanator, flare, and associated equipment shall be properly designed, installed, operated and maintained. The manufacturer's operation and maintenance manual, or its equivalent, detailing proper operation, inspection and maintenance of the wastewater treatment tanks, biomethanator and flare shall be kept on site and readily available to Department representatives.

(M) The following conditions apply to: EMERGENCY EQUIPMENT

(1) The emergency fire water-pump engine shall not equal or exceed 500 operating hours per any period twelve (12) consecutive calendar months. At no time during the first eleven (11) calendar months after the permit issuance date shall the sum of all the previous months' operating hours equal or exceed 500 hours. (Title 129, Chapters 4 and 19)

(2) Only diesel fuel (No. 1 and No. 2) shall be combusted in the emergency fire water-pump engine. The sulfur content of the diesel fuel shall not exceed 0.5%. (Title 129, Chapters 4, 19, and 24)

(3) The emergency fire water-pump engine shall be equipped with an hour meter to record the monthly and twelve (12) month consecutive operating hours to determine compliance with Condition XIII.(M)(1). The hour meter shall be installed, operated, calibrated, and maintained in accordance with manufacturer's documentation. The manufacturer's operation and maintenance manual, or its

equivalent, detailing proper operation, inspection and maintenance of the hour meter shall be kept on site and readily available to Department representatives. (Title 129, Chapter 34)

(N) Performance tests, when required by NDEQ, shall be completed and submitted to the NDEQ as follows: (Title 129, Chapter 34)

(1) Performance tests shall be conducted while operating at full capacity, unless otherwise specified by the NDEQ.

(2) Testing shall be conducted according to the methodologies found in Title 129, Chapter 34, Section 002, or other NDEQ approved methodologies.

(3) Performance tests shall be conducted for a minimum of three (3) one-hour runs unless another run-time is specified by the applicable Subpart or as deemed appropriate by the NDEQ.

(4) The owner or operator shall provide the NDEQ with an emissions testing protocol at least thirty (30) days prior to testing.

(5) The owner or operator of a source shall provide the NDEQ at least thirty (30) days written notice prior to testing to afford the NDEQ an opportunity to have an observer present.

(6) The owner or operator shall monitor and record the operating parameters for process and control equipment during the performance testing required in the permit (e.g., production rate, liquid flow rate and pressure differential during testing of the scrubber). The operating parameters shall be submitted with the test results.

(7) A certified written copy of the test results, signed by the person conducting the test, shall be provided to the NDEQ within forty-five (45) days of completion of the test and will, at a minimum, contain the following items:

(a) A description of the source's operating parameters (i.e., production rates, firing rates of combustion equipment, fuel usage, etc.) control equipment parameters (i.e., baghouse fan speeds, scrubber liquid flow rates, chemical addition flow rates (if used), etc.), and ambient conditions (i.e., weather conditions, etc.) during testing.

(b) Copies of all data sheets from the test run(s)

(c) A description and explanation of any erroneous data or unusual circumstance(s) and the cause for such situation

(d) A final conclusion section describing the outcome of the testing

(O) The following conditions apply to the verification of NAAQS modeling analysis: (Title 129, Chapter 4)

(1) Stack heights shall not be less than the following heights above ground level:

Emission Point	Minimum Stack Height (ft)
S10 (Dryers and TO/HRSG system stack)	125
S20 (Grain receiving baghouse)	135
S30 (Hammermill baghouse)	135
S40 (Fermentation Scrubber)	67
S70 (DDGS cooling cyclone/baghouse system)	40
S90 (DDGS loading baghouse)	135
Cooling tower	28

(2) The source shall sufficiently restrict public access to the facility at the ambient air boundary relied upon in the modeling analysis for the NAAQS compliance demonstration. An ambient air restriction plan detailing the measures for restricting public access (such as fencing) shall be submitted to the Department at least 90 days prior to the initial startup of operations. The public access restrictions must be in place prior to initial startup of operations.

(3) A site survey or similar documentation demonstrating compliance with the stack height limitations per Condition XIII.(O)(1) shall be kept on site and readily available to Department representatives within 180 days after the permit issuance date; or for any new emission unit constructed after this date, within 180 days following start-up of the new emission unit.

(4) A site survey or similar documentation demonstrating compliance with the restricted public access provisions of Condition XIII.(O)(2) shall be kept on site and readily available to Department representatives within 180 days after the permit issuance date. The site survey or similar documentation shall provide sufficient detail to verify that an ambient air restriction plan has been fully implemented.

(P) The following conditions apply to: MONITORING AND RELATED RECORDKEEPING AND REPORTING REQUIREMENTS

Records of all limits, measurements, results, inspections, and observations listed in Conditions XIII.(A) through XIII.(O), as required to ensure compliance with this permit shall be maintained. Calculations and records shall be completed no later than the 15th day of each calendar month through the previous calendar month. Records shall be kept on-site for a minimum of five years, unless otherwise specified in this permit. These records shall be clear and readily accessible to Department representatives and shall include the following:

(1) Emission calculations for each month and for each period of twelve (12) consecutive calendar months, demonstrating compliance with Condition XIII.(A), performed in accordance with the emission calculation methodology specified in Attachment A of this permit. The permittee shall keep appropriate records to support the emission calculations including, but are not limited to, actual material throughput rates, production rates, fuel usage rates, and operating hours.

(2) Inspection and maintenance records for the grain receiving/handling baghouse (C20), the milling baghouse (C30), and the DDGS loadout baghouse (C90) to demonstrate compliance with Conditions XIII.(B)(2) and XIII.(F)(2), shall include the following:

(a) Records documenting when routine observations were performed with a description, including operating parameters (e.g., pressure differential readings) and any atypical observations.

(b) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action conducted.

(c) Filter replacement records including filter position, type, and date of filter installation.

(d) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(3) Inspection and maintenance records for the CO_2 scrubber (C40), to demonstrate compliance with Condition XIII.(C)(2), shall include the following:

(a) Records documenting when routine observations were performed with a description, including operating parameters (e.g., pressure differential readings, scrubbant flow rates) and any atypical observations.

(b) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action performed.

(c) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(4) Inspection and maintenance records for the TO/HRSG system, dryers, and pre-fermentation and distillation equipment to demonstrate compliance with Condition XIII.(D)(3), shall include the following:

(a) Records documenting the temperature of the TO/HRSG system, including hourly temperature readings while the dryers, pre-fermentation and distillation equipment are in operation.

(b) Records documenting when routine observations were performed with a description, including operating parameters (e.g., temperature) and any atypical observations.

(c) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action performed.

(d) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(5) As designated in Title 129, Chapter 18, Section 001.22, Industrial-Commercial-Institutional Steam Generating Units –Subpart Db, Recordkeeping Requirements (40 CFR 60.49b), records to demonstrate compliance with Condition XIII.(D)(6).

(6) Inspection and maintenance records for the DDGS cooling system (cyclone/baghouse system) (C70), to demonstrate compliance with Condition XIII.(E)(2), shall include the following:

(a) Records documenting when routine observations were performed with a description, including operating parameters (e.g., pressure differential readings) and any atypical observations.

(b) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action performed.

(c) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(d) Filter replacement records including filter position, type, and date of filter installation.

(7) As designated in Title 129, Chapter 18, Section 001.62, Volatile Organic Liquid Storage Vessels (including petroleum storage vessels) – Subpart Kb, Reporting and Record keeping Requirements (40 CFR 60.115b), records to demonstrate compliance with Condition XIII.(G)(1).

(8) Operation and maintenance record for the vapor recovery system, flare, and safety device or flame monitoring system for the truck liquid product loadout station, to demonstrate compliance with Condition XIII.(H)(2), shall include the following:

(a) Records documenting when routine maintenance and preventive actions were conducted with a description of the maintenance and/or preventive action conducted.

(b) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(9) Throughput of liquid product shipped by trucks and railcars for each calendar month and for each period of twelve (12) consecutive calendar months to demonstrate compliance with Condition XIII.(H)(3).

(10) Hours of operation for the flare associated with the truck liquid product loadout operation for each calendar month and for each period of twelve (12) consecutive calendar months to demonstrate compliance with Condition XIII.(H)(4).

(11) As designated in Title 129, Chapter 18, Section 001.14, Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry – Subpart VV, Recordkeeping Requirements (40 CFR 60.486), records to demonstrate compliance with Condition XIII.(I)(1).

(12) Records documenting use of fugitive dust control measures on haul roads, daily plant surveys, silt load testing results, and fugitive dust control measures implemented to demonstrate compliance with Conditions X. and XIII.(J).

(13) Operation and maintenance records for the cooling tower, to demonstrate compliance with Condition XIII.(K)(1), shall include the following:

(a) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action performed.

(b) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(14) Manufacturer's drift loss guarantee to demonstrate compliance with Condition XIII.(K)(2). This record shall be kept for the life of the equipment.

(15) TDS concentration in cooling water for each sampling event to demonstrate compliance with Condition XIII.(K)(3).

(16) Hours of operation for the biomethanator flare for each calendar month and for each period of twelve (12) consecutive calendar months, to demonstrate compliance with Condition XIII.(L)(2).

(17) Operation and maintenance records for the biomethanator, flare, and associated equipment to demonstrate compliance with Condition XIII.(L)(4), shall include the following:

(a) Records documenting when routine maintenance and preventive actions were performed with a description of the maintenance and/or preventive action performed.

(b) Records documenting equipment failures, malfunctions, or other variations, including time of occurrence, remedial action taken, and when corrections were made.

(18) Hours of operation for the emergency fire water-pump engine for each calendar month and for each period of twelve (12) consecutive calendar months to demonstrate compliance with Condition XIII.(M)(1).

(19) Fuel receipts for the diesel fuel from the supplier, including the sulfur content of the diesel fuel in weight percent, to demonstrate compliance with Condition XIII.(M)(2).

(20) Site survey or similar documentation demonstrating compliance with the stack height limitations per Condition XIII.(O)(1) and the restricted public access provisions per Condition XIII.(O)(2). These records shall be kept for the life of the equipment.

(21) Copies of all notifications, reports, plans, and test results submitted to the Department.

(22) The manufacturer's operation and maintenance manual, or its equivalent, regarding design, installation, operation, and maintenance for all permitted equipment. These records shall be kept for the life of the equipment.

The undersigned issues this document on behalf of the Director in accordance with Title 129 – Nebraska Air Quality Regulations.

9/12/10
Date

Shelley Schneider
Shelley Schneider, Air Administrator
Air Quality Division

ATTACHMENT A

EMISSION CALCULATION METHODOLOGY

To demonstrate compliance with the emission limits specified in Condition XIII.(A), emissions shall be calculated each calendar month using data from the following sources listed in descending order of preference. For compliance purposes, total HAP is equivalent to the sum of individual HAPs.

1. Most recent valid performance test results
2. Manufacturer's guarantees and Material Safety Data Sheet (MSDS)
3. Manufacturer/engineering estimates
4. Emission factors from AP-42 or other EPA published documents

If it is necessary to convert uncontrolled to controlled emissions, multiply the uncontrolled emissions by one minus the overall control efficiency (fraction) of the control equipment.

Fermentation Operations

Emissions from fermentation operations from the scrubber stack shall be calculated using Equations (1a) or (1b).

$E_F = (CEF_F) \times (P_F) / (2{,}000 \text{ lbs/ton})$ (1a)

Where E_F = Emissions from fermentation operations (tons/month)
CEF_F = Controlled process emission factor (lbs/gal of anhydrous ethanol produced)
P_F = Anhydrous ethanol production rate (gal/month)

$E_F = (CHE_F) \times (OH_F) / (2{,}000 \text{ lbs/ton})$ (1b)

Where: E_F = Emissions from fermentation operations (tons/month)
CHE_F = Controlled emissions from fermentation operations (lbs/hr)
OH_F = Operating hours of fermentation operations (hrs/month)

Thermal Oxidizer/Waste Heat Recovery Steam Generator (TO/HRSG) System

Emissions from the TO/HRSG system shall be calculated using Equations 2 or 3.

$E_{TO} = E_{DD} + E_{DF} + E_{TF}$ (2)

Where E_{TO} = Emissions from TO/HRSG system (tons/month)
E_{DD} = Process emissions from dryers (tons/month)
E_{DF} = Fuel combustion emissions from dryers (tons/month)
E_{TF} = Fuel combustion emissions from the thermal oxidizer (tons/month)

Process emissions from the dryers (E_{DD}) shall be calculated using Equations 2a.1, 2a.2, 2a.3, 2a.4 or 2a.5.

$E_{DD} = (CEF_M) \times (P_M) / (2{,}000 \text{ lbs/ton})$ (2a.1)

Where: E_{DD} = Process emissions from dryers (tons/month)

CEF_M = Controlled process emission factor from MWDGS drying (lbs/ton of MWDGS produced)
P_M = MWDGS production rate (tons/month)

$$E_{DD} = (CHE_M) \times (OH_M) / (2{,}000 \text{ lbs/ton}) \quad (2a.2)$$

Where:
E_{DD} = Process emissions from dryers (tons/month)
CHE_M = Controlled process emissions from MWDGS drying (lbs/hr)
OH_M = Operating hours of dryers from MWDGS drying (hrs/month)

$$E_{DD} = (CEF_{DD}) \times (P_{DD}) / (2{,}000 \text{ lbs/ton}) \quad (2a.3)$$

Where:
E_{DD} = Process emissions from dryers (tons/month)
CEF_{DD} = Controlled process emission factor from DDGS drying (lbs/ton of DDGS produced)
P_{DD} = DDGS production rate (tons/month)

$$E_{DD} = (CHE_{DD}) \times (OH_{DD}) / (2{,}000 \text{ lbs/ton}) \quad (2a.4)$$

Where:
E_{DD} = Process emissions from dryers (tons/month)
CHE_{DD} = Controlled process emissions from DDGS drying (lbs/hr)
OH_{DD} = Operating hours of dryers from DDGS drying (hrs/month)

$$E_{DD} = E_{DD}A + E_{DD}B \quad \{\text{Use if both MWDGS and DDGS are produced in a single month}\} \quad (2a.5)$$

Where:
E_{DD} = Process emissions from dryers (tons/month)
$E_{DD}A$ = Process emissions from MWDGS drying (tons/month), using Equations 2a.1 or 2a.2.
$E_{DD}B$ = Process emissions from DDGS drying (tons/month), using Equations 2a.3 or 2a.4.

Fuel combustion emissions from dryers (E_{DF}) shall be calculated using Equations 2b.1, 2b.2, 2b.3 or 2b.4. These calculations are for each pollutant that is not calculated using Equations 2a.1 through 2a.5.

$$E_{DF} = (NEF_{DF}) \times (NQ_{DF}) \times (HN) / (2{,}000 \text{ lbs/ton}) \quad (2b.1)$$

Where:
E_{DF} = Fuel combustion emissions from dryers (tons/month)
NEF_{DF} = Natural gas combustion emission factor (lb/MMBtu)
NQ_{DF} = Natural gas usage rate in the dryers (MMscf/month)
HN = Heat content of natural gas (MMBtu/MMscf)

$$E_{DF} = (\{(NEF_{DF}) \times (NQ_{DF}) \times (HN)\} + \{(MEF_{DF}) \times (MQ_{DF}) \times (HM)\}) / (2{,}000 \text{ lbs/ton}) \quad (2b.2)$$

Where:
E_{DF} = Fuel combustion emissions from dryers (tons/month)
NEF_{DF} = Natural gas combustion emission factor (lb/MMBtu)
NQ_{DF} = Natural gas usage rate in the dryers (MMscf/month)
HN = Heat content of natural gas (MMBtu/MMscf)
MEF_{DF} = Methane combustion emission factor (lbs/MMscf)
MQ_{DF} = Methane usage rate in the dryers (MMscf/month)
HM = Heat content of methane (MMBtu/MMscf)

$$E_{DF} = (NEF_{DF}) \times (NQ_{DF}) / (2{,}000 \text{ lbs/ton}) \quad (2b.3)$$

Where: E_{DF} = Fuel combustion emissions from dryers (tons/month)
NEF_{DF} = Natural gas combustion emission factor (lb/MMscf)
NQ_{DF} = Natural gas usage rate in the dryers (MMscf/month)

$$E_{DF} = (\{(NEF_{DF}) \times (NQ_{DF})\} + \{(MEF_{DF}) \times (MQ_{DF})\}) / (2{,}000 \text{ lbs/ton}) \quad (2b.4)$$

Where: E_{DF} = Fuel combustion emissions from dryers (tons/month)
NEF_{DF} = Natural gas combustion emission factor (lb/MMscf)
NQ_{DF} = Natural gas usage rate in the dryers (MMscf/month)
MEF_{DF} = Methane combustion emission factor (lbs/MMscf)
MQ_{DF} = Methane usage rate in the dryers (MMscf/month)

Fuel combustion emissions from thermal oxidizer (E_{TF}) shall be calculated using Equations 2c.1 or 2c.2. These calculations are for each pollutant that is not calculated using Equations 2a.1 through 2a.5.

$$E_{TF} = (NEF_{TF}) \times (NQ_{TF}) \times (HN) / (2{,}000 \text{ lbs/ton}) \quad (2c.1)$$

Where: E_{TF} = Fuel combustion emissions from thermal oxidizer (tons/month)
NEF_{TF} = Natural gas combustion emission factor (lb/MMBtu)
NQ_{TF} = Natural gas usage rate in the thermal oxidizer (MMscf/month)
HN = Heat content of natural gas (MMBtu/MMscf)

$$E_{TF} = (NEF_{TF}) \times (NQ_{TF}) / (2{,}000 \text{ lbs/ton}) \quad (2c.2)$$

Where: E_{TF} = Fuel combustion emissions from thermal oxidizer (tons/month)
NEF_{TF} = Natural gas combustion emission factor (lb/MMscf)
NQ_{TF} = Natural gas usage rate in the thermal oxidizer (MMscf/month)

$$E_{TO} = (CHE_{TO}) \times (OH_{TO}) / (2{,}000 \text{ lbs/ton}) \quad (3)$$

Where: E_{TO} = Emissions from TO/HRSG system stack (tons/month)
CHE_{TO} = Controlled emissions from TO/HRSG system stack (lbs/hr)
OH_{TO} = Operating hours of TO/HRSG system (hrs/month)

Cooling Cyclone

Emissions from the cooling cyclone shall be calculated using Equation 4a or 4b.

$$E_{CC} = (UEF_{CC}) \times (P_{DDCC}) / (2{,}000 \text{ lbs/ton}) \quad (4a)$$

Where E_{CC} = Emissions from the cooling cyclone (tons/month)
UEF_{CC} = Uncontrolled emission factor from cooling cyclone (lbs/ton of DDGS produced)
P_{DDCC} = DDGS production rate (tons/month)

$$E_{CC} = (UHE_{CC}) \times (OH_{DDCC}) / (2{,}000 \text{ lbs/ton}) \quad (4b)$$

Where: E_{CC} = Emissions from the cooling cyclone (tons/month)
UHE_{CC} = Uncontrolled emissions from cooling cyclone (lbs/hr)

OH_{DDCC} = Operating hours of DDGS drying (hrs/month)

Wet Cake Storage

Emissions from Wet Cake Storage shall be calculated using Equation 5.

$$E_{WC} = (T_{WC}) \times (L_{WC}) \times (W_{WC}) \times (D_{WC}) \times (M_{WC}/100) \times (PPM_{WC}/10^6) \times (OD_{WC}) / (2{,}000 \text{ lbs/ton}) \quad (5)$$

Where:
E_{WC} = Emissions from wet cake storage (tons/month)
T_{WC} = Average thickness of wet cake storage pile that will dry (ft)
L_{WC} = Average length of wet cake storage pile (ft)
W_{WC} = Average width of wet cake storage pile (ft)
D_{WC} = Density of wet cake (lbs/ft^3)
M_{WC} = Liquid content of wet cake (% by weight)
PPM_{WC} = VOC or HAP content of wet cake liquid (ppm by weight)
OD_{WC} = Number of days wet cake storage pile exists on site (days/month)

Storage Tanks

VOC emission from storage tanks shall be calculated using the EPA's TANKS program. HAP emissions from each of the storage tanks shall be calculated using Equation 6.

$$E_{ST\text{-}HAP} = (E_{ST\text{-}VOC}) \times (PPM_{ST}/10^6) \quad (6)$$

Where:
$E_{ST\text{-}HAP}$ = Individual HAP emissions from storage tank (tons/month)
$E_{ST\text{-}VOC}$ = VOC emissions from storage tank (tons/month)
PPM_{ST} = HAP content of material stored in storage tank (ppm by weight)

Liquid Product Loadout

VOC emissions from liquid product loadout shall be calculated using Equations 7 and 7a through f. HAP emissions from liquid product loadout shall be calculated using Equation 8.

$$E_{EL\text{-}VOC} = TLR_{VOC} + RLR_{VOC} + DLR_{VOC} + E_{LF} + E_{LP} \quad (7)$$

Where:
$E_{EL\text{-}VOC}$ = VOC emissions from liquid product loadout (tons/month)
TLR_{VOC} = VOC emissions from liquid product loadout by trucks (tons/month)
RLR_{VOC} = VOC emissions from liquid product loadout by railcars (tons/month)
DLR_{VOC} = VOC emissions from straight denaturant loadout into dedicated tanks (trucks or railcars) (tons/month)
E_{LF} = Emissions from combustion of loadout vapors in flare (tons/month)
E_{LP} = Fuel combustion emissions from loadout flare's pilot burner (tons/month)

Truck liquid product loadout shall be calculated using Equations 7a and 7c.1 through 7c.5. The trucks are considered non-dedicated tanks, assuming that unleaded gasoline vapor is in the truck at the start of the loading of liquid product.

$$TLR_{VOC} = (E_G + E_{ET} + E_{DE}) \times (1\text{-}OCE) / (2{,}000 \text{ lbs/ton}) \quad (7a)$$

Where: TLR_{VOC} = VOC emissions from liquid product loadout into non-dedicated trucks (tons/month)
OCE = Overall capture/control efficiency of the control system (fraction)
E_G = VOC emissions from gasoline remaining in non-dedicated tanks
E_{ET} = VOC emissions from anhydrous ethanol
E_{DE} = VOC emissions from denaturant

Railcar liquid product loadout shall be calculated using Equations 7b and 7c.1 through 7c.5. The railcars are considered dedicated tanks, assuming that denatured ethanol vapor is in the railcar at the start of the loading of liquid product.

$$RLR_{VOC} = (E_{ET} + E_{DE}) \times (1\text{-OCE}) / (2{,}000 \text{ lbs/ton}) \quad (7b)$$

Where: RLR_{VOC} = VOC emissions from liquid product loadout into dedicated railcars (tons/month)
OCE = Overall capture/control efficiency of the control system (fraction)
E_{ET} = VOC emissions from anhydrous ethanol
E_{DE} = VOC emissions from denaturant

Equations 7c.1 through 7c.5 are used to determine the emissions from the truck and railcar liquid product loadouts. These equations shall be calculated separated for each type of transport, because some of the variables (S, MF, V) will be different for each type of transport.

$$E_G = E_{GND} - E_{GCC} \quad (7c.1)$$
$$= (LL_{GND} - LL_{GCC}) \times (V_{DE})$$
$$= \{(S_{ND} - S_{CC}) \times (12.46) \times (M_G) \times (P_G) / (T_G)\} \times (V_{DE})$$

Where: E_G = Uncontrolled VOC emissions from gasoline component remaining in non-dedicated tanks (lbs/month)
E_{GND} = Uncontrolled VOC emissions from gasoline component from dedicated normal service submerged loading operation (lbs/month)
E_{GCC} = Uncontrolled VOC emissions from gasoline component from submerged loading operation of a clean cargo tank (lbs/month)
LL_{GND} = loading loss of liquid loaded from dedicated normal service submerged loading operation (lbs/1,000 gal) – gasoline vapors
LL_{GCC} = loading loss of liquid loaded from submerged loading operation of a clean cargo tank (lbs/1,000gal) – gasoline vapors
S_{ND} = 0.6, saturation factor per AP-42, Chapter 5.2 (1/1995) for dedicated normal service submerged loading operation
S_{CC} = 0.5, saturation factor per AP-42, Chapter 5.2 (1/1995) for submerged loading operation of a clean cargo tank
M_G = molecular weight of gasoline
P_G = vapor pressure of gasoline at annual average ambient temperature (psia)
T_G = annual average ambient temperature, °R = (°F + 460)
V_{DE} = throughput of denatured ethanol loaded (Mgal/month, where Mgal = 1,000 gal)

E_{ET} $= (LL_{ET}) \times (MF_{ET}) \times (V_{DT})$ (7c.2)
$= \{(S) \times (12.46) \times (M_{ET}) \times (P_{ET}) / (T_{ET})\} \times (MF_{ET}) \times (V_{DT})$

Where: E_{ET} = Uncontrolled VOC emissions from anhydrous ethanol component (lbs/month)
LL_{ET} = loading loss of liquid loaded from submerged loading operation of a clean cargo tank (lbs/1,000 gal) – anhydrous ethanol vapors
S = S_{CC} or S_{ND}
S_{CC} = 0.5, saturation factor per AP-42, Chapter 5.2 (1/1995) for submerged loading operation of a clean cargo tank - Use this value for non-dedicated trucks.
S_{ND} = 0.6, saturation factor per AP-42, Chapter 5.2 (1/1995) for dedicated normal service submerged loading operation - Use this value for railcars.
M_{ET} = molecular weight of anhydrous ethanol
P_{ET} = vapor pressure of anhydrous ethanol at loading liquid temperature (psia)
T_{ET} = loading liquid temperature, °R = (°F + 460)
MF_{ET} = molar fraction of anhydrous ethanol in denatured ethanol (calculated using Equation 7c.3)
V_{DT} = throughput of denatured ethanol loaded (Mgal/month, where Mgal = 1,000 gal)

MF_{ET} $= \{(V_{ET}) \times (D_{ET}) / (M_{ET})\} / [(V_{ET}) \times (D_{ET}) / (M_{ET})\} + \{(V_{DE}) \times (D_{DE}) / (M_{DE})\}]$ (7c.3)

Where: MF_{ET} = molar fraction of anhydrous ethanol in denatured ethanol
V_{ET} = throughput of anhydrous ethanol loaded (gal)
D_{ET} = density of anhydrous ethanol (lbs/gal)
M_{ET} = molecular weight of anhydrous ethanol
V_{DE} = throughput of denaturant loaded (gal)
D_{DE} = density of denaturant (lbs/gal)
M_{DE} = molecular weight of denaturant

E_{DE} $= (LL_{DE}) \times (MF_{DE}) \times (V_{DE})$ (7c.4)
$= \{(S) \times (12.46) \times (M_{DE}) \times (P_{DE}) / (T_{DE})\} \times (MF_{DE}) \times (V_{DE})$

Where: E_{DE} = Uncontrolled VOC emissions from denaturant component (lbs/month)
LL_{ET} = loading loss of liquid loaded from submerged loading operation of a clean cargo tank (lbs/1,000 gal) – denaturant vapors
S = S_{CC} or S_{ND}
S_{CC} = 0.5, saturation factor per AP-42, Chapter 5.2 (1/1995) for submerged loading operation of a clean cargo tank - Use this value for non-dedicated trucks.
S_{ND} = 0.6, saturation factor per AP-42, Chapter 5.2 (1/1995) for dedicated normal service submerged loading operation - Use this value for railcars.
M_{DE} = molecular weight of denaturant
P_{DE} = vapor pressure of denaturant at loading liquid temperature (psia)
T_{DE} = loading liquid temperature, °R = (°F + 460)
MF_{DE} = molar fraction of denaturant in denatured ethanol (calculated using Equation 7c.5)
V_{DE} = throughput of denaturant loaded (Mgal/month, where Mgal = 1,000 gal)

MF_{DE} $= \{(V_{DE}) \times (D_{DE}) / (M_{DE})\} / [(V_{ET}) \times (D_{ET}) / (M_{ET})\} + \{(V_{DE}) \times (D_{DE}) / (M_{DE})\}]$ (7c.5)

Where: MF_{ET} = molar fraction of anhydrous ethanol in denatured ethanol
V_{ET} = throughput of anhydrous ethanol loaded (gal)

D_{ET} = density of anhydrous ethanol (lbs/gal)
M_{ET} = molecular weight of anhydrous ethanol
V_{DE} = throughput of denaturant loaded (gal)
D_{DE} = density of denaturant (lbs/gal)
M_{DE} = molecular weight of denaturant

Loadout of denaturant (not denatured ethanol) shall be calculated using Equation 7d. The railcars are considered dedicated tanks, assuming that denatured ethanol vapor is in the railcar at the start of the loading of liquid product.

$$DLR_{VOC} = (LL_D) \times (MF_D) \times (V_D) = \{(S_{ND}) \times (12.46) \times (M_D) \times (P_D) / (T_D)\} \times (V_D) \quad (7d)$$

Where:
DLR_{VOC} = VOC emissions from straight denaturant loadout into dedicated tanks (trucks or railcars) (tons/month)
LL_D = loading loss of liquid loaded from submerged loading operation of a clean cargo tank (lbs/1,000 gal) – denaturant vapors
S_{ND} = 0.6, saturation factor per AP-42, Chapter 5.2 (1/1995) for dedicated normal service submerged loading operation
M_D = molecular weight of denaturant
P_D = vapor pressure of denaturant at loading liquid temperature (psia)
T_D = loading liquid temperature, °R = (°F + 460)
V_D = throughput of denaturant loaded (Mgal/month, where Mgal = 1,000 gal)

Emissions from combustion of the loadout vapors in the flare (E_{LF}) shall be calculated using Equation 7e.1.

$$E_{LF} = (NEF_{LF}) \times (NQ_{LF}) \times (OH_{LF}) / (2{,}000 \text{ lbs/ton}) \quad (7e.1)$$

Where:
E_{LF} = Emissions from combustion of loadout vapors in flare (tons/month)
NEF_{LF} = Flaring emission factor (lb/MMBtu)
NQ_{LF} = Flare design rate (MMBtu/hr)
OH_{LF} = Operating hours of flare

Fuel combustion emissions from the pilot burner for the flare for the loadout operations (E_{LP}) shall be calculated using Equations 7f.1 or 7f.2.

$$E_{LP} = (NEF_{LP}) \times (NQ_{LP}) \times (HN) / (2{,}000 \text{ lbs/ton}) \quad (7f.1)$$

Where:
E_{LP} = Fuel combustion emissions from loadout flare's pilot burner (tons/month)
NEF_{LP} = Natural gas combustion emission factor (lb/MMBtu)
NQ_{LP} = Natural gas usage rate in the loadout flare's pilot burner (MMscf/month)
HN = Heat content of natural gas (MMBtu/MMscf)

$$E_{LP} = (NEF_{LP}) \times (NQ_{LP}) / (2{,}000 \text{ lbs/ton}) \quad (7f.2)$$

Where:
E_{LP} = Fuel combustion emissions from loadout flare's pilot burner (tons/month)
NEF_{LP} = Natural gas combustion emission factor (lb/MMscf)
NQ_{LP} = Natural gas usage rate in the loadout flare's pilot burner (MMscf/month)

$$E_{EL\text{-}HAP} = [(E_G \times PPM_G) + (E_{ET} \times PPM_{ET}) + (E_{DE} \times PPM_{DE})] \times (1 - OCE) / (2{,}000 \text{ lbs/ton}) \quad (8)$$

Where:
- $E_{EL\text{-}HAP}$ = HAP emissions from ethanol product loadout (tons/month)
- E_G = VOC emissions from gasoline remaining in non-dedicated tanks
- E_{ET} = VOC emissions from anhydrous ethanol
- E_{DE} = VOC emissions from denaturant
- PPM_G = HAP content of gasoline (ppm by weight)
- PPM_{ET} = HAP content of anhydrous ethanol (ppm by weight)
- PPM_{DE} = HAP content of denaturant (ppm by weight)
- OCE = Overall capture/control efficiency of the control system (fraction)

Equipment Leaks

VOC emissions from equipment leaks shall be calculated using Equation 9. HAP emissions from equipment leaks shall be calculated using Equation 10. These equations are based on compliance with the LDAR program.

$$LK, _{VOC} = \{\Sigma[(N\text{-}LK) \times (EF\text{-}LK) \times (1-(CE\text{-}LK/100))]\} \times (OH\text{-}LK) \times (2.21 \text{ lbs/kg}) / (2{,}000 \text{ lbs/ton}) \quad (9)$$

Where:
- $LK, _{VOC}$ = VOC emissions from equipment leaks (tons/month)
- Σ = Summation over all types of components
- N-LK = Number of components in each type
- EF-LK= Equipment leak emission factor (kg/hr/source)
- CE-LK = Control efficiency of LDAR system (%)
- OH-LK = Operating hours = 720 or 744 (hrs/month)

$$LK, _{HAP} = (LK, _{VOC}) \times (PPM\text{-}LK/10^6) \quad (10)$$

Where:
- $LK, _{HAP}$ = HAP emissions from equipment leaks (tons/month)
- $LK, _{VOC}$ = VOC emissions from equipment leaks (tons/month)
- PPM-LK = HAP content of anhydrous ethanol (ppm by weight)

Biomethanator Flare

Methane combustion emissions from the biomethanator flare and its pilot burner shall be calculated using Equation 11.

$$E_{BF} = (\{(NEF_{BF}) \times (NQ_{BF}) \times (HN)\} + \{(MEF_{BF}) \times (DR_{BF}) \times (OH_{BF})\}) / (2{,}000 \text{ lbs/ton}) \quad (11)$$

Where:
- E_{DF} = Fuel combustion emissions from pilot on flare (tons/month)
- NEF_{BF} = Natural gas combustion emission factor (lb/MMBtu)
- NQ_{BF} = Natural gas usage rate in the pilot on flare (MMscf/month)
- HN = Heat content of natural gas (MMBtu/MMscf)
- MEF_{BF} = Methane combustion emission factor (lbs/MMBtu)
- DR_{BF} = Biomethanator flare design rating (MMBtu/hr)
- OH_{BF} = Operating hours of biomethanator flare (hrs/month)

Emergency Equipment

Fuel combustion emissions from the emergency equipment shall be calculated using Equation 12.

EQ= (FE-EQ) x (EQ-HP) x (OH-EQ) / (2,000 lbs/ton) (12)

Where: EQ = Fuel combustion emissions from emergency equipment (tons/month)
EQ-HP = Emergency equipment rating (hp)
FE-EQ = Fuel combustion emission factor (lb/hp-hr)
OH-EQ = Operating hours of emergency equipment (hrs/month)

FACT SHEET

September 12, 2010

Facility Name: Green Plains Ord, LLC

NDEQ Facility ID#: 85861

Mailing Address:
48267 Val-E Road
Ord, Nebraska 68862-1988

Facility Location:
48267 Val-E Road
Ord, Nebraska 68862-1988

DESCRIPTION OF THE FACILITY OR ACTIVITY:

This facility is an ethanol manufacturing plant (Standard Industrial Classification (SIC) Code 2869). The facility uses a dry-mill process with biomass (grain, mainly corn) as the feedstock. The production rate is approximately 62,500,000 gallons of denatured ethanol per year.

Green Plains Ord, LLC (Green Plains) was issued a construction permit (CP05-0021) on March 14, 2006, for initial construction. Green Plains was also issued a construction permit (CP07-0048) on July 28, 2008, which revised CP05-0021 in order to reflect as-built facility processes and emissions, and a reopen-for-cause construction permit (CP08-018n) on May 8, 2008, which clarified the facility's requirements in regard to the control of emissions from the fermentation process. This permit (CP10-005) supersedes CP05-0021, CP07-0048, and CP08-018n in their entirety, and will be the only active construction permit for Green Plains upon issuance. Conditions from CP05-0021, CP07-0048, and CP08-018n have been incorporated into CP10-005. The requests, submitted in construction permit application #10-005 and in supplemental materials received prior to public notice, for revisions to conditions in existing permits are summarized below.

In this construction permit application (#10-005) Green Plains requested that stack heights for several emission points be revised based on differences between the as-built stack heights and the stack heights that were permitted in the past. Also, the facility requested to increase their maximum production capacity from 55,000,000 gallons of denatured ethanol per year to 62,500,000 gallons of denatured ethanol per year.

TYPE AND QUANTITY OF AIR CONTAMINANT EMISSIONS ANTICIPATED:

This revision to the construction permits for Green Plains affects particulate matter (PM), PM with an aerodynamic diameter equal to or less than ten microns (PM_{10}), PM with an aerodynamic diameter equal to or less than two and a half microns ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and hazardous air pollutants (HAPs) emissions. Potential emissions are as follows:

Regulated Pollutant	New PTE CP10-005 (tons/year)	Previous PTE CP07-0048 (tons/year)	Change in PTE (tons/year)
Particulate Matter (PM)	57.5	89.4	-31.9
PM smaller than or equal to 10 microns (PM_{10})	47.8	54.0	-6.2
PM smaller than or equal to 2.5 microns ($PM_{2.5}$)	29.3	Not calculated	Not calculated
Sulfur Dioxide (SO_2)	40.8	40.8	-

Regulated Pollutant	New PTE CP10-005 (tons/year)	Previous PTE CP07-0048 (tons/year)	Change in PTE (tons/year)
Oxides of Nitrogen (NO_x)	98.1	98.1	-
Carbon Monoxide (CO)	97.8	103.2 [1]	-5.4
Volatile Organic Compounds (VOC)	95.5	97.7	-2.2
Hazardous Air Pollutants (HAPs):			
Individual HAP	<10	<10	-
Total HAPs	<25	<25	-

[1] PTE calculations from the CP07-0048 fact sheet were 97.8 tons/year. However, based on CO limit in the permit for the TO/HRSG, facility-wide PTE for CO was actually 103.2 tons/year.

The expected change in potential emissions are the result of updating the emission calculations using emission factors determined from performance testing at Green Plains (including a 14% increase to account for the 14% increase in production taking place as part of this permitting action, where appropriate). Emission calculations for some processes (haul roads, equipment leaks, and storage tanks) were recalculated using updated and/or more accurate calculation methodologies which reduced calculated PTE in all cases. Also, $PM_{2.5}$ emissions were calculated and tabulated above for the entire facility even though previous fact sheets did not quantify $PM_{2.5}$. The facility is required to conduct performance testing as a result of the increase in production and the results will be evaluated for compliance with the permit and to verify the accuracy of the potential emission calculations. The facility-wide PTE is based on using the permitted limits and updated emission factors based on site-specific testing for those units where permitted limits do not exist.

As a result of this permitting action Green Plains has not modified any existing equipment, nor have they constructed any new equipment. The facility has requested to have several of their stack heights revised in order to more accurately reflect as-built conditions. Also, Green Plains intends to increase ethanol production, but has requested not to increase permit limits based on the increase in production. Rather, all permit limits remain unchanged, with the exception of the CO limit for the TO/HRSG. The CO limit for the TO/HRSG has been decreased from 20.6 lb/hr to 19.4 lb/hr in order to be consistent with the original emission calculations and to keep facility-wide potential emissions below 100 tpy. The original PTE calculations erroneously calculated CO emissions from the TO/HRSG at 19.4 lb/hr even though the permit allowed CO emissions up to 20.6 lb/hr.

APPLICABLE REQUIREMENTS AND VARIANCES OR ALTERNATIVES TO REQUIRED STANDARDS:

Chapter 4 – Ambient Air Quality Standards (AAQS)

Air Dispersion Modeling was not conducted for this permitting action because the change in emissions are expected to be less than the thresholds for which dispersion modeling may be required according to the NDEQ's *Atmospheric Dispersion Modeling Guidance for Permits* (09/05). It is expected that this project will not cause or significantly contribute to any violations of applicable National and State AAQS. If in the future expected emissions increase or a significant impact on National and/or State AAQS is suspected, dispersion modeling may be required.

Chapters 5 and 7 – Operating Permit Requirements

Green Plains Ord, LLC is a Class II Synthetic Minor source because unlimited potential emissions would exceed 100 tpy (for Criteria Pollutants) and/or 10/25 tpy (for HAPs), but potential emissions are limited by permit conditions under the Class I thresholds. On May 9, 2008, an operating permit application was received and the NDEQ is currently in the final stages of processing prior to being placed on public notice.

Chapter 17 – Construction Permit Requirements:

This state construction permit revision was requested by the facility in order to more closely reflect the facility as-built and to increase production capacity. The potential emissions are such that the facility submitted a $1,500 permit fee with their construction permit application, in accordance with Title 129, Chapter 17, Section 003.01.

Chapter 18 – New Source Performance Standards (NSPS), and 40 CFR Part 60:

This facility is subject to a number of NSPS subparts which are summarized in the fact sheets for construction permits CP05-0021 and CP07-0048. Also, 40 CFR 60 Subpart IIII become applicable to area sources between the issue date of Green Plains last permit and now; therefore Green Plains Ord is now subject to 40 CFR 60 Subpart IIII. Below is a summary of Subpart IIII and a list of requirements from Subpart IIII applicable to Green Plains at the time of this permitting action.

40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition (IC) Internal Combustion Engines (ICE): This subpart, adopted by reference into Title 129, Chapter 18, Section 001.76, applies to stationary compression ignition internal combustion engines (CI ICE). The subpart limits emissions of CI ICE based on engine size (hp, cylinder displacement), type of use (emergency or non-emergency), and model year. The emergency fire water-pump engine existing at the facility is not being modified as a part of this permitting action rather it is subject to this subpart due to the subpart recently becoming applicable to area sources. The requirements of Subpart IIII applicable to the emergency fire water-pump engine include, but are not limited to, the following:

- 40 CFR 60 Subpart IIII (4I)
  - 60.4200(a)(2)(ii), (c)
  - 60.4205(c)
  - 60.4206
  - 60.4207(a), (b), (c)
  - 60.4208(a), (b), (c), (d), (e), (f), (g), (h)
  - 60.4209(a)
  - 60.4211(a), (b)(1), (b)(2), (b)(3), (b)(4), (b)(5), (e)
  - 60.4212(a), (b), (c)
  - 60.4214(b)
  - 60.4218
  - 60.4219
  - Tables 3, 4, 5, 8
  - The following requirements are also applicable to the emergency fire water-pump engine, based on reference by Subpart IIII:
    - 40 CFR 60.1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19
    - 40 CFR 80.510(a), (b)
    - 40 CFR 89 including 89.112

- 40 CFR 1039 including 1039.101(e) and 1039.102(g))1), except as specified in 1039.104(d)
- 40 CFR 1068

Chapter 19 - Prevention of Significant Deterioration (PSD)

This construction permitting action does not trigger the PSD applicability thresholds. Green Plains is an ethanol manufacturing facility to which the 250 tpy PSD applicability threshold applies. Potential emissions from Green Plains, as limited by this permitting action, are not expected to exceed 250 tons/yr for any criteria pollutant. Therefore, this facility is not subject to PSD and is a PSD minor source.

Chapter 20 – Particulate Matter Emissions:

Chapter 20, Section 001 – Process Weight Rate
The following formulas were used to determine expected compliance with this regulation: for process weight rates up to 60,000 lbs/hr, $E= 4.10\ p^{0.67}$, and for process weight rates in excess of 60,000 lbs/hr, $E= 55.0\ p^{0.11}-40$, where E = rate of emissions in lbs/hr and p = process weight rate in tons/hr. The facility is expected to be in compliance with the process weight rate limitations as shown in the fact sheet attachment.

Chapter 20, Section 002 – Particulate Matter from Combustion Source
This facility, as designed, is expected to comply with this regulation because the fuels combusted at this facility are natural gas, diesel fuel, and methane. The allowable emission rates per Title 129, Chapter 20, Section 002 and expected facility compliance are presented in the fact sheet attachment.

Chapter 20, Section 004 – Opacity
This rule limits opacity from all equipment at the facility. It is unlikely that the equipment at this facility would exceed this standard due to the use of natural gas, diesel fuel, and methane. In addition, the equipment controlled by baghouses should be able to meet this standard. With the thermal oxidizer, the DDGS dryers are designed to minimize particulate emissions and, therefore, are also expected to be in compliance with the opacity standard.

Chapter 24 - Sulfur Compounds Emissions

The requirements of this chapter apply to facilities in existence prior to February 26, 1974. This facility was not in existence prior to February 26, 1974; therefore requirements of this chapter do not apply.

Chapter 27, Section 002 - Best Available Control Technology

The potential HAP emissions at Green Plains are expected to exceed 2.5 tons/year of individual HAP or 10 tons/year of combined HAPs, and to remain below 10 tons/year of individual HAP and 25 tons/year of combined HAPs. As discussed in the fact sheet for construction permit CP05-0021 the facility is subject to state Toxics Best Available Control Technology (T-BACT) requirements. Revisions approved by this permit do not change the applicability, nor do they trigger additional requirements, of T-BACT.

Chapter 28 -National Emission Standards for Hazardous Air Pollutants (NESHAPs)

Summarized below are NESHAP Subparts to which the facility is subject or are relevant to various processes or equipment at the facility.

Subpart A – General Provision: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.01, applies to the owner or operator of any stationary source that emits or has the potential to emit any hazardous air pollutant listed in or pursuant to section 112(b) of the Act; and is subject to any standard, limitation, prohibition, or federally enforceable requirement established pursuant to Part 63. This facility is subject to this subpart because it is subject to at least one subpart (as described below) contained in Part 63 and emits hazardous air pollutants listed in section 112(b) of the Act. Although the facility may be subject to this subpart it may not have to meet any of the requirements of this subpart, as discussed in 40 CFR 63.6590 of Subpart ZZZZ.

Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines (RICE): This subpart, adopted by reference in Title 129, Chapter 28, Section 001.88, applies to existing, new, or reconstructed stationary reciprocating internal combustion engines (RICE) located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand. The emergency fire water-pump engine at this facility is subject to Subpart ZZZZ because it is a stationary RICE at an area source. NESHAP Subpart ZZZZ was amended to apply to area sources of HAPs on January 18, 2008, which was after construction permit CP05-0060 was issued; therefore applicability of Subpart ZZZZ had not been discussed in any of the previous permitting actions for Green Plains Ord. The requirements of Subpart ZZZZ applicable to the emergency fire water-pump engine include, but are not limited to, the following:

- 40 CFR 63 Subpart ZZZZ (4Z)
    - 63.6585(a), (c), (d)
    - 63.6590(a)(2)(iii), (c)

Subpart VVVVVV- National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources: This subpart, not yet adopted into Title 129, Chapter 28, applies to area sources, which own or operate chemical manufacturing process units (CMPU). The CMPU must use as feedstocks, generate as byproducts, or produce as products any of the following HAP: 1,3-butadiene, 1,3-dichloropropene, Acetaldehyde, Chloroform, Ethylene dichloride, Hexachlorobenzene, Methylene chloride, Quinoline, Arsenic compounds, Cadmium compounds, Chromium compounds, Lead compounds, Manganese compounds or Nickel compounds. Additionally the HAP must be present in feedstocks or must be generated or produced in the CMPU at concentrations greater than 0.1 % for carcinogens and 1.0% for non-carcinogens as defined by the Occupational Safety and Health Administration (OSHA) (percentages are determined on a mass basis).

A CMPU includes all process vessels, equipment, and activities necessary to operate a chemical manufacturing process as defined in §63.11502, that produces a material or a family of materials described by NAICS code 325. A CMPU consists of one or more unit operations and any associated recovery devices and, a CMPU also includes each storage tank, transfer operation, surge control vessel, and bottoms receiver associated with the production of such NAICS code 325 materials. Ethanol production is one of the source categories to which the rule applies (NAICS code 325193). The existing sources, those facilities that commenced construction or reconstruction of the affected source before October 6, 2008, must achieve compliance with the applicable provisions in this subpart no later than October 29, 2012. New sources, those facilities that commenced construction or reconstruction of the affected source on or after October 6, 2008, must achieve compliance with this rule by October 29, 2009. Any new affected source started after October 29, 2009, must achieve compliance with this rule upon startup of the affected source.

There is some uncertainty regarding whether ethanol plants would be subject to this rule. EPA is expected to address this uncertainty later this year with new proposals or clarifying language. At this time, the NDEQ cannot conclude with certainty whether the source is subject to the requirements of this rule.

Proposed changes to specific permit requirements under Condition XIII of construction permit CP05-0021 (as amended by CP07-0048 and CP08-018n) are discussed as follows:

Revisions to the existing permit conditions have been identified in the following ways; added items are **bold and underlined**, while removed items have a ~~strikethrough~~. The description of changes to the permit conditions are in *italics*.

(D) The following conditions apply to: THERMAL OXIDIZER/HEAT RECOVERY STEAM GENERATOR (TO/HRSG) SYSTEM

(1) Emissions from the **liquefaction tank, slurry tank,** DGS dryers while producing MWDGS and/or DDGS, and the distillation process vent shall be controlled by a TO/HRSG System (C10) exhausting through stack S10.

This condition has been revised in order to clarify that the liquefaction and slurry tank are controlled by the TO. Not including the requirement to control these tanks using the TO was an oversight in the original permit.

(D) The following conditions apply to: THERMAL OXIDIZER/HEAT RECOVERY STEAM GENERATOR (TO/HRSG) SYSTEM

(4) Emissions from the TO/HRSG system stack (S10) shall not exceed the following emission limits (30-day rolling average for NOx, 3-hour or test method average for other pollutants). (Title 129, Chapters 4 and 19)

(a) 3.67 pounds per hour PM

(b) 9.30 pounds per hour SO2

(c) 21.5 pounds per hour NOx

(d) ~~20.6~~ **19.4** pounds per hour CO

(e) 2.85 pounds per hour VOC

The CO limit for the TO/HRSG has been decreased from 20.6 lb/hr to 19.4 lb/hr in order to be consistent with the original emission calculations and to keep facility-wide potential emissions below 100 tpy. The original PTE calculations erroneously calculated CO emissions from the TO/HRSG at 19.4 lb/hr even though the permit allowed CO emissions up to 20.6 lb/hr.

(O) The following conditions apply to the verification of NAAQS modeling analysis: (Title 129, Chapter 4)

(1) Stack heights shall not be less than the following heights above ground level:

Emission Point	Minimum Stack Height (ft)
S10 (Dryers and TO/HRSG system stack)	125
S20 (Grain receiving baghouse)	~~110~~ **135**
S30 (Hammermill baghouse)	~~110~~ **135**
S40 (Fermentation Scrubber)	~~75~~ **67**
S70 (DDGS cooling cyclone/baghouse system)	~~70~~ **40**
S90 (DDGS loading baghouse)	~~40~~ **135**
Cooling tower	28

Condition XIII.(O)(1) of CP05-0021 has been revised by changing the minimum stack heights of several emission points as was requested by the facility in construction permit application #10-005 in order to more accurately reflect the as-built facility.

STATUTORY OR REGULATORY PROVISIONS ON WHICH PERMIT REQUIREMENTS ARE BASED:

Applicable regulations: Title 129 - Nebraska Air Quality Regulations as amended July 21, 2010.

PROCEDURES FOR FINAL DETERMINATION WITH RESPECT TO THE PROPOSED CONSTRUCTION PERMIT:

The public notice, as required under NAQR Chapter 14, shall be published on June 23, 2010, in the Ord Quiz newspaper. Persons or groups shall have 30 days from that issuance of public notice (July 22, 2010) to provide the NDEQ with any written comments concerning the proposed permit action and/or to request a public hearing, in accordance with NAQR Chapter 14. If a public hearing is granted by the Director, there will be a notice of that meeting published at least 30 days prior to the hearing. Persons having comments or requesting a public hearing may contact:

W. Clark Smith-Permitting Section Supervisor
Air Quality Division
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, Nebraska 68509-8922

If no public hearing is requested, the permit may be granted at the close of the 30-day comment period. If a public hearing is requested, the Director of the NDEQ may choose to extend the date on which the permit is to be granted until after that public hearing has been held. During the 30-day comment period, persons requiring further information should contact:

Carmen Kunze-Environmental Engineer
Air Quality Division-Permitting Section
Nebraska Department of Environmental Quality
PO Box 98922
Lincoln, Nebraska 68509-8922

Telephone inquiries may be made at: (402) 471-2189
TDD users please call 711 and ask the relay operator to call us at (402) 471-2186.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Facility Wide Emissions

Pollutant (CAS #)	Grain handling baghouses (tons/yr)	Fugitive Grain Handling (tons/yr)	Fermentation Scrubber** (tons/yr)	TO/HRSG Stack (tons/yr)	DDGS Cooler** (tons/yr)	Solid Product Loading (tons/yr)	Storage Tanks (tons/yr)	Liquid Product Loading (tons/yr)	Equipment Leaks (tons/yr)	Haul Roads** (tons/yr)	Cooling Tower** (tons/yr)	Methanator flare (tons/yr)	Emergency Equipment (tons/yr)	Total Individual Pollutant (tons/yr)
$PM_{2.5}$	1.81	2.24	0.91	14.95	5.39	0.92		0.00		0.22	2.76	0.00	0.10	**29.31**
PM_{10}	13.80	0.66	2.17	16.07	5.39	0.92		0.00		2.09	6.58	0.00	0.11	**47.78**
PM	13.80	1.52	2.17	16.07	5.39	0.92		0.00		10.9	6.58	0.00	0.11	**57.45**
SO_2				40.73				0.00				0.00	0.10	**40.83**
NO_x				94.17				1.89				0.52	1.47	**98.05**
CO				84.75				10.08				2.63	0.32	**97.79**
VOC			49.5	12.48	10.07	0.38	1.93	17.7	2.93			0.37	0.12	**95.47**
Individual HAPs														
Acetaldehyde			3.92E+00	4.63E-01	1.35E-01		2.10E-04	3.12E-03	6.00E-04				2.55E-04	**4.53E+00**
Acrolein			9.84E-01	9.16E-01	1.10E-01				1.32E-02				3.08E-04	**2.02E+00**
Benzene				1.98E-03			2.18E-03	9.86E-03					3.10E-04	**1.43E-02**
1,3-Butadiene													1.30E-05	**1.30E-05**
Carbon Disulfide							1.70E-05	4.19E-05						**5.89E-05**
Cumene							8.70E-05	3.11E-03						**3.19E-03**
Dichlorobenzene				1.13E-03										**1.13E-03**
Ethyl Benzene							4.40E-05	6.06E-03						**6.11E-03**
Formaldehyde			2.65E-01	9.99E-02	4.59E-01				5.00E-04				5.99E-04	**8.25E-01**
n-Hexane				1.70E+00			3.66E-04	1.05E-01						**1.80E+00**
Methanol			6.99E-01	3.00E-01	2.00E-02		2.10E-04	3.12E-03	6.00E-04					**1.02E+00**
Methyl tert-Butyl Ether								3.72E-02						**3.72E-02**
Napthalene				5.74E-04									2.82E-05	**6.03E-04**
Polycyclic Organic Matter				8.31E-05									2.77E-05	**1.11E-04**
Toluene				3.20E-03			4.36E-03	5.01E-02					1.36E-04	**5.78E-02**
Xylenes							2.04E-03	3.66E-02					9.48E-05	**3.87E-02**
Metal HAPs*				5.71E-03										**5.71E-03**
Total HAPs			5.87E+00	3.49E+00	7.24E-01		9.51E-03	2.54E-01	1.49E-02				1.77E-03	**10.36**

*Metal HAPs include compounds of arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Grain Receiving and Milling
Emission Points: S20 and S30

Design rate of grain receiving equipment: 144,155 lbs/hr
631,400 tons/yr
Design rate of milling equipment: 144,155 lbs/hr

PM & PM_{10} emission calculations from baghouses
PTE hourly = (gr/scf)(lbs/7,000 grains)(acfm)(60 min/hr)
PTE annual = (gr/scf)(lbs/7,000 grains)(acfm)(60 min/hr)(8,760 hrs/yr)/(2,000 lbs/ton)

Table B-1: Grain Receiving and Milling Baghouse Emission Estimates

Equipment description	Stack ID	Hourly PTE of PM/PM_{10} (lbs/hr)	Annual PTE of PM/PM_{10} (tons/yr)
Grain receiving baghouse	S20	2.17	9.50
Hammermill baghouse	S30	0.98	4.29
Total			13.8

Emission factors for PM/PM_{10} are the permitted limits.

Fugitive Emissions

PTE annual =(tons/yr)(lbs/ton)(1ton/2000 lbs)(1-Capture %)

Table B-2: Fugitive Emissions from Grain Receiving and Milling Operations

Equipment description	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	Capture Efficiency (%)	Annual PTE of PM (tons/yr)	Annual PTE of PM_{10} (tons/yr)
Grain receiving baghouse	0.035	0.0078	95%	0.55	0.12
Hammermill baghouse	0.061	0.034	95%	0.96	0.54
Total				1.52	0.66

Emission factors are from AP-42, Table 9.9.1-1 (AP-42, 03/03).

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Fermentation
Emission Point: S40

Denatured ethanol production:	62,500,000	gal/yr
	62.5	MMgal/yr
	7,134.7	gal/hr
Operating hours:	8,760	hrs/yr
Density of anhydrous ethanol:	6.58	lbs/gal

TABLE C-1: Fermentation Emissions Summary

Pollutant	Controlled Hourly PTE (lbs/hr)	Controlled Annual PTE (tons/yr)
PM_{10}[1]	0.50	2.17
PM[1]	0.50	2.17
VOC[2]	11.30	49.5
Individual HAPs		
Acetaldehyde	0.896	3.92
Acrolein	0.225	0.98
Formaldehyde	0.060	0.26
Methanol	0.160	0.70
Total HAPs	1.341	5.87

[1]Emission factors are from 10/2007 stack testing at Green Plains, Ord with a margin of safety of 2.5.

[2] Hourly limit from permit used to calculate PTE

Emission factors for HAPs are from 12/2009 stack testing at Green Plains, Ord.

Emission factors from testing have been increased by 14% based on the increase in production from 55 Mmgal/yr to 62.5 Mmgal/yr.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: TO HRSG
Emission Point: S10

Potential to Emit Calculations for Emissions from the Thermal Oxidizer (CE007)

Emission Units Routed to the Thermal Oxidizer

Emission Unit ID	Design Rate (MMBtu/hr)
Liquefaction Tanks	-
Slurry Tanks	-
DDGS DRYER	45
DDGS DRYER	45
Distillation Process Vent	-

Natural Gas Combustion Emissions

Natural Gas Combustion Emissions take into account the 125 MMBtu/hr Thermal Oxidizer and the two 45 MMBtu/hr Dryers

Total Heat Input Capacity	215.0	MMBtu/hr			
Potential Natural Gas Throughput	0.215	MMscf/hr	=	1883.4	MMscf/yr

Pollutant	(A) Emission Factor[1] (lb/MMscf)	(B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr)	(C) = (B)x8760 Potential Emission Rate (lbs/year)	(D) = (C)/2000 Potential Emission Rate (tons/year)
Individual Hazardous Air Pollutants (HAP)				
Benzene	2.10E-03	4.52E-04	3.96E+00	1.98E-03
Dichlorobenzene	1.20E-03	2.58E-04	2.26E+00	1.13E-03
Hexane	1.80E+00	3.87E-01	3.39E+03	1.70E+00
Lead Compounds	5.00E-04	1.08E-04	9.42E-01	4.71E-04
Naphthalene	6.10E-04	1.31E-04	1.15E+00	5.74E-04
Polycyclic Organic Matter (POM)	8.82E-05	1.90E-05	1.66E-01	8.31E-05
Toluene	3.40E-03	7.31E-04	6.40E+00	3.20E-03
Arsenic Compounds (ASC)	2.00E-04	4.30E-05	3.77E-01	1.88E-04
Beryllium Compounds (BEC)	1.20E-05	2.58E-06	2.26E-02	1.13E-05
Cadmium Compounds (CDC)	1.10E-03	2.37E-04	2.07E+00	1.04E-03
Chromium Compounds (CRC)	1.40E-03	3.01E-04	2.64E+00	1.32E-03
Cobalt Compounds (COC)	8.40E-05	1.81E-05	1.58E-01	7.91E-05
Manganese Compounds (MNC)	3.80E-04	8.17E-05	7.16E-01	3.58E-04
Mercury Compounds (HGC)	2.60E-04	5.59E-05	4.90E-01	2.45E-04
Nickel Compounds (NIC)	2.10E-03	4.52E-04	3.96E+00	1.98E-03
Selenium Compounds (SEC)	2.40E-05	5.16E-06	4.52E-02	2.26E-05
Total HAPs	1.81	0.3899	3415.47	1.71

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)

Conversion Factor: 1 MMscf = 1000 MMBtu

Fact Sheet Attachment: (continued)
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: TO HRSG
Emission Point: S10

Total Emissions Emitted form Thermal Oxidizer

Pollutant	Potential Emission Rate	
	(lbs/hr)	(tons/year)
Particulate Matter (PM)	3.67	16.07
Particulate Matter (PM_{10})	3.67	16.07
Nitrogen Oxides (NO_x)	21.50	94.17
Sulfur Dioxide (SO_2)	9.30	40.73
Carbon Monoxide (CO)	19.35	84.75
Volatile Organic Compounds (VOC)	2.85	12.48
Individual Hazardous Air Pollutants (HAP)		
Acetaldehyde	1.06E-01	4.63E-01
Acrolein	2.09E-01	9.16E-01
Benzene	4.52E-04	1.98E-03
Dichlorobenzene	2.58E-04	1.13E-03
Formaldehyde	2.28E-02	9.99E-02
Hexane	3.87E-01	1.70E+00
Lead Compounds	1.08E-04	4.71E-04
Methanol	6.84E-02	3.00E-01
Naphthalene	1.31E-04	5.74E-04
Polycyclic Organic Matter (POM)	1.90E-05	8.31E-05
Toluene	7.31E-04	3.20E-03
Arsenic Compounds (ASC)	4.30E-05	1.88E-04
Beryllium Compounds (BEC)	2.58E-06	1.13E-05
Cadmium Compounds (CDC)	2.37E-04	1.04E-03
Chromium Compounds (CRC)	3.01E-04	1.32E-03
Cobalt Compounds (COC)	1.81E-05	7.91E-05
Manganese Compounds (MNC)	8.17E-05	3.58E-04
Mercury Compounds (HGC)	5.59E-05	2.45E-04
Nickel Compounds (NIC)	4.52E-04	1.98E-03
Selenium Compounds (SEC)	5.16E-06	2.26E-05
Metal HAPs	1.30E-03	5.71E-03
Total HAPs	0.80	3.49

Emission factors (lb/hr) for PM, PM $_{10}$, SO_2, NO_x, CO, and VOC are the permitted limits. Acetaldehyde, Acrolein, Formaldehyde, and Methanol are based from 09/2009 stack testing at Green Plains, Ord.

Emission factors from testing are based on the production 178,440 tons per year of DDGS.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: DDGS Cooling
Emission Point: S70

DDGS Cooling

Design rate of cooling cyclone:	42,676.10	lbs/hr DDGS cooled*
	21.34	tons/hr DDGS cooled
Operating Hours:	8,760	hrs/yr
Annual throughput of DDGS:	186,921	tons/yr

*Assuming 17 lbs DDGS per bushel of corn, 56 lbs per bushel of corn, and 21,990,741 bushels of corn per year.

TABLE E-1: DDGS Cooler Emissions - VOC and HAP		
Pollutant	Potential Controlled Hourly Emissions (lbs/hr)	Potential Controlled Annual Emissions (tons/yr)
VOC	2.30	10.07
Individual HAPs		
Acetaldehyde	0.031	0.13
Acrolein	0.025	0.11
Formaldehyde	0.105	0.46
Methanol	0.005	0.02
Total HAPs	0.165	0.72

Emission factor for VOC is the permitted limit.

Emission factors for Acetaldehyde, Acrolein, Formaldehyde, and Methanol are from 10/2007 stack testing at Green Plains, Ord.

Emission factors from testing have been increased by 14% based on the increase in production from 55 Mmgal/yr to 62.5 Mmgal/yr.

TABLE E-2: DDGS Cooler Emissions - $PM/PM_{10}/PM_{2.5}$		
	Hourly PTE of PM/PM_{10}	Annual PTE PM/PM_{10}
Control Device	(lbs/hr)	(tons/yr)
C70	1.23	5.39

Emission factor is the permitted limit.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Solids Loadout
Emission Point: S90

Solid product storage and loading

DDGS
Design rate of DDGS loadout equipment: 42,676 lbs/hr

PM & PM_{10} emission calculations from baghouse
PTE hourly = (gr/scf)(lbs/7,000 grains)(acfm)(60 min/hr)
PTE annual = (gr/scf)(lbs/7,000 grains)(acfm)(60 min/hr)(8,760 hrs/yr)/(2,000 lbs/ton)

Equipment description	Stack ID	Hourly PTE PM/PM_{10} (lbs/hr)	Annual PTE PM/PM_{10} (tons/yr)
DDGS loadout baghouse	S90	0.21	0.92

Emission factor is their permitted limit.

WDGS (as product)	306,600	tons/yr	70,000	lbs/hr (average, based on 8,760 hrs/yr)			
Maximum hrs WDGS in storage pile:			48	hrs			
Maximum amount WDGS in storage pile:			3,360,000	lbs =	1,680	tons	
Bulk density of WDGS:			35	lbs/ft^3			
WDGS moisture content:			55	%			

* Green Plains Ord stated that they would produce 306,600 tpy of WDGS with a moisture content of 55%.

Volume in storage pile = (amount stored lbs)/(bulk density lbs/ft^3) = 96,000 ft^3

Pile is cone shape, and diameter = height.

Diameter = Height = $((12*\text{Volume } ft^3)/\pi)^{(1/3)}$ = 71.58 ft

Surface area of pile = $\pi * \left(\frac{Diameter}{2}\right)\sqrt{\left(\frac{Diameter}{2}\right)^2 + (Diameter^2)}$

= 8,997 ft^2

Ethanol in WDGS: 0.004 %
(assumed, the facility will need to test to confirm concentration)

Thickness of crust formed: 2 inches

WDGS emitting volume = (Surface area ft^2)*(Crust thickness inches/12) = 1,500 ft^3

VOC emissions = (Emitting volume ft^3)*(Bulk density lbs/ft^3)*(Ethanol in WDGS %)
= 2.10 lbs/day VOC
= 0.38 tons/yr VOC (based on 365 days/yr)

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Tanks
Emission Points: T61-T65

Storage Tanks

The VOC emissions listed in the table below are from TANKS 4.09b.

Product Code definition for the table below.
DE = Denatured ethanol (ethanol/gasoline blends - percentages can vary)
ET = Anhydrous ethanol
GA = natural gasoline (denaturant)
OT = Other

Table G-1: Storage Tanks VOC Emission Summary

Tank ID	Product Stored	Product Code	Max. Throughput (gal/yr)	VOC (lbs/yr)	Amount of VOC from ethanol (lbs/yr)	Amount of VOC from denaturant (lbs/yr)
T61	95% ethanol, 5% gasoline	DE	31,250,000	292.86	285.54	7.32
T62	95% ethanol, 5% gasoline	DE	31,250,000	292.86	285.54	7.32
T63	200 proof ethanol	ET	61,000,000	748.53	748.53	0
T64	190 proof ethanol	ET	64,050,000	776.86	776.86	0
T65	100% natural gasoline	GA	1,500,000	1,729.57	0.00	1,729.57
	Corrosion Inhibitor	OT	3,000	26.00	0.00	26.00

Table G-2: HAP Composition of Ethanol & Denaturant (Gasoline)

Material	Pollutant	PPM	%	Fraction
Ethanol	Acetaldehyde	200		0.0002
Ethanol	Methanol	200		0.0002
Denaturant	Benzene		0.25	0.0025
Denaturant	Carbon disulfide		0.002	0.00002
Denaturant	Cumene		0.01	0.0001
Denaturant	Ethyl Benzene		0.005	0.00005
Denaturant	n-Hexane		5	0.05
Denaturant	Toluene		0.5	0.005
Denaturant	Xylenes		0.05	0.0005

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Tanks
Emission Points: T61-T65

Storage Tanks

HAP Emissions = (Sum of VOC emissions from chemical)(*HAP fraction) = lbs/yr

TABLE G-3: Storage Tanks HAP Emission Summary			
Chemical type	Hazardous Air Pollutant	HAP Fraction of VOC	HAP Emissions (lbs/year)
Denatured ethanol	Acetaldehyde	0.0002	0.1142
	Benzene	0.0025	0.0366
	Carbon disulfide	0.00002	0.0003
	Cumene	0.0001	0.0015
	Ethyl Benzene	0.00005	0.0007
	n-Hexane	0.05	0.7322
	Methanol	0.0002	0.1142
	Toluene	0.005	0.0732
	Xylenes	0.0005	0.0073
Anhydrous ethanol	Acetaldehyde	0.0002	0.3051
	Methanol	0.0002	0.3051
Denaturant (100% natural gasoline)	Benzene	0.0025	4.3239
	Carbon disulfide	0.00002	0.0346
	Cumene	0.0001	0.1730
	Ethyl Benzene	0.00005	0.0865
	n-Hexane	0.05	0.0000
	Toluene	0.005	8.6479
	Xylenes	0.0005	0.8648
Corrosion Inhibitor	Xylenes	1.00	3.20

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Tanks
Emission Points: T61-T65

Storage Tanks

TABLE G-4: Total Emissions from Storage Tanks	
Pollutant	Potential Annual Emissions (tons/yr)
VOC	1.93
Individual HAPs	
Acetaldehyde	2.10E-04
Benzene	2.18E-03
Carbon disulfide	1.70E-05
Cumene	8.70E-05
Ethyl Benzene	4.40E-05
n-Hexane	3.66E-04
Methanol	2.10E-04
Toluene	4.36E-03
Xylenes	2.04E-03
Total HAPs	9.51E-03

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

Anhydrous ethanol loading rate:	61 MMgal/yr
Denaturant loading rate:	1.5 MMgal/yr
Denatured ethanol loading rate:	62.5 MMgal/yr
Truck loadout throughput limitation:	33.3 MMgal/yr denatured ethanol

Truck loadout is assumed to be non-dedicated trucks, which previous load was unleaded gasoline.
The gasoline vapors are assumed to be displaced by the ethanol, for worst-case assumption.
Rail loadout is assumed to be in dedicated railcars, which previous load was denatured ethanol.

VOC emission factor equation from AP-42, Section 5.2.2 - Loading Losses (1/1995)
HAP emission factors are a percentage of the VOC emission factor.

VOC = 12.46*S*P*M/T*(1-eff/100)*X = lbs/Mgal per component
where:

$S_{normal\ dedicated,\ submerged\ loading}$	0.6 Saturation factor
$S_{clean\ cargo,\ submerged\ loading}$	0.5 Saturation factor

TABLE H-1: VOC Emission Factor Variables

Physical Data	Materials		
	Gasoline	Ethanol	Denaturant
Molecular weight (M, lbs/lbs-mole)	62	46	62
Temperature (T, deg R)[a]	510	525	525
Vapor pressure (P, psia)[b]	5.96	0.77	7.57
Liquid molecular weight (ML)	92	46	92
Density (D, lb/gal)	5.6	6.6	5.6
Liquid Mole Fraction (X)[C]	NA	0.99	0.01

[a] $T_{gasoline}$ is annual average ambient temperature from Tank 4.0 for site location.

Denatured ethanol is loaded out at elevated temperature.

[b] Assume worst-case based on RVP 13 gasoline.

c Liquid Mole Fraction (X) was calculated as follows, where V = loading rate:

$$X = \frac{\left(\frac{D * V}{ML}\right)}{\left(\frac{D_{ethanol} * V_{ethanol}}{ML_{ethanol}}\right) + \left(\frac{D_{denaturant} * V_{denaturant}}{ML_{denaturant}}\right)}$$

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

TABLE H-2: Control Equipment: Vapor Recovery System with Flare		
	Truck loadout	Rail loadout
Capture efficiency:	100.0%	0.0%
Control efficiency:	98.0%	0.0%
Overall control efficiency:	98.0%	0.0%

$E_{VOC,\ uncontrolled\ trucks} = E_{gasoline} + E_{ethanol} + E_{denaturant}$

$E_{VOC,\ uncontrolled\ railcars} = E_{ethanol} + E_{denaturant}$

where

$E_{VOC,uncontrolled\ trucks}$ = total uncontrolled emissions of VOC from loading of ethanol into trucks previously carrying gasoline

$E_{VOC,uncontrolled\ railcars}$ = total uncontrolled emissions of VOC from loading of ethanol into railcars previously carrying denatured ethanol

$E_{gasoline}$ = emissions of gasoline vapor remaining from the previous load that will be expelled during loading of denatured ethanol

$E_{ethanol}$ = emissions of ethanol vapor that will be generated and expelled during loading of denatured ethanol (ethanol portion only)

$E_{denaturant}$ = emissions of the denaturant vapor that will be generated and expelled during loading of denatured ethanol (denaturant portion only)

$E_{VOC,\ controlled} = E_{VOC,\ uncontrolled} * (1 -$ overall control efficiency)

TABLE H-3: VOC Emission Factors for Denatured Ethanol Loadout				
	Uncontrolled truck loadout (lbs/Mgal)	Controlled Truck Loadout (lbs/Mgal)	Uncontrolled Rail Loadout (lbs/Mgal)	Controlled Rail Loadout (lbs/Mgal)
$EF_{gasoline}$	0.903	0.018		
$EF_{ethanol}$	0.416	0.008	0.499	NA
$EF_{denaturant}$	0.056	0.001	0.067	NA

Efgasoline emission factors assumes $S = S_{normal} - S_{clean\ cargo}$ and do not use the Liquid Mole Fraction (X) in the equations.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

VOC emissions = (lbs/Mgal)((MMgal/yr)*(1000 Mgal/MMgal)/(2000 lbs/ton)

TABLE H-4: VOC Emissions for Liquid Loadout				
	Gasoline (tons/yr)	Ethanol (tons/yr)	Denaturant (tons/yr)	Total (tons/yr)
100 % Denatured ethanol:				
Rail loadout		7.285	0.978	8.26
Limited % Denatured ethanol:				
Truck loadout	0.301	0.139	0.019	0.459
Rail loadout		8.308	1.116	9.424
Max. emissions - Denatured ethanol:				17.69

TABLE H-5: HAP Weight Fraction			
Individual HAP	Emission Factor (Wt Fraction of VOC Emissions)		
	Gasoline	Ethanol*	Denaturant*
Acetaldehyde		2.00E-04	
Benzene	2.45E-02		2.50E-03
Carbon disulfide			2.00E-05
Cumene	1.00E-02		1.00E-04
Ethyl benzene	2.00E-02		5.00E-05
n-Hexane			5.00E-02
Methanol		2.00E-04	
Methyl tert-butyl ether (MTBE)	7.50E-02		
Toluene	1.50E-01		5.00E-03
Xylene	1.20E-01		5.00E-04
Total HAPs	4.00E-01	4.00E-04	5.82E-02

*The weight fraction of HAPs for ethanol and denaturant are the same as the weight fractions listed in tanks emission calculations.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

For TABLES H-6 and H-7:
HAP emissions = (lbs/Mgal)((MMgal/yr)*(1000 Mgal/MMgal)*(HAP weight fraction)/(2000 lbs/ton)

TABLE H-6: HAP Emissions from 100% Denatured Ethanol		
Pollutant	Ethanol	Denaturant
	Rail Loadout	Rail Loadout
	(tons/yr)	(tons/yr)
Acetaldehyde	1.46E-03	0.00E+00
Benzene	0.00E+00	2.45E-03
Carbon disulfide	0.00E+00	1.96E-05
Cumene	0.00E+00	9.78E-05
Ethyl benzene	0.00E+00	4.89E-05
n-Hexane	0.00E+00	4.89E-02
Methanol	1.46E-03	0.00E+00
MTBE	0.00E+00	0.00E+00
Toluene	0.00E+00	4.89E-03
Xylene	0.00E+00	4.89E-04
Total HAPs	2.91E-03	5.69E-02

TABLE H-7: HAP Emissions from Limited Denatured Ethanol					
Pollutant	Gasoline	Ethanol		Denaturant	
	Truck Loadout	Truck Loadout	Rail Loadout	Truck Loadout	Rail Loadout
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Acetaldehyde	0.00E+00	2.77E-05	1.66E-03	0.00E+00	0.00E+00
Benzene	7.37E-03	0.00E+00	0.00E+00	4.66E-05	2.79E-03
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	3.73E-07	2.23E-05
Cumene	3.01E-03	0.00E+00	0.00E+00	1.86E-06	1.12E-04
Ethyl benzene	6.01E-03	0.00E+00	0.00E+00	9.32E-07	5.58E-05
n-Hexane	0.00E+00	0.00E+00	0.00E+00	9.32E-04	5.58E-02
Methanol	0.00E+00	2.77E-05	1.66E-03	0.00E+00	0.00E+00
MTBE	2.26E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	4.51E-02	0.00E+00	0.00E+00	9.32E-05	5.58E-03
Xylene	3.61E-02	0.00E+00	0.00E+00	9.32E-06	5.58E-04
Total HAPs	1.20E-01	5.54E-05	3.32E-03	1.08E-03	6.49E-02

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

TABLE H-8: Worst-Case HAP Emissions	
Pollutant	Highest Emissions (tons/yr)
Acetaldehyde	0.0031
Benzene	0.0099
Carbon disulfide	0.0000
Cumene	0.0031
Ethyl benzene	0.0061
n-Hexane	0.1047
Methanol	0.0031
MTBE	0.0226
Toluene	0.0501
Xylene	0.0366
Total HAPs	0.1811

Worst-case emissions are the highest emissions from denatured ethanol loadout. Denatured ethanol emissions are the highest of the following categories: (1) 100% truck loadout, (2) 100% rail loadout, or (3) limited truck loadout + rail loadout.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

Loadout Flare Emissions

Design rate of flare:	12.4	MMBtu/hr	
Heating value:	850	Btu/scf	(methane/VOC combustion)
Operating hours:	4,380	hrs/yr	(for truck loadout flare)

Emission factors from AP-42, Chapter 13.5 (9/1991), Table 13.5-1.

Hourly Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)
Annual Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)(hrs/yr)/(2,000 lbs/ton)

TABLE H-9: Flaring Emission Summary

Pollutant	Emission Factor (lbs/MMBtu)	Hourly Emissions (lbs/hr)	Annual Emissions (tons/yr)
NO_x	0.068	0.843	1.846
CO	0.37	4.588	10.05
VOC	0.0518	0.642	1.406

Design rate of pilot:	0.1	MMBtu/hr	
Heating value:	1,020	Btu/scf	
Operating hours:	8,760	hrs/yr	(natural gas combustion)

The emission factors are from AP-42, Chapter 1.4 (7/1998).

Hourly Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)
Annual Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)(hrs/yr)/(2,000 lbs/ton)

TABLE H-10: Pilot Emission Summary

Pollutant	Emission Factor (lbs/MMBtu)	Hourly Emissions (lbs/hr)	Annual Emissions (tons/yr)
PM_{10}	0.0076	0.00076	0.0033
PM	0.0076	0.00076	0.0033
SO_2	0.0006	0.00006	0.0003
NO_x	0.1	0.01	0.0438
CO	0.084	0.0084	0.0368
VOC	0.0055	0.00055	0.0024

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Liquid Loading
Emission Point: S50

Liquid Product Loading

TABLE H-11: Total Emissions from Liquid Loading Rack	
Pollutant	Potential Annual Emissions (tons/yr)
PM_{10}	0.003
PM	0.003
SO_2	0.000
NO_x	1.890
CO	10.085
VOC*	17.689
Individual HAPs	
Acetaldehyde	0.0031
Benzene	0.0099
Carbon disulfide	0.0000
Cumene	0.0031
Ethyl benzene	0.0061
n-Hexane	0.1047
Methanol	0.0031
Methyl tert-Butyl Ether (MTBE)	0.0226
Toluene	0.0501
Xylene	0.0366
Total HAPs	0.1811

*The worst case VOC emissions include the VOC emissions from the railcar loading operation and the flare pilot.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Equipment Leaks

Equipment Leaks

VOC Emissions are calculated from *Protocol for Leak Emission Estimates*, EPA-453/R-95-017, November 1995. For an established LDAR program.

VOC(lbs/hr) = (# of components)(emission factor kg/hr/source)(2.21 lbs/kg)
VOC uncontrolled (tons/yr) = (VOC in lbs/hr)(8,760 hrs/year)/(2,000 lbs/ton)
VOC controlled (tons/yr) = (VOC uncontrolled in tons/yr)(1-{% value/100})

TABLE I-1: Equipment Leaks Emission Summary

Type of Component	# of Components	Leaking Emission Factor (kg/hr/source)	VOC (lbs/hr)	VOC uncontrolled (tons/yr)	LDAR (cont.eff. %)	VOC controlled (tons/yr)
Light liquid valves	484	0.00159	1.70	7.45	84.00	1.19
Light liquid pumps	25	0.00613	0.34	1.48	69.00	0.46
Gas valves	50	0.00195	0.22	0.94	87.00	0.12
Flanges	500	0.00183	2.02	8.86	87.00	1.15
TOTAL EMISSIONS:				18.73		2.93

* Emission factors and # of components have been updated based on CP application 10-005.

HAP emissions = (VOC emissions)(Mass Fraction)

TABLE I-2: Equipment Leaks HAP Emission Summary

HAP	Mass Fraction	HAP Emissions (tons/yr)
Acetaldehyde	0.0002	0.0006
Methanol	0.0002	0.0006
Formaldehyde	0.000169	0.0005
Acrolein	0.0045	0.0132
Total HAPs		0.0149

HAP fractions were provided by the source based on mass fraction provided in tanks calculations

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Haul Roads

PTE Calculation For Truck Traffic On Haul Roads

Rev. 12/2008

Paved roads {Draft AP-42 Chapter 13.IV (8/08)}

Equation (2): (modified) $$E = k \times \left(\frac{sL}{2}\right)^{0.8} \times \left(\frac{W}{3}\right)^{0.8} \times \left(1 - \frac{P}{4 \times 365}\right) \times \left(\frac{S}{30}\right)^{d}$$

	k	d
PM	0.12	0.3
PM_{10}	0.023	0.5
$PM_{2.5}$	0.0034	0.5

Unpaved roads {AP-42 Chapter 13.2.2 (11/06)}

Equation (1a): (modified) $$E = k \times \left(\frac{sC}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right) \times \left(\frac{S}{30}\right)^{d} \times (1 - CE)$$

	k	a	b	d
PM	4.9	0.7	0.45	0.3
PM_{10}	1.5	0.9	0.45	0.5
$PM_{2.5}$	0.15	0.9	0.45	0.5

Haul Road / Traffic Parameters

Activity / Road Description	Road Type / Silt Value		Roundtrip Length (feet)		Truck Weight (tons)			Ave. Speed (mph)	Unrestricted Maximum Throughput (units/yr)	Ave. Truck Capacity (units/truck)		Annual VMT
			empty	full	empty	full	Ave.					
Denatured Ethanol	P	1.75	2,704	1,521	15	40	24.0	15	33,300,000	7,500	gal	3,553
Denaturant	P	1.75	1525	2705	15	40	31.0	15	1,500,000	7,500	gal	160
MWDGS	P	1.75	2,704	1,521	15	40	24.0	15	306,600	27	ton	9,087
DDGS	P	1.75	2,704	1,521	15	40	24.0	15	178,440	27	ton	5,288
Grain	P	1.75	2,070	2,154	15	40	27.7	15	631,400	25	ton	20,205

Denatured Ethanol and Denaturant throughputs are in gallons, MWDGS, DDGS, and Grain throughputs are in tons.

Emission Calculations

	Emission Factors (lb/VMT)			Potential Emissions (tons/yr)		
	PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
Denatured Ethanol	0.43	0.07	0.01	0.77	0.13	0.02
Denaturant	0.53	0.09	0.01	0.04	0.01	0.00
MWDGS	0.43	0.07	0.01	1.97	0.33	0.05
DDGS	0.43	0.07	0.01	1.15	0.19	0.03
Grain	0.49	0.08	0.01	4.92	0.82	0.12
Total Annual Emissions:				**8.85**	**1.48**	**0.22**

Description of Constants/Variables

E: haul road emissions (lb/VMT)

k, d: dimensionless constants from Draft AP-42 Chapter 13.IV (paved)

k, a, b, c, d: dimensionless constants from AP-42 Tables 13.2.1-1 & 13.2.2-2 (unpaved)

sL: silt loading (g/m^2) of paved road surface

sC: silt content (%) of unpaved road surface

W: average vehicle weight (tons)

P: days/yr with at least 0.01" of precipitation
P = 90 default = 90

S: mean vehicle speed on road (mph)
default = 30, minimum = 15

CE: unpaved road, dust control efficiency
CE = 0 % default = 0%

VMT: vehicle miles traveled

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Cooling Tower
Emission Points: CT1, CT2, CT3, CT4

Cooling Tower

Circulation rate:	1,200,000 gal/hr	10,512,000 Mgal/yr (based on 8,760 hrs/yr)
Drift loss percent:	0.005	
Water density:	8.34 lbs/gal	

TDS concentration: 3,000 ppm single sample event
3,000 ppm average annual rate

PM/PM_{10} emission factor = $\left(\frac{\text{ppmTDS}}{1{,}000{,}000\,\text{lbs water}}\right)\left(\frac{8.34\,\text{lbs}}{\text{gal}}\,\text{water}\right)\left(\frac{1{,}000\,\text{gal}}{1\,\text{Mgal}}\right)\left(\frac{0.005}{100}\,\text{drift loss}\right)$

0.001251 lbs/Mgal single sample event (highest hourly rate)
0.001251 lbs/Mgal average annual rate

TABLE K-1: Cooling Tower Emission Summary

Pollutant	Hourly PTE (lbs/hr)	Annual PTE (tons/year)
PM_{10}	1.501	6.58
PM	1.501	6.58

Equation from AP-42, Section 13.4-2 (1/1995).
Hourly Emissions = (lbs/Mgal single sample event)(hourly throughput gal/hr)(1 Mgal/1,000 gal)
Annual Emissions = (lbs/Mgal average annual rate)(annual throughput Mgal/yr)/(2,000 lbs/ton)
*Information for Cooling Tower calculations was taken from the previous permit fact sheet attachment; except the TDS concentration has been adjusted according to the permit revision.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Biomethanator Flare
Emission Point: S60

Biomethanator Flare

Design rate of flare:	3.2 MMBtu/hr	
Heating value:	850 Btu/scf	(methane combustion)
Operating hours:	4,380 hrs/yr	

Methane combustion AP-42 emission factors came from AP-42, Section 13.5 (9/1991), Tables 13.5-1 and 13.5-2.

Hourly Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)
Annual Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)(hrs/yr)/(2,000 lbs/ton)

TABLE L-1: Flaring Emission Summary

Pollutant	Emission Factor (lbs/MMBtu)	Hourly Emissions (lbs/hr)	Annual PTE (tons/yr)
NO_x	0.068	0.218	0.477
CO	0.37	1.184	2.593
VOC	0.0518	0.166	0.363

Design rate of pilot:	0.1 MMBtu/hr	
Heating value:	1,020 Btu/scf	(natural gas combustion)
Operating hours:	8,760 hrs/yr	

Natural gas combustion AP-42 emission factors came from AP-42, Section 1.4 (7/1998), Tables 1.4-1 and 1.4-2.

Hourly Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)
Annual Emissions = (Emission factor lbs/MMBtu)(MMBtu/hr)(hrs/yr)/(2,000 lbs/ton)

TABLE L-2: Pilot Emission Summary

Pollutant	Emission Factor (lbs/MMBtu)	Hourly Emissions (lbs/hr)	Annual PTE (tons/yr)
PM_{10}	0.0076	0.00076	0.0033
PM	0.0076	0.00076	0.0033
SO_2	0.0006	0.00006	2.63E-04
NO_x	0.1	0.01	0.0438
CO	0.084	0.0084	0.0368
VOC	0.0055	0.00055	0.0024

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Biomethanator Flare
Emission Point: S60

Biomethanator Flare

Total Methananator Emissions = (flare emissions) + (pilot emissions)

TABLE L-3: Methanator Emission Summary		
Pollutant	Hourly Emissions (lbs/hr)	Annual PTE (tons/yr)
PM_{10}	7.60E-04	3.30E-03
PM	7.60E-04	3.30E-03
SO_2	6.00E-05	2.63E-04
NO_x	0.23	0.52
CO	1.19	2.63
VOC	0.17	0.37

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Emergency Equipment
Emission Points: S100

Emergency Equipment

Design rate of engine	190 hp	1.33 MMBtu/hr
PTE operating hours	500 hrs/yr	

Diesel combustion AP-42 emission factors came from AP-42, Section 3.3 (10/1996), Tables 3.3-1 and 3.3-2.

Hourly Emissions = (lbs/hp-hr)(hp) = lbs/hr
Annual Emissions = (lbs/hr)(hrs/yr)/(2,000 lbs/ton)

TABLE M-1: Emergency Equipment Emission Summary

Pollutant	Emission Factor (lbs/hp-hr)	Hourly PTE (lbs/hr)	Annual PTE (tons/year)
PM_{10}	0.0022	0.42	0.105
PM	0.0022	0.42	0.105
SO_2	0.00205	0.39	0.097
NO_x	0.031	5.89	1.473
CO	0.0068	1.29	0.323
VOC	0.0025141	0.48	0.119
Individual HAPs	(lbs/MMBtu)		
Acetaldehyde	7.67E-04	1.02E-03	2.55E-04
Acrolein	9.25E-04	1.23E-03	3.08E-04
Benzene	9.33E-04	1.24E-03	3.10E-04
1,3-Butadiene	3.91E-05	5.20E-05	1.30E-05
Formaldehyde	1.80E-03	2.39E-03	5.99E-04
Naphthalene	8.48E-05	1.13E-04	2.82E-05
Polycyclic Organic Matter	8.32E-05	1.11E-04	2.77E-05
Toluene	4.09E-04	5.44E-04	1.36E-04
Xylenes	2.85E-04	3.79E-04	9.48E-05
Total HAPs		7.08E-03	1.77E-03

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: $PM_{2.5}$ Emission Calculations

	PM2.5 Emission Factor		Emission Factor Source	Scale Factor	PTE (tpy)
Grain Receiving Baghouse	2.17	lb/hr	Grain Receiving Baghouse PM emission factor	0.01	0.10
Hammermill Baghouse	0.98	lb/hr	Hammermilling Baghouse PM emission factor	0.4	1.72
Fugitive Grain Receiving Baghouse	0.00	lb/ton	Emission factors are from AP-42, Table 9.9.1-1 (AP-42, 03/03).	-	0.41
Fugitive Hammermill Baghouse	0.01	lb/ton	Emission factors are from AP-42, Table 9.9.1-1 (AP-42, 03/03).	-	1.83
Fermentation Scrubber	0.50	lb/hr	Fermentation Scrubber PM emission factor	0.42	0.91
TO/HRSG Stack	3.67	lb/hr	TO/HRSG PM	0.93	14.95
DDGS Cooler	1.23	lb/hr	DDGS Cooler PM emission factor	-	5.39
Solid Product Loading	0.21	lb/hr	Solid Product Loading PM emission factor	-	0.92
Liquid Product Loading	0.00	lb/hr	Liquid Product Loading PM emission factor	-	0.00
Haul Roads	0.05	lb/hr	Haul Road $PM_{2.5}$ emission factor (Based on AP-42 Ch. 13)	-	0.22
Cooling Tower	1.50	lb/hr	Cooling Tower PM emission factor (Based on AP-42 Ch. 13)	0.42	2.76
Methanator flare	0.00	lb/hr	Methanator Flare PM emission factor	1	0.00
Emergency Equipment	0.42	lb/hr	Emergency Equipment PM emission factor	0.992	0.10

Scale factors are from CEIDARS $PM_{2.5}$ emission factor scaling table.

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Ch. 20 and Ch.24

Title 129, Chapter 20, Section 001 **Process Weight Rate**

For process weight rates up to 60,000 lbs/hr: $E= 4.10\ p^{0.67}$
For process weight rates in excess of 60,000 lbs/hr: $E= 55.0\ p^{0.11}-40$
where E = rate of emissions in lbs/hr PM and p = process weight rate in tons/hr.

Process	P	E	Unit PM emission rate
Grain receiving baghouse	144,155 lbs/hr 72.08 tons/hr	48.1 lbs/hr	2.17 lbs/hr
Grain milling baghouse	144,155 lbs/hr 72.08 tons/hr	48.1 lbs/hr	0.98 lb/hr
Fermentation Process	46,946 lbs/hr 23.47 tons/hr	34.0 lbs/hr	0.50 lb/hr
TO/HRSG System	106,690 lbs/hr 53.35 tons/hr	45.2 lbs/hr	3.67 lb/hr
DDGS Cooler	42,676 lbs/hr 21.34 tons/hr	31.9 lbs/hr	1.23 lb/hr
DDGS Storage and Loadout	42,676 lbs/hr 21.34 tons/hr	31.9 lbs/hr	0.21 lb/hr
Cooling Tower	10,008,000 lbs/hr 5,004 tons/hr	100 lbs/hr	1.50 lb/hr

Fact Sheet Attachment
Green Plains Ord, LLC
Facility ID# 85861
Emission Calculations: Ch. 20 and Ch. 24

Title 129, Chapter 20, Section 002 **PM Limitations for Combustion Sources**

Total Heat Input (MMBtu/hr)	Maximum Allowable Emissions of PM (lbs/MMBtu)
10 or less	0.6
Between 10 and 10,000	$1.026/I^{0.233}$ Where I = total heat input in MMBtu/hr.
10,000 or more	0.12

Process equipment	hp	MMBtu/hr	Allowable PM (lbs/MMBtu)	Unit PM emission rate (lbs/MMBtu)
Methanator Flare		3.2	0.6	2.38E-04
Emergency equipment	190	1.33	0.6	0.31

To convert hp to MMBtu/hr: hp*((7,000 Btu/hr)/hp)*(1 MMBtu/1,000,000 Btu)
Unit PM emission rate = (Unit's lbs/hr PM)/(Unit's MMBtu/hr)