TECHNICAL SUPPORT DOCUMENT
For
DRAFT/PROPOSED AIR EMISSION PERMIT NO. 11100077-004

This Technical Support Document (TSD) is intended for all parties interested in the draft/proposed permit and to meet the requirements that have been set forth by the federal and state regulations (40 CFR § 70.7(a)(5) and Minn. R. 7007.0850, subp. 1). The purpose of this document is to provide the legal and factual justification for each applicable requirement or policy decision considered in the preliminary determination to issue the draft/proposed permit.

1. General Information

1.1 Applicant and Stationary Source Location:

Table 1. Applicant and Source Address

Applicant/Address	Stationary Source/Address (SIC Code: 2869)
Green Plains Renewable Energy, Inc. 450 Regency Parkway, Suite 400 Omaha, NE 68114	Green Plains Otter Tail, LLC 24096 170th Ave. Fergus Falls, MN Otter Tail County
Contact: Anthony Hicks, General Manager Phone: 218-998-4301	

1.2 Facility Description

Green Plains Otter Tail, LLC (Facility) is a fuel-grade ethanol production plant in Fergus Falls, Minnesota. The facility emits VOC, PM, PM_{10}, $PM_{2.5}$, NO_X, and CO. Volatile organic compounds (VOC) are emitted by fermentation, distillation, dried distiller grains with solubles (DDGS), ethanol loading, and VOC liquid storage and piping. Particulate matter (PM, PM_{10}, $PM_{2.5}$) is emitted by the DDGS handling and drying, corn receiving and handling, and vehicle traffic. Nitrogen oxides (NO_X) and carbon monoxide (CO) are primarily emitted by two natural gas-fired boilers and the natural gas-fired regenerative thermal oxidizer (RTO). The plant is permitted to produce 65 million gallons of 200-proof ethanol annually.

The control equipment at the facility includes fabric filters, scrubbers, and a regenerative thermal oxidizer (RTO). The scrubbers control VOC emissions from fermentation and distillation. The RTO controls VOC emissions from DDGS cooling and DDGS drying. Fabric filters control PM, PM_{10}, $PM_{2.5}$ from the corn and DDGS handling and storage systems. A flare controls emissions from truck and rail ethanol loadout. There are five large, internal floating roof tanks for ethanol, denaturant, and denatured ethanol. Emissions from process valves and piping are minimized through an inspection and maintenance program.

1.3 Description of any Changes Allowed with this Permit Issuance

This permit action allows the facility to add three more grain bins and changes the permit from a State Permit to Part 70 permit due to greenhouse gas (GHG) emissions. This permit action includes an administrative amendment for a change of ownership for the facility, and an administrative amendment

for a test extension. The MPCA has a combined operating and construction permitting program under Minnesota Rules Chapter 7007, and under Minn. R. 7007.0800, the MPCA has authority to include additional requirements in a permit. Under that authority, the following changes to the permit are also made through this permit action:

Facility Description:

- Inactivated all control equipment from tanks (floating roof are not considered control equipment for these purposes) and removed the CE 033-037 from the control equipment list.
- Inactivated CE 021, 022, 031, and 032 because limits are not control equipment
- Removed SV 029-033 which were never built
- Retired GP 003 because it was not used
- Removed emission units that are fugitive sources
- Removed stack vents for tanks
- Added fugitive source, FS 007, for temporary flat storage

Permit Conditions:

- Added daily recordkeeping of ethanol production
- Updated modeling language
- Added requirements for NESHAP Subpart ZZZZZ to EU 026 and EU 027
- Added direct heating rule to EU 50
- Updated Subpart VV language for FS 005
- Updated to reflect current MPCA templates and standard citation formatting
- Completed requirements and the requirements for equipment that has been removed have been deleted
- Some requirements have been reordered to help with clarity (i.e., similar requirements are grouped)

1.4 Description of All Amendments Issued Since the Issuance of the Last Total Facility Permit

Permit Number and Issuance Date	Action Authorized
11100077-002 August 14, 2008	Reconciled the permit with the constructed facility.
11100077-003 April 1, 2010	Added a PM_{10} emission limit and lowered the VOC emission limit for SV 028. Increased VOC emission limit for SV 026 and SV 027.

1.5 Facility Emissions:

Table 2. Total Facility Potential to Emit Summary

	PM tpy	**PM_{10}** tpy	**$PM_{2.5}$** tpy	**SO_2** tpy	**NO_X** tpy	**CO** tpy	**CO_2e** tpy	**VOC** tpy	**Single HAP** tpy	**All HAP** tpy
Total Facility Limited Potential Emissions	75.9	63.4	61.6	13.6	95.0	94.6	145,730	95.0	6.0	9.6
Total Facility Actual Emissions (2010)	62.6	39.35	*	0.62	37.45	52.96	*	47.68	*	

*Not reported in MN emission inventory.

Table 3. Facility Classification

Classification	**Major/Affected Source**	**Synthetic Minor/Area**	**Minor/Area**
Prevention of Significant Deterioration (PSD)		PM, PM_{10}, $PM_{2.5}$, NO_X, CO, VOC	Pb, SO_2
Part 70 Permit Program	CO_2e	PM, PM_{10}, $PM_{2.5}$, NO_X, CO, VOC	SO_2
Part 63 NESHAP		HAP	

2. Regulatory and/or Statutory Basis

New Source Review (NSR)

The permit contains requirements that restrict annual emissions of PM, PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, and VOC such that all NSR-regulated air pollutants are less than the major source thresholds for NSR (40 CFR § 52.21(b)(1)). Therefore, as defined by the federal rules, the facility is not considered an existing major source for NSR.

In May of 2007, US EPA promulgated a change to the federal PSD regulation changing the major source threshold for this type of ethanol plant from 100 to 250 tons per year. This means that this facility could apply to increase emissions above 100 tons per year, but less than 250 tons per year, and remain below the major source threshold for PSD. In the documents promulgating the change, US EPA states the following requirements:

> … existing permit limits and other permit requirements remain in effect and enforceable unless and until revised through a permitting procedure which, to be consistent with CAA section 110(a)(2)(C) and 40 CFR 51.160, must be shown not to cause or contribute to a violation of the NAAQS and to comply with all applicable requirements.

Part 70 Permit Program

This facility has the potential to emit more than 100,000 tpy of carbon dioxide equivalent (CO_2e) and is therefore a major source under Title V and the Part 70 permit program. CO_2e expresses the amount of global warming potential the various greenhouse gases (GHG) have as a functionally equivalent amount of CO_2. The facility became a major source under the federal Title V operating permit regulation on July 1, 2011 (subject to action by Congress or US EPA which may change the federal regulations for GHG). Prior to July 1, 2011, the limits the facility had accepted on production and emissions limited the potential-to-emit to less than the major source level for Part 70. While the facility as a whole is subject to Part 70, the throughput limit remains in place which limits PM, PM_{10}, $PM_{2.5}$, NO_X, CO, and VOC.

New Source Performance Standards (NSPS)

Five product storage tanks (TK 001 to TK 005) are subject to Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Tanks. The requirements for these tanks are listed at GP 001.

Two natural gas boilers (EU 028 and EU 029) are subject to Subpart Dc – Standards of Performance for Steam Generating Units.

Two engines (EU 026 and EU 027) are subject to Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

This facility is subject to Subpart VV - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced after January 5, 1981, and on or before November 7, 2006. Requirements for this subpart are located at FS 005.

This facility is not subject to Subpart DD – Standards of Performance for Grain Handling Facilities. Applicability is based on a grain elevator's storage capacity, which must exceed 2.5 million bushels for any grain storage facility not for human consumption. The storage capacity of grain elevators at this facility is 2,452,501 bushels; therefore, Subpart DD does not apply.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

Most hazardous air pollutants (HAP) emitted from ethanol production are VOC; so VOC limits effectively limit HAP. Test data from ethanol plants demonstrates that compliance with a VOC emissions limit of less than 100 tons per year will also limit HAP emissions to less than major source thresholds, if compliance is achieved by having at least 95% VOC control on the fermentation and drying processes. Thus, no major source NESHAPs apply.

The facility is required to conduct regular VOC performance tests. The VOC performance test method used by ethanol facilities, the Midwest Scaling Protocol, has speciated HAP results. The emission factors used to calculate HAP emissions are confirmed with performance test results.

Other controls taken into account include the liquid storage tanks with floating roofs and the Leak Detection and Repair program for piping leaks.

Two engines (EU 026 and EU 027) are subject to NESHAP Subpart ZZZZ for Stationary Reciprocating Internal Combustion Engines.

The facility is not subject to Subpart VVVVVV for Chemical Manufacturing Area. The facility provided test results with their permit application showing acetaldehyde is not present in concentrations greater than 0.1 percent.

Compliance Assurance Monitoring (CAM)

The facility is a major source under 40 CFR Part 70, therefore, CAM applies. Because this is a first time Part 70 permit, only information about large pollutant specific emission unit (PSEU) sources is required to be submitted. The facility has no large PSEUs as defined by 40 CFR Part 64. Information about "other" PSEUs at this facility is required to be submitted as part of the application for renewal of the Part 70 permit.

Table 4. CAM Summary

Emission Unit	Control	Applicability	Pollutant	Monitoring
EU 002, 003, 005, 006, 007, 056, 061, 064	CE 001 (fabric filter)	Other	PM	Will be addressed at reissuance.
EU 008, 011, 012, 055	CE 002 (fabric filter)	Other	PM/PM_{10}	Will be addressed at reissuance.
EU 032	CE 026 (flare)	Other	VOC	Will be addressed at reissuance.
EU 033-038	CE 027 (CO_2 Scrubber)	Other	VOC	Will be addressed at reissuance.
EU 039-049	CE 028 (CO_2 Scrubber)	Other	VOC	Will be addressed at reissuance.
EU 050, 051	CE 030 (RTO)	Other	CO	Will be addressed at reissuance.

Environmental Review & AERA

An Environmental Assessment Worksheet (EAW) is mandatory if potential emissions from the project are greater than 250 tons of any air pollutant (except GHG, which would be greater than 100,000 tons of CO2e). The facility's emissions potential does not exceed these thresholds.

Minnesota State Rules

Portions of the facility are subject to the following Minnesota Standards of Performance:

- Minn. R. 7011.0150 Minnesota Performance Standards for Bulk Agricultural Handling Facilities
- Minn. R. 7011.0610 Standards of Performance for Fossil-Fuel-Burning Direct Heating Equipment
- Minn. R. 7011.2300 Standards of Performance for Stationary Internal Combustion Engines

Table 5. Regulatory Overview of Facility

Level*	Applicable Regulations	Comments:
FC	Title I limits to avoid major source classification for 40 CFR §52.21 and to avoid major source classification for 40 CFR §63.2 Minn. R. 7011.0150	Production limit of 65,000,000 gallons/yr of ethanol production. The production limit restricts allowable emissions to below major source thresholds. Limit on HAP emissions to avoid major source classification under NESHAPs. Minnesota Standards of Performance for Preventing Particulate Emissions from Becoming Airborne.
GP 001	40 CFR pt. 60, subp. Kb - Standards of Performance for Petroleum Storage Vessels	Determination of applicable limits from rule: Tanks constructed after 7/23/1984 and greater than 151 m^3 (39,900 gallons)
GP 002	Title I limits to avoid major source classification for 40 CFR §52.21 Minn. R. 7011.0070-0080	Requirements to operate and maintain fabric filters to achieve an overall control efficiency greater than 99% for PM, greater than 93% for PM_{10} and $PM_{2.5}$. Control Equipment Rule (CER). The facility has chosen to rely upon the CER for fabric filter efficiencies in GP 002.
SV 001, SV 008, SV 011	Title I limits to avoid major source classification for 40 CFR §52.21 Minn. R. 7011.1005	Limits on PM, PM_{10}, $PM_{2.5}$ and requirement to vent all emissions to fabric filters. Minnesota performance standard for bulk agricultural commodities, limits opacity.
SV 026, SV 027	Title I limits to avoid major source classification for 40 CFR §52.21	Limit on VOC, requirement to vent all emissions to scrubber, and additive feed rate limit.
EU 026; EU 027	Title I limits to avoid major source classification for 40 CFR §52.21 Minn. R. 7011.2300 40 CFR pt. 60, subp. IIII 40 CFR pt. 63, subp. ZZZZ	Limits on fuel and operating hours Limits on opacity and SO_2. PM, CO, NMHC+NO_X limits. Satisfied by complying with 40 CFR pt. 60, subp. IIII
EU 028; EU 029	Title I limits to avoid major source classification for 40 CFR §52.21 40 CFR pt. 60, subp. Dc Minn. R. 7011.0515	Limits on CO and NO_X. Recordkeeping for fuel use. Limits on PM and opacity.

EU 050	Title I limits to avoid major source classification for 40 CFR §52.21 Minn. R. 7011.0610	Requirement to vent emissions to CE 030 Minnesota Standards of Performance for Fossil Fuel Burning Direct Heating Equipment. PM and opacity limit.
EU 050	Title I limits to avoid major source classification for 40 CFR §52.21	Requirement to vent emissions to CE 030
CE 026	Title I limits to avoid major source classification for 40 CFR §52.21	Requirements to operate and maintain flare to achieve an overall control efficiency greater than 98% for VOC.
CE 030	Title I limits to avoid major source classification for 40 CFR §52.21	Limits on PM, NO_X, VOC, and CO. Requirements to operate and maintain flare to achieve an overall control efficiency greater than 95% for VOC.
FS 004	Minn. R. 7009.0020	Requirements on fugitive dust emissions from vehicle traffic, ensuring compliance with Minnesota Ambient Air Quality Standards.
FS 005	40 CFR pt. 60, subp. VV	Requirements on best management practices, regarding equipment leaks.
FS 006	Minn. R. 7007.0800	Wetcake storage time limitation.

*Where the requirement appears in the permit (e.g., EU, SV, GP, etc.).

3. Technical Information

3.1 Calculations of Potential to Emit and Emissions Increase Analysis

Attachment 1 to this TSD contains Form GI-07, which summarizes the PTE of the Facility, and Attachment 2 contains detailed spreadsheets and supporting information prepared by the MPCA and the Permittee.

Table 6. Total Facility Limited Potential Emissions Increase Summary

	PM tpy	**PM_{10}** tpy	**$PM_{2.5}$** tpy	**SO_2** tpy	**NO_X** tpy	**CO** tpy	**CO_2e** tpy	**VOC** tpy	**Single HAP** tpy	**All HAP** tpy
Pre-Modification	83.9	68.2	NR[A]	13.7	94.7	94.6	NR[A]	95.0	9.0	12.4
Post-Modification	75.9	63.4	61.6	13.6	95.0	94.6	145,730	95.0	6.0[B]	9.6[B]
Mod. Change	-8.0	-4.8	NR[A]	0.1	0.3	0.0	NR[A]	0.0	NR[A,B]	NR[A,B]

[A] Not reported

[B] The potential emissions of single and all HAP did not change with this modification other than updating emission factors. The limits of 9.0 tpy and 24.0 tpy were removed with permit action 002 but were still incorrectly referenced as the single HAP limited PTE. The true limited PTE is 6.0 tpy of single HAP and 9.6 tpy of all HAP based on the facility's permitted operating conditions and the emission factor derived from performance testing.

3.2 Dispersion Modeling

The total facility limited potential emissions for PM and PM_{10} decreased through this permit amendment; therefore, the Permittee did not trigger the requirement to remodel.

The facility initially submitted modeling with the permit amendment application prior to determining that remodeling was not required. The modeling was completed per MCPA guidance which at the time allowed for the use of paired sums. MPCA modeling policy has since changed, and the MPCA no longer accepts the paired sums method of calculating background concentrations. Because the facility is not required to model and because the modeling conducted by the facility will not be used to support changes made through this permit amendment, the MPCA did not require the facility to resubmit the modeling using a method other than paired sums.

3.3 Periodic Monitoring

In accordance with the Clean Air Act, it is the responsibility of the owner or operator of a facility to have sufficient knowledge of the facility to certify that the facility is in compliance with all applicable requirements.

In evaluating the monitoring included in the permit, the MPCA considered the following:

- The likelihood of the facility violating the applicable requirements;
- Whether add-on controls are necessary to meet the emission limits;
- The variability of emissions over time;
- The type of monitoring, process, maintenance, or control equipment data already available for the emission unit;
- The technical and economic feasibility of possible periodic monitoring methods; and
- The kind of monitoring found on similar units elsewhere.

Table 7 summarizes the periodic monitoring requirements for those emission units for which the monitoring required by the applicable requirement is nonexistent or inadequate.

Table 7. Periodic Monitoring

Level*	Requirement (basis)	Additional Monitoring	Discussion
FC	Production limit *(limit to avoid NSR and NESHAP)*	Daily record of production and monthly calculations of ethanol production.	Based on a flow meter of 200-proof ethanol transferred to the storage tanks.
GP001	Storage tanks with a fixed roof and an internal floating roof (*NSPS Subpart Kb*)	None.	NSPS includes inspections, records, and notification provisions.

Level*	Requirement (basis)	Additional Monitoring	Discussion
GP002 *(CE 001 CE 008 CE 011)*	Control Efficiencies: PM $\geq$ 99% $PM_{10} \geq$ 93 % $PM_{2.5} \geq$ 93 % (*limit to avoid NSR, Minn. R. 7011.0070-0080*)	Fabric Filter monitoring for visible emissions Pressure drop monitoring O & M and corrective actions	Absence of visible emissions is an indicator of normal operation of the fabric filter and compliance with the efficiencies. Permittee is relying on the Control Equipment Rule for fabric filter.
SV001	PM / $PM_{10} \leq$ 1.38 lb/hr *(limits to avoid NSR)*	Vent all emissions through a fabric filter. (see GP 002)	See GP 002.
SV008	PM / $PM_{10} \leq$ 0.51 lb/hr *(limits to avoid NSR)*		
SV011	PM / $PM_{10} \leq$ 0.16 lb/hr *(limits to avoid NSR)*		
SV026	VOC $\leq$ 11.28 lb/hr *(limit to avoid NSR and NESHAP)*	Daily record of pressure drop and water flow rate. Performance Test for VOC emissions every 5 years.	
SV027	VOC $\leq$ 1.74 lb/hr *(limit to avoid NSR and NESHAP)*		
EU 026	Opacity $\leq$ 20 % $SO_2 \leq$ 0.5 lb/MMBtu *(Minn. R. 7011.2300)* Op. hours $\leq$ 500/yr *(limit to avoid NSR)* PM $\leq$ 0.40 g/hp-hr NMHC+NOX $\leq$ 7.8 g/hp-hr CO $\leq$ 2.6 g/hp-hr (*NSPS Subpart IIII and NESHAP Subpart ZZZZ*)	Records of fuel type used. Hour meter	Ensures the restriction on fuel use (diesel fuel oil), which guarantees meeting this limit, and fuel supplier certification is required.
EU 027	Opacity $\leq$ 20 % $SO_2 \leq$ 0.5 lb/MMBtu *(Minn. R. 7011.2300)* Op. hours $\leq$ 250/yr *(limit to avoid NSR)* PM $\leq$ 0.40 g/hp-hr NMHC+NOX $\leq$ 7.8 g/hphr CO $\leq$ 2.6 g/hp-hr (*NSPS Subpart IIII and NESHAP Subpart ZZZZ*)	Records of fuel type used. Hour meter	Ensures the restriction on fuel use (diesel fuel oil), which guarantees meeting this limit, and fuel supplier certification is required.

Level*	Requirement (basis)	Additional Monitoring	Discussion
EU028 EU029	$NO_x \leq 4.62$ lb/hr CO ≤ 4.16 lb/hr *(limit to avoid NSR)* PM ≤ 0.03 lb/MMBtu Opacity < 20 % *(Minn. R. 7011.0515)*	Performance test for NO_X and CO every 5 years.	The PTE of PM for these boilers is calculated to be 0.007 lb/MMBtu each.
CE 026	Control Efficiency: VOC ≥ 98% *(limit to avoid NSR and NESHAP)*	Records of any startup, shutdown or malfunction.	
CE030	PM ≤ 5.15 lb/hr $PM_{10} \leq 5.15$ lb/hr $NO_x \leq 11.32$ lb/hr VOC ≤ 1.11 lb/hr CO ≤ 12.91 lb/hr *(limit to avoid NSR and NESHAP)*	Continuous temperature records with daily verification. Performance test for PM, PM_{10}, NO_X, CO and VOC every 5 years.	
FS004	$PM_{10} \leq 150 \mu g/m^3$ 24-hour period $PM_{10} \leq 50 \mu g/m^3$ annually *(Minn. R. 7009.0020)*	Road pavement and dust accumulation inspections, corrective actions, and records. Speed limits.	To ensure modeled compliance with 24-hour and annual NAAQS and MAAQS.
FS005	*(NSPS Subpart VV)*	None	Subpart VV has periodic monitoring to ensure minimization of VOC emissions from leaks.

*Where the requirement appears in the permit (e.g., EU, SV, GP, etc.).

3.4 Insignificant Activities

Green Plains Otter Tail has several operations which are classified as insignificant activities under the MPCA's permitting rules. These are listed in Appendix A to the permit. The permit is required to include periodic monitoring for all emissions units, including insignificant activities, per EPA guidance. The insignificant activities at this Facility are only subject to general applicable requirements. Using the criteria outlined earlier in this TSD, the insignificant activities listed in Appendix A also have justification why no additional periodic monitoring is necessary. See Attachment 2 of this TSD for PTE information for the insignificant activities.

3.5 Permit Organization

In general, the permit meets the MPCA Delta Guidance for ordering and grouping of requirements. One area where this permit deviates slightly from Delta guidance is in the use of appendices. While appendices are fully enforceable parts of the permit, in general, any requirement that the MPCA thinks should be electronically tracked (e.g., limits, submittals, etc.), should be in Table A or B of the permit. The main reason is that the appendices are word processing sections and are not part of the electronic

tracking system. Violation of the appendices can be enforced, but the computer system will not automatically generate the necessary enforcement notices or documents. Staff must generate these.

3.6 Comments Received

Public Notice Period: <start date> - <end date>
EPA 45-day Review Period: <start date> - <end date>

Comments were <not> received from the public during the public notice period. <The comments received did <not> include adverse comments on any applicable requirements of the permit. Changes to the permit were <not> made as a result of the comments. *Provide summary of changes.* >

<The revised permit was sent to EPA for their 45-day review on <date>.> Comments were <not> received from EPA during their review period. Changes to the permit were <not> made as a result of the comments. *Provide summary of changes.* >

4. Permit Fee Assessment

This permit action is the issuance of an individual Part 70 permit based on an application received June 12, 2012. Even though the Permittee previously held a state operating, this action is not considered a reissuance of an individual state or Part 70 operating permit; therefore, the application fees apply under Minn. R. 7002.0019. Attachment 4 to this TSD contains the MPCA's assessment of Application and Additional Points used to determine the permit application fee for this permit action as required by Minn. R. 7002.0019. The permit action includes review of refined modeling and one NESHAP for which additional points apply.

5. Conclusion

Based on the information provided by Green Plains Otter Tail, LLC, the MPCA has reasonable assurance that the proposed operation of the emission facility, as described in the Air Emission Permit No. 11100077-004 and this TSD, will not cause or contribute to a violation of applicable federal regulations and Minnesota Rules.

Staff Members on Permit Team: Adriane Lenshek (permit writer/engineer)
Rachel Studanski (enforcement)
Curt Stock (stack testing)
Scott Whitney (peer reviewer)

AQ File No. 4297; DQ 3940, 3663, 3427, 3753

Attachments:
1. GI-07 – Facility Emissions Summary
2. PTE Summary and Emissions Increase Calculation Spreadsheets
3. Facility Description and CD-01 Forms
4. Additional Point Assessment

Attachment 1
GI-07 – Facility Emissions Summary

		PM				PM10			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001	0.85	3.71	3.71	3.71	0.19	0.83	0.83	0.83
FS	002	0.59	0.35	0.35	0.35	0.14	0.08	0.08	0.08
FS	003	0.24	1.05	1.05	1.05	0.06	0.25	0.25	0.25
FS	004	0.86	3.77	3.77	3.77	0.17	0.75	0.75	0.75
FS	005								
FS	006								
FS	007	0.03	0.13	0.13	0.13	0.01	0.04	0.04	0.04
TK	001								
TK	002								
TK	003								
TK	004								
TK	005								
TK	006								
TK	007								
SV	001	3.17	13.89	1389.00	13.89	3.17	13.89	198.43	13.89
SV	008	2.04	8.94	894.00	8.94	2.04	8.94	127.71	8.94
SV	011	0.41	1.80	180.00	1.80	0.41	1.80	25.71	1.80
SV	012	0.83	3.65	14.60	3.65	0.58	2.55	10.20	2.55
SV	013	0.83	3.65	14.60	3.65	0.58	2.55	10.20	2.55
SV	014	0.83	3.65	14.60	3.65	0.58	2.55	10.20	2.55
SV	020	0.07	0.31	0.31	0.02	0.07	0.31	0.31	0.02
SV	022	0.67	2.93	2.93	2.93	0.67	2.93	2.93	2.93
SV	023	0.67	2.93	2.93	2.93	0.67	2.93	2.93	2.93
SV	025	0.00	0.01	0.03	0.01	0.00	0.01	0.03	0.01
SV	026								
SV	027								
SV	028	5.15	22.57	59.39	22.57	5.15	22.57	59.39	22.57
SV	034	0.04	1.81	1.81	0.05	0.04	1.81	1.81	0.05
SV	036	0.13	0.57	0.57	0.57	0.03	0.14	0.14	0.14
SV	037	0.13	0.57	0.57	0.57	0.03	0.14	0.14	0.14
SV	038	0.13	0.57	0.57	0.57	0.03	0.14	0.14	0.14
SV	039	0.13	0.57	0.57	0.57	0.03	0.14	0.14	0.14
SV	040	0.13	0.57	0.57	0.57	0.03	0.14	0.14	0.14
FC									
			Unrestricted		Limited		Unrestricted		Limited
			78.0		75.9		65.5		63.4

		PM2.5				NOx			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001	0.03	0.14	0.14	0.14				
FS	002	0.14	0.08	0.08	0.08				
FS	003	0.06	0.25	0.25	0.25				
FS	004	0.04	0.19	0.19	0.19				
FS	005								
FS	006								
FS	007	0.002	0.01	0.01	0.01				
TK	001								
TK	002								
TK	003								
TK	004								
TK	005								
TK	006								
TK	007								
SV	001	3.17	13.89	198.43	13.89				
SV	008	2.04	8.94	127.71	8.94				
SV	011	0.41	1.80	25.71	1.80				
SV	012	0.58	2.55	10.20	2.55				
SV	013	0.58	2.55	10.20	2.55				
SV	014	0.58	2.55	10.20	2.55				
SV	020	0.07	0.31	0.31	0.02	5.18	22.7	22.70	1.30
SV	022	0.67	2.93	2.93	2.93	4.62	20.24	40.48	20.24
SV	023	0.67	2.93	2.93	2.93	4.62	20.24	40.48	20.24
SV	025	0.00	0.01	0.03	0.01	0.6	0.57	0.57	0.57
SV	026								
SV	027								
SV	028	5.15	22.57	59.39	22.57	11.32	49.58	49.58	49.58
SV	034	0.04	1.81	1.81	0.05	24.1	105.72	105.72	3.02
SV	036	0.01	0.02	0.02	0.02				
SV	037	0.01	0.02	0.02	0.02				
SV	038	0.01	0.02	0.02	0.02				
SV	039	0.01	0.02	0.02	0.02				
SV	040	0.01	0.02	0.02	0.02				
FC									
			Unrestricted		Limited		Unrestricted		Limited
			63.6		61.6		219.1		95.0

		VOC				CO			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001								
FS	002								
FS	003								
FS	004								
FS	005	1.92	8.43	8.43	8.43				
FS	006								
FS	007								
TK	001	0.04	0.16	0.16	0.16				
TK	002	0.04	0.16	0.16	0.16				
TK	003	0.16	0.69	0.69	0.69				
TK	004	0.04	0.15	0.15	0.15				
TK	005	0.04	0.15	0.15	0.15				
TK	006	0.01	0.04	0.04	0.04				
TK	007	0.10	0.46	0.46	0.46				
SV	001								
SV	008								
SV	011								
SV	012								
SV	013								
SV	014								
SV	020	0.09	0.4	0.40	0.02	0.48	2.09	2.09	0.12
SV	022	0.48	2.12	2.12	2.12	4.16	18.21	18.21	18.21
SV	023	0.48	2.12	2.12	2.12	4.16	18.21	18.21	18.21
SV	025	5.51	5.24	262.00	5.24	1.41	1.34	67.00	1.34
SV	026	11.28	49.41	2470.50	49.41				
SV	027	4.75	20.81	1040.50	20.81				
SV	028	1.11	4.86	162.00	4.86	12.91	56.55	1885.00	56.55
SV	034	1.16	5.09	5.09	0.15	1.61	7.06	7.06	0.201
SV	036								
SV	037								
SV	038								
SV	039								
SV	040								
FC									
			Unrestricted		Limited		Unrestricted		Limited
			100.3		95.0		103.5		94.6

		SO2				CO2			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001								
FS	002								
FS	003								
FS	004								
FS	005								
FS	006								
FS	007								
TK	001								
TK	002								
TK	003								
TK	004								
TK	005								
TK	006								
TK	007								
SV	001								
SV	008								
SV	011								
SV	012								
SV	013								
SV	014								
SV	020	0.001	0.01		0	525.03	2,299		131.3
SV	022	0.05	0.23		0.23	10,800.40	47,306		47,306
SV	023	0.05	0.23		0.23	10,800.40	47,306		47,306
SV	025					2.38	10.44		10.44
SV	026								
SV	027								
SV	028	3	13.14		13.14	11,548.50	50,583		50,583
SV	034	0.02	0.09		0	1,939.53	8,495		242.4
SV	036								
SV	037								
SV	038								
SV	039								
SV	040								
FC									
			Unrestricted		Limited		Unrestricted		Limited
			13.7		13.6		155,999		145,579

		CH4				N20			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001								
FS	002								
FS	003								
FS	004								
FS	005								
FS	006								
FS	007								
TK	001								
TK	002								
TK	003								
TK	004								
TK	005								
TK	006								
TK	007								
SV	001								
SV	008								
SV	011								
SV	012								
SV	013								
SV	014								
SV	020	0.02	0.45		0.01	0.00	0.02		0.00
SV	022	0.20	0.89		0.89	0.02	0.10		0.10
SV	023	0.20	0.89		0.89	0.02	0.10		0.10
SV	025	0.00	0.00		0.00	0.00	0.00		0.00
SV	026								
SV	027								
SV	028	0.20	0.08		0.95	0.02	0.10		0.10
SV	034	0.08	0.34		0.00	0.02	0.08		0.00
SV	036								
SV	037								
SV	038								
SV	039								
SV	040								
FC									
			Unrestricted		Limited		Unrestricted		Limited
			2.7		2.7		0.4		0.3

		CO2e			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001				
FS	002				
FS	003				
FS	004				
FS	005				
FS	006				
FS	007				
TK	001				
TK	002				
TK	003				
TK	004				
TK	005				
TK	006				
TK	007				
SV	001				
SV	008				
SV	011				
SV	012				
SV	013				
SV	014				
SV	020	526.92	2,308		131.7
SV	022	10,811.60	47,355		47,355
SV	023	10,811.60	47,355		47,355
SV	025	2.39	10.45		10.45
SV	026				
SV	027				
SV	028	11,560	50,635		50,635
SV	034	1,946.51	8,525.00		243
SV	036				
SV	037				
SV	038				
SV	039				
SV	040				
FC					
			Unrestricted		Limited
			156,188		145,730

		Acetaldehyde				Total HAPs			
Emission Source Type	Emission Source ID No.	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy	Lbs per Hr	Controlled/ unlimited tpy	Uncont/ Unlimit tpy	Limited tpy
FS	001								
FS	002								
FS	003								
FS	004								
FS	005								
FS	006								
FS	007								
TK	001								
TK	002								
TK	003								
TK	004								
TK	005								
TK	006								
TK	007								
SV	001								
SV	008								
SV	011								
SV	012								
SV	013								
SV	014								
SV	020	0.002	0.001			0.02	0.091		
SV	022					0.17	0.73		
SV	023					0.17	0.73		
SV	025								
SV	026	0.21	0.93	46.50		0.41	1.78	89.00	
SV	027	0.68	2.98	149.00		0.79	3.47	173.50	
SV	028	0.48	2.1	70.00		0.64	2.8	93.33	
SV	034	0.01	0.04			0.08	0.336		
SV	036								
SV	037								
SV	038								
SV	039								
SV	040								
FC		2.05	9		9	5.47	24		24
			Unrestricted		Limited		Unrestricted		Limited
			6.1		9.0		33.9		24.0

Attachment 2
PTE Summary and Emissions Increase Calculation Spreadsheets

Green Plains Otter Tail, LLC
Limited Potential to Emit Emissions @ 65.0 million gallons ethanol production

Stack/	Control	Emission		Criteria Pollutants (Limited Emissions)							HAP Emissions		Greenhouse Gas Emissions
Vent	Eq.	Unit	Emission Sources Associated with	PM	PM10	PM2.5	SO2	NOx	VOC	CO	HAP (Single) Acetaldehyde	HAP (Total)	CO2e
ID	ID	ID	Ethanol Operations	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
---	---	EU001	Corn Dump Pit/Auger#1	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU002	Corn Conveyor#1	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU003	Corn Elevator#1	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU004	Corn Dump Pit/Auger#2 [FN1]	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU005	Corn Conveyor#2	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU006	Corn Elevator#2	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU007	Transfer Conveyor#1	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU056	Silo #3 Conveyer	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU061	Silo #4 Conveyer	CE001	CE001	CE001	---	---	---	---	---	---	---
---	---	EU064	Silo #5 Conveyer	CE001	CE001	CE001	---	---	---	---	---	---	---
SV001	CE001	---	Grain Receiving Baghouse	13.89	13.89	13.89	---	---	---	---	---	---	---
SV036	---	EU058	Corn Storage Silo #1	0.57	0.14	0.02	---	---	---	---	---	---	---
SV037	---	EU059	Corn Storage Silo #2	0.57	0.14	0.02	---	---	---	---	---	---	---
SV038	---	EU060	Corn Storage Silo #3	0.57	0.14	0.02	---	---	---	---	---	---	---
SV039	---	EU063	Corn Storage Silo #4	0.57	0.14	0.02	---	---	---	---	---	---	---
SV040	---	EU066	Corn Storage Silo #5	0.57	0.14	0.02	---	---	---	---	---	---	---
---	---	EU008	Scalper	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU009	Reclaim System	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU010	Grinder Surge Bin	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU011	Hammermill#1	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU012	Hammermill#2	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU055	Hammermill #3	CE008	CE008	CE008							
---	---	EU057	Silo #3 Reclaim	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU062	Silo #4 Reclaim	CE008	CE008	CE008	---	---	---	---	---	---	---
---	---	EU065	Silo #5 Reclaim	CE008	CE008	CE008	---	---	---	---	---	---	---
SV008	CE008	---	Hammermill Baghouse	8.94	8.94	8.94	---	---	---	---	---	---	---
---	---	EU013	DDGS Storage Reclaim	CE011	CE011	CE011	---	---	---	---	---	---	---
---	---	EU014	Bulkweigher	CE011	CE011	CE011							
---	---	EU015	DDGS Conveyor	CE011	CE011	CE011	---	---	---	---	---	---	---
---	---	EU016	DDGS Load Spout	CE011	CE011	CE011	---	---	---	---	---	---	---
SV011	CE011	---	DDGS Loadout Baghouse	1.80	1.80	1.80	---	---	---	---	---	---	---
SV012	CE012	EU017	Cooling Tower Cell#1	3.65	2.55	2.55	---	---	---	---	---	---	---
SV013	CE013	EU018	Cooling Tower Cell#2	3.65	2.55	2.55	---	---	---	---	---	---	---
SV014	CE014	EU019	Cooling Tower Cell#3	3.65	2.55	2.55	---	---	---	---	---	---	---
FS001			Grain Receiving Fug.	3.71	0.83	0.14	---	---	---	---	---	---	---
FS002			DDGS Loadout Fug.	0.35	0.08	0.08	---	---	---	---	---	---	---
FS003			DDGS Storage Fug.	1.05	0.25	0.25	---	---	---	---	---	---	---
FS004	CE020		Truck Traffic	3.77	0.75	0.19	---	---	---	---	---	---	---
SV020	CE021	EU026	Fire Pump (test only)(500 hours)	0.02	0.02	0.02	0.00	1.30	0.02	0.12	0.00	0.01	132
SV034	CE022	EU027	Emergency Generator (250hrs)	0.05	0.05	0.05	0.00	3.02	0.15	0.20	0.00	0.01	243
SV022	CE023	EU028	Boiler#1	2.93	2.93	2.93	0.23	20.24	2.12	18.21	---	0.73	47,355
SV023	CE024	EU029	Boiler#2	2.93	2.93	2.93	0.23	20.24	2.12	18.21	---	0.73	47,355
---	---	EU031	Ethanol Loadout	CE026	CE026	CE026	CE026	CE026	CE026	CE026	CE026	CE026	---
SV025	CE026	EU032	Loadout Flare	0.01	0.01	0.01	neg	0.57	5.24	1.34	---	---	10
---	---	EU033	Yeast Tank	---	---	---	---	---	CE027	---	CE027	CE027	---
---	---	EU034	Fermenter#1	---	---	---	---	---	CE027	---	CE027	CE027	---

Stack/	Control	Emission		Criteria Pollutants (Limited Emissions)							HAP Emissions		Greenhouse Gas Emissions
Vent	Eq.	Unit	Emission Sources Associated with	PM	PM10	PM2.5	SO2	NOx	VOC	CO	HAP (Single) Acetaldehyde	HAP (Total)	CO2e
ID	ID	ID	Ethanol Operations	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
---	---	EU035	Fermenter#2	---	---	---	---	---	CE027	---	CE027	CE027	---
---	---	EU036	Fermenter#3	---	---	---	---	---	CE027	---	CE027	CE027	---
---	---	EU037	Fermenter#4	---	---	---	---	---	CE027	---	CE027	CE027	---
---	---	EU038	Beerwell	---	---	---	---	---	CE027	---	CE027	CE027	---
SV026	CE027	---	CO2 Scrubber	---	---	---	---	---	49.41	---	0.93	1.78	---
---	---	EU039	Liquefaction Tank	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU040	Beer Stripper	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU041	Side Stripper	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU042	Rectifier	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU043	Molecular Sieve	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU044	Evaporator	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU045	Centrifuge#1	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU046	Centrifuge#2	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU047	Centrifuge#3	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU048	Centrifuge#4	---	---	---	---	---	CE028	---	CE028	CE028	---
---	---	EU049	Centrate Tank	---	---	---	---	---	CE028	---	CE028	CE028	---
SV027	CE028	---	Vent Gas Scrubber	---	---	---	---	---	20.81	---	2.98	3.47	---
---	CE029	EU050	DDGS Dryer	CE030	CE030	CE030	---	---	CE030	CE030	CE030	CE030	CE030
---	---	EU051	DDGS Cooler	CE030	CE030	CE030	---	---	CE030	CE030	CE030	CE030	---
SV028	CE030	EU052	RTO	22.57	22.57	22.57	13.14	49.58	4.86	56.55	2.10	2.80	50,635
FS005	CE031	---	Equipment Leaks	---	---	---	---	---	8.43	---	---	---	---
FS006	CE032	---	Wetcake (AOS)	---	---	---	---	---	(FN3)	---	(FN3)	---	---
---	---	TK006	Corn Syrup Retention Tank	---	---	---	---	---	0.04	---	---	---	---
		TK007	Corn Oil Tank	---	---	---	---	---	0.46	---	---	---	---
FS007	---	---	Temporary Flat Storage	0.13	0.04	0.01	---	---	---	---	---	---	---
SV029	CE033	TK001	200 Proof Tank	---	---	---	---	---	0.16	---	neg	neg	---
SV030	CE034	TK002	200 Proof Tank	---	---	---	---	---	0.16	---	neg	neg	---
SV031	CE035	TK003	Denaturant Storage Tank	---	---	---	---	---	0.69	---	neg	0.0131	---
SV032	CE036	TK004	Denatured Ethanol Tank#1	---	---	---	---	---	0.15	---	neg	0.0007	---
SV033	CE037	TK005	Denatured Ethanol Tank#2	---	---	---	---	---	0.15	---	neg	0.0007	---
			TOTALS	75.9	63.5	61.6	13.6	94.9	95.0	94.6	6.0	9.5	145,730
			Total Facility Emission Originally Permitted	83.9	68.2	65.0	13.7	94.7	95.0	94.6	9.0	12.4	0
			Emission Change due to the Modification	-7.97	-4.72	-3.40	-0.09	0.24	-0.03	0.03	-2.99	-2.86	145,730

(FN1) Corn Dump Pit #2 has two openings (one for truck and one for rail) grain may be removed from only one opening at a time due the physical limitations of the conveyor. There are less emissions associated with rail receiving than with truck receiving therefore the potential emissions remain based on truck receiving only.

(FN3) FS006 Wetcake (AOS) is an alternate operating scenario that is not worst case for emissions therefore does not contribute to facility Potential to Emit.

EU030 Dedicated fleet loadout has been removed from the PTE because the facility's control systems will not allow loadout without use of the flare.

Green Plains Otter Tail, LLC
Combustion GHG Emissions

Emission Calculation Method

Fuel Usage based on maximum burner capacity/brake specific fuel consumption and annual operating hours (500 hr for fire pump, 250 hr for generator and 8,760 hr for other equipment).

Emission factors are derived from 40 CFR 98 Subpart C, Tables C-1 and C-2 (EF kg/MMBtu * 2.2046 lb/kg = EF lb/MMBtu) (for natural gas and distillate fuel oil #2)

GHG Emissions (lbs) = Fuel Usage (MMBtu) x Emission Factor (lb/MMBtu)

Fire pump and emergency generator capacities are calculated based on average brake-specific fuwl consumption of 7,000 btu/hp-hr (AP-42 Section 3.3, 10/1996).

GWP's are 40 CFR 98 Subpart A, Table A-1 and are as follows:

CO2	1
CH4	21
N2O	310

Emission Unit ID	Description	Burner Capacity MMBtu/hr	Fuel Usage		Emission Factors (lb/MMBtu)			GHG emissions (lbs)			CO2e GHG emissions (lbs)		
			Fuel Type	Annual Use (MMBtu)	CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
EU026	Fire Pump (test only 500hrs)	3.22	diesel	1,610	163.05222	0.00661	0.00144	262,514	10.65	2.32	262,514	224	720
EU027	Emergency Generator (250hrs)	11.90	diesel	2,975	162.98608	0.00661	0.00144	484,884	19.68	4.29	484,884	413	1,331
EU028	Boiler#1	92.4	natural gas	809,424	116.88789	0.00220	0.00024	94,611,865	1,784.46	194.63	94,611,865	37,474	60,337
EU029	Boiler#2	92.4	natural gas	809,424	116.88789	0.00220	0.00024	94,611,865	1,784.46	194.63	94,611,865	37,474	60,337
EU050	Dryer	90	natural gas	788,400	116.88789	0.00220	0.00024	92,154,414	1,738.11	189.58	92,154,414	36,500	58,769
EU052	RTO	8.80	natural gas	77,088	116.88789	0.00220	0.00024	9,010,654	169.95	18.54	9,010,654	3,569	5,746
EU032	Loadout Flare	0.0204	natural gas	179	116.88789	0.00220	0.00024	20,888	0.39	0.04	20,888	8	13
								Combustion Emission (lbs/yr CO_2e)			291,157,084	115,661	187,253
								Combustion Emission (tons/yr CO_2e)			145,579	58	94
								Total Combustion CO_2e (tons/yr)			145,730		

Emission Unit ID	Description	Burner Capacity MMBtu/hr	Maximum Operating Hours	GHG emissions (lbs/hr)			GHG emissions (tons)			CO2e GHG emissions (lb/hr)			CO2e GHG emissions (tons)		
				CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
EU026	Fire Pump (test only 500hrs)	3.22	500	525.03	0.02	0.00	131.3	0.01	0.00	525.03	0.45	1.44	131.3	0	0
EU027	Emergency Generator (250hrs)	11.90	250	1,939.53	0.08	0.02	242.4	0.01	0.00	1,939.53	1.65	5.32	242.4	0	1
EU028	Boiler#1	92.4	8,760	10,800.44	0.20	0.02	47,306	0.89	0.10	10,800.44	4.28	6.89	47,306	19	30
EU029	Boiler#2	92.4	8,760	10,800.44	0.20	0.02	47,306	0.89	0.10	10,800.44	4.28	6.89	47,306	19	30
EU050	Dryer	90	8,760	10,519.91	0.20	0.02	46,077	0.87	0.09	10,519.91	4.17	6.71	46,077	18	29
EU052	RTO	8.80	8,760	1,028.61	0.02	0.00	4,505	0.08	0.01	1,028.61	0.41	0.66	4,505	2	3
EU032	Loadout Flare	0.0204	8,760	2.38	0.00	0.00	10.44	0.0002	0.00	2.38	0.00	0.00	10.44	0	0
				Combustion Emission (tons/yr)			145,579	2.75	0.30	Combustion Emission (tons/yr CO_2e)			145,579	58	94

Annual Production Throughputs for Green Plains Otter Tail, LLC

Undenatured ethanol throughput:	65	MMgal/yr
Denaturant throughput:	3.421	MMgal/yr
(assuming 5% denaturant by volume)		
Denatured ethanol throughput:	68.42	MMgal/yr
Corn Processed	24.3	MMBu/yr
	679,104	tpy
	77.52	tons/hr
(assuming 2.68 gal EtOH per bushel of corn, 56 lbs/Bu)		
DDGS Produced:	212,220	tpy (dry mass)
	24.23	tons/hr
(assuming 17.5 lb DDGS/Bu Corn processed)		
Max Wetcake Produced	212,220	tpy (dry mass)
	663,188	tpy (wet, 32% solids)
(wetcake is 32% solids)	75.71	tons per hour (av) (wet 32% solids)
Corn Oil Produced	3	gpm
	1,576,800	gallons/year
Corn Oil Produced	67	gpm
	35,215,200	gallons/year

Green Plains Otter Tail, LLC
Grain Handling Point Source Emissions

Emission Calculation Method

Controlled Emissions (short term) = Air Flow Rate (dscfm) x Outlet Concentration (gr/dscfm) x 60 min/hr x 1lb/7,000gr = lb/hr
Controlled Emissions (long term) = Average Short Term emissions (lb/hr) x 4.38 tpy/(lb/hr) = tpy

Limited Potential to Emit Emissions

Stack/Vent Unit ID	Emission Source	Air Flow Rate DSCFM	Outlet Concentration gr/dscf	Controlled PM / PM10 / PM2.5 Emissions (lb/hr)	Controlled PM / PM10 / PM2.5 Emissions (tpy)
SV001	Grain Receiving Baghouse	37,000	0.010	3.17	13.89
SV008	Hammermill Baghouse	23,800	0.010	2.04	8.94
SV011	DDGS Loadout Baghouse	4,800	0.010	0.41	1.80

All PM size fractions are assumed to be equal (to be conservative) because size data is not available.

Green Plains Otter Tail, LLC
Grain Receiving, Cleaning, and Hammermilling Emission Calculations

Assumptions

- *Only grain for ethanol operations is processed through cleaning and hammermilling equipment.*
- *The facility is capable of filling only one bin at a time.*
- *All grain is corn which has the highest Dustiness Ratio for the AP-42 emission factors.*
- *Each grain bin will handle 1/5 of the facility's grain throughput.*
- *The maximum grain receiving throughput is limited by equipment capacity of 15,000 bushels/hour (420 tons/hour).*
- *The maximum (short term) DDGS loadout throughput is limited by equipment capacity of 180 tons/hour.*
- *The annual grain receiving throughput is based on amount of grain necessary to meet ethanol production capacity.*

Process Data

Total Grain Receiving Throughput:	679,104	ton/yr	=	77.5 ton/hr
Short Term Grain Receiving Throughput (facility maximum based on equipment capacity)	420	ton/hr		
DDGS Handling (facility maximum):	180	ton/hr		
Control Effcienceny of Baghouse	99%			

Emission Calculation Method

Uncontrolled Potential Emissions = Throughput (ton/hr) · Emission Factor (lb/ton) · 8,760 hr/yr · 1 ton/2000 lb

PM Emissions from Grain Receiving, Cleaning, and Hammermilling

Emission Unit ID	Emission Source	Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM Emissions (lb/hr)	Uncontrolled PM Emissions (tpy)	Capture Efficiency	Control Equipment Efficiency	Controlled PM Emissions (tpy)	Controlled PM Emissions (lb/hr)
EU001	Corn Dump Pit/Auger#1	420.0	0.035	14.70	64.39	100%	99%	0.64	0.15
EU002	Corn Conveyor#1	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU003	Corn Elevator#1	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU004	Corn Dump Pit/Auger#2 [2]	420.0	0.035	14.70	64.39	100%	99%	0.64	0.15
EU005	Corn Conveyor#2	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU006	Corn Elevator#2	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU007	Transfer Conveyor#1	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU056	Silo #3 Conveyer	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU061	Silo #4 Conveyer	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
EU064	Silo #5 Conveyer	420.0	0.061	25.62	112.22	100%	99%	1.12	0.26
SV001	**Grain Receiving Baghouse**			**234.36**	**1026.50**			**10.26**	**2.34**
EU008	Scalper [3]	77.5	1.500	116.28	509.33	100%	99%	5.09	1.16
EU009	Reclaim System	77.5	0.061	4.73	20.71	100%	90%	0.01	0.00
EU010	Grinder Surge Bin	77.5	0.250	19.38	84.89	100%	99%	0.85	0.19
EU011	Hammermill#1 [3]	77.5	1.200	93.03	407.46	100%	99%	4.07	0.93
EU012	Hammermill#2 [3]	77.5	1.200	93.03	407.46	100%	99%	4.07	0.93
EU055	Hammermill #3 [3]	77.5	1.200	93.03	407.46	100%	99%	4.07	0.93
EU057	Silo #3 Reclaim	77.5	0.061	4.73	20.71	100%	99%	0.21	0.05
EU062	Silo #4 Reclaim	77.5	0.061	4.73	20.71	100%	99%	0.21	0.05
EU065	Silo #5 Reclaim	77.5	0.061	4.73	20.71	100%	99%	0.21	0.05
SV088	**Grain Receiving Baghouse**			**433.67**	**1899.45**			**18.79**	**4.29**
EU013	DDGS Storage Reclaim	180.0	0.035	6.30	27.59	100%	99%	0.28	0.06
EU014	Bulkweigher	180.0	0.061	10.98	48.09	100%	99%	0.48	0.11
EU015	DDGS Conveyor	180.0	0.061	10.98	48.09	100%	99%	0.48	0.11
EU016	Truck Load Spout	180.0	0.086	15.48	67.80	100%	99%	0.68	0.15
SV011	**DDGS Loadout Baghouse**		**0.243**	**43.74**	**191.58**			**1.92**	**0.44**

1. Emission factors taken from AP-42 Section 9.9.1, 6/98.

2. Corn Dump Pit #2 has two openings (one for truck and one for rail) grain may be removed from only one opening at a time due the physical limitations of the conveyor. There are less emissions associated with rail receiving than with truck receiving therefore the potential emissions remain based on truck receiving only.

3. The scalper and hammermilling emission factor are for controlled systems. The uncontrolled factor is back-calculated based on the cyclone and baghouse control efficiencies.

Green Plains Otter Tail, LLC
Grain Receiving, Cleaning, and Hammermilling Emission Calculations (continued)

PM_{10} Emissions from Grain Receiving, Cleaning, and Hammermilling

Emission Unit ID	Emission Source	Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM10 Emissions		Capture Efficiency	Control Equipment Efficiency	Controlled PM10 Emissions	
				(lb/hr)	(tpy)			(tpy)	(lb/hr)
EU001	Corn Dump Pit/Auger#1	420.0	0.0078	3.28	14.35	100%	93%	1.00	0.23
EU002	Corn Conveyor#1	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU003	Corn Elevator#1	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU004	Corn Dump Pit/Auger#2 [2]	420.0	0.0078	3.28	14.35	100%	93%	1.00	0.23
EU005	Corn Conveyor#2	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU006	Corn Elevator#2	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU007	Transfer Conveyor#1	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU056	Silo #3 Conveyer	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU061	Silo #4 Conveyer	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
EU064	Silo #5 Conveyer	420.0	0.034	14.28	62.55	100%	93%	4.38	1.00
SV001	**Grain Receiving Baghouse**			**120.79**	**529.07**			**37.03**	**8.46**
EU008	Scalper [3]	77.5	0.750	58.14	254.66	100%	93%	17.83	4.07
EU009	Reclaim System	77.5	0.034	2.64	11.54	100%	93%	0.00	0.00
EU010	Grinder Surge Bin	77.5	0.0063	0.49	2.14	100%	93%	0.15	0.03
EU011	Hammermill#1 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU012	Hammermill#2 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU055	Hammermill #3 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU057	Silo #3 Reclaim	77.5	0.034	2.64	11.54	100%	93%	0.81	0.18
EU062	Silo #4 Reclaim	77.5	0.034	2.64	11.54	100%	93%	0.81	0.18
EU065	Silo #5 Reclaim	77.5	0.034	2.64	11.54	100%	93%	0.81	0.18
SV088	**Grain Receiving Baghouse**			**208.72**	**914.18**			**63.19**	**14.43**
EU013	DDGS Storage Reclaim	180.0	0.0078	1.40	6.15	100%	93%	0.43	0.10
EU014	Bulkweigher	180.0	0.034	6.12	26.81	100%	93%	1.88	0.43
EU015	DDGS Conveyor	180.0	0.034	6.12	26.81	100%	93%	1.88	0.43
EU016	Truck Load Spout	180.0	0.029	5.22	22.86	100%	93%	1.60	0.37
SV011	**DDGS Loadout Baghouse**		**0.105**	**18.86**	**82.62**			**5.78**	**1.32**

1. Emission factors taken from AP-42 Section 9.9.1, 6/98.

2. Corn Dump Pit #2 has two openings (one for truck and one for rail) grain may be removed from only one opening at a time due the physical limitations of the conveyor. There are less emissions associated with rail receiving than with truck receiving therefore the potential emissions remain based on truck receiving only.

3. The scalper and hammermilling emission factor are for controlled systems. The uncontrolled factor is back-calculated based on the cyclone and baghouse control efficiencies.

Green Plains Otter Tail, LLC
Grain Receiving, Cleaning, and Hammermilling Emission Calculations (continued)

$PM_{2.5}$ Emissions from Grain Receiving, Cleaning, and Hammermilling

Emission Unit ID	Emission Source	Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM2.5 Emissions		Capture Efficiency	Control Equipment Efficiency	Controlled PM2.5 Emissions	
				(lb/hr)	(tpy)			(tpy)	(lb/hr)
EU001	Corn Dump Pit/Auger#1	420.0	0.0013	0.55	2.39	100%	93%	0.17	0.04
EU002	Corn Conveyor#1	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU003	Corn Elevator#1	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU004	Corn Dump Pit/Auger#2 [2]	420.0	0.0013	0.55	2.39	100%	93%	0.17	0.04
EU005	Corn Conveyor#2	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU006	Corn Elevator#2	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU007	Transfer Conveyor#1	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU056	Silo #3 Conveyer	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU061	Silo #4 Conveyer	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
EU064	Silo #5 Conveyer	420.0	0.0058	2.44	10.67	100%	93%	0.75	0.17
SV001	**Grain Receiving Baghouse**			**20.58**	**90.14**			**6.31**	**1.44**
EU008	Scalper [3]	77.5	0.750	58.14	254.66	100%	93%	17.83	4.07
EU009	Reclaim System	77.5	0.0058	0.45	1.97	100%	93%	0.00	0.00
EU010	Grinder Surge Bin	77.5	0.0011	0.09	0.37	100%	93%	0.03	0.01
EU011	Hammermill#1 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU012	Hammermill#2 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU055	Hammermill #3 [3]	77.5	0.600	46.51	203.73	100%	93%	14.26	3.26
EU057	Silo #3 Reclaim	77.5	0.0058	0.45	1.97	100%	93%	0.14	0.03
EU062	Silo #4 Reclaim	77.5	0.0058	0.45	1.97	100%	93%	0.14	0.03
EU065	Silo #5 Reclaim	77.5	0.0058	0.45	1.97	100%	93%	0.14	0.03
SV088	**Grain Receiving Baghouse**			**199.57**	**874.11**			**61.05**	**13.94**
EU013	DDGS Storage Reclaim	180.0	0.0013	0.23	1.02	100%	93%	0.07	0.02
EU014	Bulkweigher	180.0	0.0058	1.04	4.57	100%	93%	0.32	0.07
EU015	DDGS Conveyor	180.0	0.0058	1.04	4.57	100%	93%	0.32	0.07
EU016	Truck Load Spout	180.0	0.005	0.88	3.86	100%	93%	0.27	0.06
SV011	**DDGS Loadout Baghouse**		**0.018**	**3.20**	**14.03**			**0.98**	**0.22**

1. Emission factors taken from AP-42 Section 9.9.1, 6/98.
2. Corn Dump Pit #2 has two openings (one for truck and one for rail) grain may be removed from only one opening at a time due the physical limitations of the conveyor. There are
3. The scalper and hammermilling emission factor are for controlled systems. The uncontrolled factor is back-calculated based on the cyclone and baghouse control efficiencies.

Original Permit Calculation is based on baghouse manufacturer guarantee outlet concentration and air flow rate from facility design company. This data is presented as a comparison with the AP-42 derived values and the most recent preformance tests of the sources.

Emission Calculation Method

Controlled Emissions (short term) = Air Flow Rate (dscfm) x Outlet Concentration (gr/dscfm) x 60 min/hr x 1lb/7,000gr = lb/hr
Controlled Emissions (long term) = Average Short Term emissions (lb/hr) x 4.38 tpy/(lb/hr) = tpy

Point Source Grain Handling Emissions

Stack/Vent Unit ID	Emission Source	Air Flow Rate	Outlet Concentration	Manufacturer Derived Controlled PM / PM10 / PM2.5 Emissions			AP-42 Derived Controlled PM / PM10 / PM2.5 Emissions		Test Data from 6/24-26/2008
		DSCFM	gr/dscf	(lb/hr)	Unlimited (tpy)	Limited (tpy)	(lb/hr)	(tpy)	(lb/hr)
SV001	Grain Receiving Baghouse	37,000	0.010	3.17	13.89	13.89	2.34	10.26	0.503
SV008	Hammermill Baghouse	23,800	0.010	2.04	8.94	8.94	4.29	18.79	0.116
SV011	DDGS Loadout Baghouse	4,800	0.010	0.41	1.80	1.80	0.44	1.92	0.039

All PM size fractions are assumed to be equal (to be conservative) because size data is not available.

Green Plains Otter Tail, LLC
Fugitive Dust Emissions

Assumptions

- *The maximum (short term) grain receiving throughput is limited by equipment capacity of 15,000 bushels/hour (420 tons/hour).*
- *The maximum (short term) DDGS loadout throughput is limited by equipment capacity of 180 tons/hour.*
- *Grain Receiving/DDGS Loadout operating hours will be 7:00 to 17:00 Monday through Friday and Saturdays during harvest season (September through November).*
- *The annual grain receiving throughput is based on amount of grain necessary to meet ethanol production capacity.*

All emission factors are from EPA's AP-42 guidance.			**Emission Factors**		
	Table	SCC Code or Description	PM (lb/ton)	PM10 (lb/ton)	PM2.5 (lb/ton)
Grain Receiving Fug. (Truck)	9.9.1-1	(SCC 3-02-007-41) --> (3-02-005-5	0.0350	0.0078	0.0013
Grain Receiving Fug. (Rail)	9.9.1-1	(SCC 3-02-007-41) --> (3-02-005-5	0.0320	0.0078	0.0013
DDGS Loadout Fug.	9.9.1-2	(SCC 3-02-008-03)	0.0033	0.0008	0.0008
DDGS Storage Fug.	9.9.1-2	(SCC 3-02-008-03) x 3 operations	0.0099	0.0024	0.0024

PM (Total)							
ID#	Description	Annual Average Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug. (Truck)	24.23	0.0350	0.848	0%	0.848	3.714
FS002	DDGS Loadout Fug.	24.23	0.0033	0.080	0%	0.080	0.350
FS003	DDGS Storage Fug.	24.23	0.0099	0.240	0%	0.240	1.050
ID#	Description	Short Term Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug. (Truck)	420.00	0.0350	14.700	0%	14.700	NA
FS002	DDGS Loadout Fug.	180.00	0.0033	0.594	0%	0.594	NA
FS003	DDGS Storage Fug.	24.23	0.0099	0.240	0%	0.240	NA

PM10 (less than 10 microns in diameter)

ID#	Description	Annual Average Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug.	24.23	0.0078	0.189	0%	0.189	0.828
FS002	DDGS Loadout Fug.	24.23	0.0008	0.019	0%	0.019	0.085
FS003	DDGS Storage Fug.	24.23	0.0024	0.058	0%	0.058	0.255

ID#	Description	Short Term Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug.	420.00	0.0078	3.276	0%	3.276	NA
FS002	DDGS Loadout Fug.	180.00	0.0008	0.144	0%	0.144	NA
FS003	DDGS Storage Fug.	24.23	0.0024	0.058	0%	0.058	NA

PM2.5 (less than 2.5 microns in diameter)

ID#	Description	Annual Average Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug.	24.23	0.0013	0.031	0%	0.031	0.138
FS002	DDGS Loadout Fug.	24.23	0.0008	0.019	0%	0.019	0.085
FS003	DDGS Storage Fug.	24.23	0.0024	0.058	0%	0.058	0.255

ID#	Description	Short Term Throughput	Emission Factor	Uncontrolled	Capture / Prevention Efficiency	Fugitive Emissions	Fugitive Emissions
		ton/hr	lb/ton	lb/hr	%	lb/hr	tpy
FS001	Grain Receiving Fug.	420.00	0.0013	0.546	0%	0.546	NA
FS002	DDGS Loadout Fug.	180.00	0.0008	0.144	0%	0.144	NA
FS003	DDGS Storage Fug.	24.23	0.0024	0.058	0%	0.058	NA

* Rail receiving emissions are less than those of truck receiving, therefore, PM fugitive emissions assume all grain receiving by truck (worse case) at Corn Dump Pit #2.

Green Plains Otter Tail, LLC
Proposed Grain Storage Emission Calculations

GPOT is proposing to construct an additional grain storage bin along side the 2 existing bins to be able to accept more grain during the harvest season. The proposed elevator would tie-in to the existing grain receiving and baghouse system and would consist of the addition of one elevator leg, a 576,255 bushel and two 629,750 bushel bins, and extension of the reclaim system. GPOT is not proposing any additional grain throughput, only additional storage capacity. Previous permitting had not accounted for these bin vents and are now being included as seperate emission units.

Assumptions

- *Only grain for ethanol operations is processed through cleaning and hammermilling equipment.*
- *The facility is capable of filling only one bin at a time.*
- *All grain is corn which has the highest Dustiness Ratio for the AP-42 emission factors.*
- *Each grain bin will handle 1/5 of the facility's grain throughput.*
- *The maximum grain receiving throughput is limited by equipment capacity of 15,000 bushels/hour (420 tons/hour).*
- *The annual grain receiving throughput is based on amount of grain necessary to meet ethanol production capacity.*

Process Data

Total Facility Grain Throughput (tons/year)	679,104
Proposed Grain Receiving Throughput (tons/year)	226,368
Proposed Grain Receiving Average Throughput (tons/hour)	78
Control Effcienceny of Baghouse	99%
Proposed Grain Recieving Short Term Maximum Throughput (tons/hour)	420

Emission Calculation Method

Uncontrolled Potential Emissions = anticipated throughput x applicable AP-42 emission factor
Controlled Potential Emissions = uncontrolled potential emissions x (100 - % control efficiency of baghouse)

Assumptions

· *grain handling emissions are based on air flow rate through the aspiration equipment and an estimates outlet PM concentration after control in a baghouse.*

PM Emissions from Additional Grain Elevator

Proposed Emission Unit ID	Emission Source	Throughput (ton/yr)	Average Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM Emissions		Controlled PM Emissions	
					(lb/hr)	(tpy)	(lb/hr)	(tpy)
EU056	Silo #3 Conveyer	226,368	26	0.061	1.58	6.90	0.02	0.07
EU057	Silo #3 Reclaim	226,368	26	0.061	1.58	6.90	0.02	0.07
	Corn Storage Silo 3 Equipment				3.15	13.81	0.03	0.14
EU061	Silo #4 Conveyer	226,368	26	0.061	1.58	6.90	0.02	0.07
EU062	Silo #4 Reclaim	226,368	26	0.061	1.58	6.90	0.02	0.07
	Corn Storage Silo 4 Equipment				3.15	13.81	0.03	0.14
EU064	Silo #5 Conveyer	226,368	26	0.061	1.58	6.90	0.02	0.07
EU065	Silo #5 Reclaim	226,368	26	0.061	1.58	6.90	0.02	0.07
	Corn Storage Silo 5 Equipment				3.15	13.81	0.03	0.14
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Average)	679,104	78	0.025	1.94	8.49	NA	NA
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Worst Case for modeling)	--	420	0.025	10.50	NA	NA	NA
	Individual Corn Storage Silos	226,368	26	0.025	0.65	2.83	NA	NA

1. Emission factors taken from AP-42 Section 9.9.1-1 & 9.9.1-2, 03/2003.

PM_{10} Emissions from Additional Grain Elevator

Proposed Emission Unit ID	Emission Source	Throughput (ton/yr)	Average Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM10 Emissions		Controlled PM10 Emissions	
					(lb/hr)	(tpy)	(lb/hr)	(tpy)
EU056	Silo #3 Conveyer	226,368	26	0.034	0.88	3.85	0.01	0.04
EU057	Silo #3 Reclaim	226,368	420	0.034	14.28	62.55	0.14	0.63
	Corn Storage Silo 3 Equipment				15.16	66.39	0.15	0.66
EU061	Silo #4 Conveyer	226,368	26	0.034	0.88	3.85	0.01	0.04
EU062	Silo #4 Reclaim	226,368	26	0.034	0.88	3.85	0.01	0.04
	Corn Storage Silo 4 Equipment				1.76	7.70	0.02	0.08
EU064	Silo #5 Conveyer	226,368	26	0.034	0.88	3.85	0.01	0.04
EU065	Silo #5 Reclaim	226,368	26	0.034	0.88	3.85	0.01	0.04
	Corn Storage Silo 5 Equipment				1.76	7.70	0.02	0.08
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Average)	679,104	78	0.0063	0.49	2.14	NA	NA
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Worst Case for modeling)	--	420	0.0063	2.65	11.59	NA	NA
	Individual Corn Storage Silos	226,368	26	0.0063	0.16	0.71	NA	NA

1. Emission factors taken from AP-42 Section 9.9.1-1 & 9.9.1-2, 03/2003.

$PM_{2.5}$ Emissions from Additional Grain Elevator

Emission Unit ID	Emission Source	Throughput (ton/yr)	Average Throughput (ton/hr)	AP-42[1] Emission Factor (lb/ton)	Uncontrolled PM2.5 Emissions		Controlled PM Emissions	
					(lb/hr)	(tpy)	(lb/hr)	(tpy)
EU056	Silo #3 Conveyer	226,368	26	0.006	0.15	0.66	0.00	0.01
EU057	Silo #3 Reclaim	226,368	26	0.006	0.15	0.66	0.00	0.01
	Corn Storage Silo 3 Equipment				0.30	1.31	0.00	0.01
EU061	Silo #4 Conveyer	226,368	26	0.034	0.88	3.85	0.01	0.04
EU062	Silo #4 Reclaim	226,368	26	0.034	0.88	3.85	0.01	0.04
	Corn Storage Silo 4 Equipment				1.76	7.70	0.02	0.08
EU064	Silo #5 Conveyer	226,368	26	0.034	0.88	3.85	0.01	0.04
EU065	Silo #5 Reclaim	226,368	26	0.034	0.88	3.85	0.01	0.04
	Corn Storage Silo 5 Equipment				1.76	7.70	0.02	0.08
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Average)	679,104	78	0.0011	0.09	0.37	NA	NA
EU058, EU059, EU060, EU063, & EU066	Bin Vents (Worst Case for modeling)	--	420	0.0011	0.46	2.02	NA	NA
	Individual Corn Storage Silos	226,368	26	0.0011	0.03	0.12	NA	NA

1. Emission factors taken from AP-42 Section 9.9.1-1 & 9.9.1-2, 03/2003.

		Air	Outlet	Controlled	
Stack/Vent		Flow	Concentration	PM / PM10 / PM2.5	
Unit	Emission	Rate		Emissions	
ID	Source	DSCFM	gr/dscf	(lb/hr)	(tpy)
SV001	Grain Receiving Baghouse	37,000	0.010	3.17	13.89
SV001	Proposed Corn Storage Silo 3-5 Equipment	NA	NA	0.02	0.07
SV001	June 24, 2008 Stack Test Results	36,935	0.002	0.50	2.20
SV001	Proposing No Change to Emission Rate	NA	NA	3.17	13.89
SV008	Hammermill Baghouse	23,800	0.010	2.04	8.94
SV008	June 24, 2008 Stack Test Results	NA	0.002	0.12	0.51
SV008	Proposed Corn Storage Silo 3-5 Equipment	NA	NA	0.02	0.07
SV008	Proposing No Change to Emission Rate	NA	NA	3.17	13.89

Based on the above calculations, the previous test results of the sources, and the natural removal of particulate matter due to prior grain handling and that the facility can only fill one bin at a time, GPOT is not requesting a change of emission rate and potential-to-emit for SV001 or SV008 at this time.

Green Plains Otter Tail, LLC
Corn Oil Tanks Emissions Estimates

	Capacity (gallons)	Flow (GPM)	Operating Temperature (deg. F)	Annual Working Loss (lb VOC)	Annual Breathing Loss (lb VOC)	Emission Rate (lb/hr VOC)	Emission Rate (TPY VOC)
Retention Tank	35,000	70	200	58,553.37*	0.00**	0.00	0.00
Retention Tank (TK006)	35,000	70	ambient	1,603.81*	82.04	0.01	0.04
De-Oiled Renention Tank	1,000	67	200	26,616.75*	0.00**	0.00	0.00
De-Oiled Renention Tank	1,000	67	ambient	1,326.8*	2.50	0.00	0.00
Corn Oil Tank (TK007)	15,000	3	140	913.07	0.00**	0.10	0.46
Corn Oil Tank	15,000	3	ambient	1.97	0.40	0.00	0.00
Total						0.11	0.50

* These tanks will be kept at a constant level the headspace of the tank will not routinely change, therefore working loss is not applicable and not included in the emission rate.

** The TANKS program does not allow breather vent settings other than zero on heated tanks (considered low pressure tanks), so no breathing emissions are estimated from heated tanks.

Green Plains Otter Tail, LLC
Temporary Flat Storage
FS007

Due to a lack of sutable emission factors for wind driven particluate emissions from outdoor grain storage piles, the emissions from the temporary flat storage area is derived from AP-42 Chapter 13.2.4 for aggregate handling and storage piles. This is likely an overestimation of emissions given the differences in moisture content of grain and aggregate.

Assumptions:

- Corn will be added to the pile to during the harvest season and removed as space becomes available in the grain bins

- Pile is at maximum capacity (1,000,000 bushels or 28,000 tons) after filling

-Maximum particulate emissions will occur during filling

-Pile will be filled in 70 hours (approximately 15,000 bu/hr)

- Pile will have a tarp cover in place year round, but no control is assumed for this calculation

$$E = k\,(0.0032)\,\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \qquad Equation\ 1$$

E = emission factor (lb/ton)
k = particle size multiplier
U = mean wind speed (mph)
M = material moisture content (%)

k =	1	for TSP
	0.35	for PM10
	0.053	for PM2.5
U =	12.2	mph (based on Fargo, ND data)
M =	4.8	%[1] (AP-42 Table 13.2.4-1)

[1] Actual material moisture content is typically 13-16%, but the maximum range of sources used to generate the equation was 4.8% and was used instead.

Emissions Activity	Throughput (tons)	Emission Factor (lb/ton)			Average Uncontrolled Emissions (lb/yr)		
		PM	PM10	PM2.5	PM	PM10	PM2.5
Truck to Elevator	28,000	0.0030	0.0010	0.0002	83.87	29.36	4.45
Elevator to Pile	28,000	0.0030	0.0010	0.0002	83.87	29.36	4.45
Pile to Truck	28,000	0.0030	0.0010	0.0002	83.87	29.36	4.45
Total lbs/year					251.62	88.07	13.34
Total tons/year					0.13	0.04	0.01
Annual Average Lbs/hr					0.029	0.010	0.002
"Worst Case" Filling Activities Lbs/hr					2.396	0.839	0.127
Unloading Activities lbs/hr					0.010	0.003	0.001

Green Plains Otter Tail, LLC
Cooling Tower Emissions
Potential to Emit Estimate

Circulating Flow Rate (gallons/minute)	Circulating Flow Rate (gallons/hour)	Total Drift (% circulating flow)	Total Drift (gal/hr)	Total Drift (lb/hr)	TDS Concentration (ppm)	**PM Emissions (lb/hr)**	**PM Emissions (ton/yr)**	**PM10/PM2.5 Emissions (lb/hr)**	**PM10/PM2.5 Emissions (ton/yr)**
40,000	2,400,000	0.005%	120	1000	2500.0	**2.50**	**10.95**	**1.75**	**7.66**
			SV012	EU017	Cooling Tower Cell#1	0.83	3.65	0.583	2.55
			SV013	EU018	Cooling Tower Cell#2	0.83	3.65	0.583	2.55
			SV014	EU019	Cooling Tower Cell#3	0.83	3.65	0.583	2.55

Peak circulating flow rate is calculated to be 33,000 gal/min. The PTE emission calculations have been based on 40,000 gal/min, chosen as a round conservative number greater than is expected to be seen at the facility in practice.
[a] PM10 / PM2.5 emissions are estimated to be 56% of total PM emissions, as presented in "Calculating realistic PM10 emissions from cooling towers," by Joel Reisman & Gordon Frisbie, Environmental Progress, Vol. 21, No. 2, Pg. 127-130, 2002 (Figure 1).
(http://www.energy.ca.gov/sitingcases/palomar/documents/applicants_files/Data_Request_Response/Air%20Quality/Attachment%204-1.pdf)

Green Plains Otter Tail, LLC
Fugitive Dust Emissions from Truck Traffic

E= (k x (sL)^0.91) x (W^1.02) x (1-P/4N) AP-42, Section 13.2.2-1

Factor	Description	PM Value	M10 Value	M2.5 Value
E =	Emission factor (lb/VMT, vehicle miles traveled)	0.20	0.04	0.01
k =	PM Particle size multiplier (lb/VMT)	0.0110	0.0022	0.0005
sL =	Road surface silt loading (g/m^2)	0.60	0.60	0.60
P =	Number of "wet" days during an averaging period	100.00	100.00	100
N =	Number of days in the averaging period	365.00	365.00	365
W =	Average vehicle weight (ton)	29.00	29.00	29.00

PM Emissions from Paved Roads

Activity	Quantity Transp per truck	No. of Trucks (truck/yr)	Miles Traveled per Truck miles/truck	Annual Mileage (VMT/yr)	unctrl PM Emissions (lb/yr)	unctrl PM Emissions (tpy)
Grain receiving	25 ton	27,164	0.850	23,090	4,611	2.31
DDGS haul out	25 ton	8,489	0.850	7,215	1,441	0.72
Ethanol haul out	8,000 gal	8,344	0.850	7,092	1,416	0.71
Denaturant delivery	8,000 gal	417	0.850	355	71	0.04
Total					**7,538**	**3.77**

PM10 Emissions from Paved Roads

Activity	Quantity Transp per truck	No. of Trucks (truck/yr)	Miles Traveled per Truck miles/truck	Annual Mileage (VMT/yr)	unctrl PM10 Emissions (lb/yr)	unctrl PM10 Emissions (tpy)
Grain receiving	25 ton	27,164	0.850	23,090	922	0.46
DDGS haul out	25 ton	8,489	0.850	7,215	288	0.14
Ethanol haul out	8,000 gal	8,344	0.850	7,092	283	0.14
Denaturant delivery	8,000 gal	417	0.850	355	14	0.01
Total					**1,508**	**0.75**

PM2.5 Emissions from Paved Roads

Activity	Quantity Transp per truck	No. of Trucks (truck/yr)	Miles Traveled per Truck miles/truck	Annual Mileage (VMT/yr)	unctrl PM2.5 Emissions (lb/yr)	unctrl PM2.5 Emissions (tpy)
Grain receiving	25 ton	27,164	0.850	23,090	226	0.11
DDGS haul out	25 ton	8,489	0.850	7,215	71	0.04
Ethanol haul out	8,000 gal	8,344	0.850	7,092	70	0.03
Denaturant delivery	8,000 gal	417	0.850	355	3	0.00
Total					**370**	**0.19**

Green Plains Otter Tail, LLC
Product Loadout Emissions

SV025 **CE026** **EU032** **Loadout Flare**

From Fifth Edition AP-42, Section 5.2:

$L = 12.46 \cdot S \cdot P \cdot M \div T$

where: L = Loading Loss, lb VOC/1000 gal of liquid loaded
S = Saturation Factor (AP-42 Table 5.2-1)
P = True Vapor Pressure of Liquid Loaded, psia
M = Molecular Weight of Vapors, lb/lb-mole
T = Temperature of Bulk Liquid Loaded, R

The values of P, T, and M are taken from the TANKS software which calculates the annual average bulk product temperature based on the annual average temperatures for the city of Fargo, ND, which is the nearest major city listed in the TANKS program. The PTE is based on loading the maximum volume of ethanol that can be distilled by the facility plus denaturant at a concentration of 5 % by volume.

		Monthly Throughput (1000 gal)	Vapor Saturation Factor S	Molecular Weight MW	Product Temperature T (deg R)	True Vapor Pressure P (psia)	Total Loading Loss (lb/1000 gal)	Total Uncontrolled Loss (lb/hr)	Uncontrolled Loss (ton/yr)	Total Control Efficiency (%)	Total Controlled Loss (lb/hr)	Controlled Loss (ton/yr)
Non-Dedicated	Gasoline (RVP10)	68,421	1	62	500.63	4.9619	7.6567	59.80	261.94	98%	1.20	5.24

SV025 CE026 EU032 Loadout Flare

Emissions from Loadout Flare

Emission factors are from a flare installed at a similar ethanol facility.
SO2 is negligible based on minimal H2S levels
PM/PM-10 is negligible based on smokeless design

Emission	NOx	1.67725E-05	lb/gal	Manufactuer
Factors	CO	3.92192E-05	lb/gal	Manufactuer
	PM	2.99E-07	lb/gal	Inferred assuming similar to Natural Gas Combustion
		Limited emissions		
Emissions	NOx	**0.57**	ton/yr	
	CO	**1.34**	ton/yr	
	PM	**0.010**	ton/yr	

Ethanol Loadout PTE		
	tpy	Basis
PM	0.010	Non-dedicated
NOx	0.57	Non-dedicated
CO	1.34	Non-dedicated
VOC	5.24	Non-dedicated

Green Plains Otter Tail, LLC
Fire Pump

SV020 CE021 EU026 Fire Pump (test only)(500 hours)

The facility has installed a 460 BHP fire pump that is emergency use only diesel engine to drive fire suppression water systems. The facility must only be allowed to test this unit. It has no other purpose at the facility. Emissions are estimated at 500 hours use per year per EPA guidance.

Source of factor		Emission Factor (g/hp-hr)	Engine Rating (BHP)	Emission Rate (lb/hr)	Unlimited Potential to Emit	Hrs per year	Limited Potential to Emit (tpy)
CLARKE	PM	7.00E-02	460	0.07	0.31	500	0.018
CLARKE	PM10	7.00E-02	460	7.10E-02	0.31	500	0.018
CLARKE	PM2.5	7.00E-02	460	7.10E-02	0.31	500	0.018
CLARKE	SO2	1.28E-03	460	1.29E-03	0.01	500	0.000
CLARKE	NOx	5.11E+00	460	5.18E+00	22.70	500	1.296
CLARKE	VOC	9.00E-02	460	9.13E-02	0.40	500	0.023
CLARKE	CO	4.70E-01	460	4.77E-01	2.09	500	0.119

* CLARKE fire protection products 3133 East Kemper Road, Cincinnati, OH 45241

Source of factor		Emission Factor (lb/MMBtu)	Fuel Consumption (MMBtu/hr)	Emission Rate (lb/hr)	Unlimited Potential to Emit	Hrs per year	Limited Potential to Emit (tpy)
AP-42	Benzene	9.33E-04	3.22	0.00	0.01	500	0.001
AP-42	Toluene	4.09E-04	3.22	0.00	0.01	500	0.000
AP-42	Xylenes	2.85E-04	3.22	0.00	0.00	500	0.000
AP-42	Propylene	2.58E-03	3.22	0.01	0.04	500	0.002
AP-42	1,3-Butadiene	3.91E-05	3.22	0.00	0.00	500	0.000
AP-42	Formaldehyde	1.18E-03	3.22	0.00	0.02	500	0.001
AP-42	Acetaldehyde	7.67E-04	3.22	0.00	0.01	500	0.001
AP-42	Acrolein	9.25E-05	3.22	0.00	0.00	500	0.000
AP-42	Total PAH	1.68E-04	3.22	0.00	0.00	500	0.000
Total HAPs				0.021	0.091	500	0.005

Green Plains Otter Tail, LLC
Emergency Generator (250hrs)

SV034 **CE022** **EU027** **Emergency Generator (250hrs)**

Source of factor		Emission Factor (g/hp-hr)	Engine Rating (BHP)	Emission Rate (lb/hr)	Unlimited Potential to Emit (tpy)	Hrs per year	Limited Potential to Emit (tpy)
Mitsubishi	PM	0.11	1700	4.12E-01	1.81	250	0.052
Mitsubishi	PM10	0.11	1700	4.12E-01	1.81	250	0.052
Mitsubishi	PM2.5	0.11	1700	4.12E-01	1.81	250	0.052
Mitsubishi	SO2	0.006	1700	2.06E-02	0.09	250	0.003
Mitsubishi	NOx	6.44	1700	2.41E+01	105.72	250	3.017
Mitsubishi	VOC	0.31	1700	1.16E+00	5.09	250	0.145
Mitsubishi	CO	0.43	1700	1.61E+00	7.06	250	0.201

Source of factor		Emission Factor (lb/MMBtu)	Fuel Consumption (MMBtu/hr)	Emission Rate (lb/hr)	Unlimited Potential to Emit	Hrs per year	Limited Potential to Emit (tpy)
AP-42	Benzene	9.33E-04	11.9	0.01	0.05	250	0.001
AP-42	Toluene	4.09E-04	11.9	0.00	0.02	250	0.001
AP-42	Xylenes	2.85E-04	11.9	0.00	0.01	250	0.000
AP-42	Propylene	2.58E-03	11.9	0.03	0.13	250	0.004
AP-42	1,3-Butadiene	3.91E-05	11.9	0.00	0.00	250	0.000
AP-42	Formaldehyde	1.18E-03	11.9	0.01	0.06	250	0.002
AP-42	Acetaldehyde	7.67E-04	11.9	0.01	0.04	250	0.001
AP-42	Acrolein	9.25E-05	11.9	0.00	0.00	250	0.000
AP-42	Total PAH	1.68E-04	11.9	0.00	0.01	250	0.000
Total HAPs				0.077	0.336	500	0.010

Green Plains Otter Tail, LLC
Boiler#1
Boiler#2

SV022 CE023 EU028 Boiler#1
Firing Capacity: 92.4 MMBtu/hr

Fuel Type: Natural Gas (propane back-up)
Heat Value: 1,050 BTU/cf
Fuel Burning Capacity: 8.80E-02 MMcf/hr
Annual Capacity Factor: 100.00%

Pollutant	Uncontrolled Emission Factor (lb/MMcf)	Pollution Control Efficiency (%)	Controlled Emission Factor (lb/MMcf)	Max. Controlled Emissions (lb/hr)	Max. Controlled Emissions (tons/yr)
PM	7.6	0.00%	7.6	0.67	2.93
PM10	7.6	0.00%	7.6	0.67	2.93
PM2.5	7.6	0.00%	7.6	0.67	2.93
SOx	0.6	0.00%	0.6	0.05	0.23
NOx	100.0	41.90%	0.05 lb/MMBtu	4.62	20.24
VOC	5.5	0.00%	5.5	0.48	2.12
CO	84.0	50.00%	0.045 lb/MMBtu	4.16	18.21

All emission factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 7/98 except NOx and CO which are vendor gurantees.

SV023 CE024 EU029 Boiler#2
Firing Capacity: 92.4 MMBtu/hr

Alternative #1 Fuel Type: Natural Gas (propane back-up)
Heat Value: 1,050 BTU/cf
Fuel Burning Capacity: 8.80E-02 MMcf/hr
Annual Capacity Factor: 100.00%

Pollutant	Uncontrolled Emission Factor (lb/MMcf)	Pollution Control Efficiency (%)	Controlled Emission Factor (lb/MMcf)	Max. Controlled Emissions (lb/hr)	Max. Controlled Emissions (tons/yr)
PM	7.6	0.00%	7.6	0.67	2.93
PM10	7.6	0.00%	7.6	0.67	2.93
PM2.5	7.6	0.00%	7.6	0.67	2.93
SOx	0.6	0.00%	0.6	0.05	0.23
NOx	100.0	41.90%	0.05 b/MMBtu	4.62	20.24
VOC	5.5	0.00%	5.5	0.48	2.12
CO	84.0	50.00%	0.045 lb/MMBtu	4.16	18.21

All emission factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 7/98 except NOx and CO which are vendor gurantees.

Projected Actual NOx and CO (Vendor Gurantee) (per boiler) @75% capacity

	Utilization	lb/MMBtu	lb/hr	tpy
NOx	75%	0.04	2.772	12.14136
CO	75%	0.037	2.5641	11.230758

Green Plains Otter Tail, LLC
Natural Gas HAP Emissions Boiler#1 and Boiler#2

SV022	CE023	EU028	Boiler#1
Firing Capacity	92.40	MMBtu/hr	
	1050	Btu/Scf	
	0.09	MMCf/hr	

HAP Emissions

Pollutant	Emission Factor* (lb/MMCf)	Potential to Emit Emissions (lb/hr)	Potential to Emit Emissions (ton/yr)
2-Methylnaphthalene	2.40E-05	2.1E-06	9.3E-06
3-Methylchloranthrene	1.80E-06	1.6E-07	6.9E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.4E-06	6.2E-06
Acenaphthene	1.80E-06	1.6E-07	6.9E-07
Acenaphthlyene	1.80E-06	1.6E-07	6.9E-07
Anthracene	2.40E-06	2.1E-07	9.3E-07
Benz(a)anthracene	1.80E-06	1.6E-07	6.9E-07
Benzene	2.10E-03	1.8E-04	8.1E-04
Benzo(a)pyrene	1.20E-06	1.1E-07	4.6E-07
Benzo(b)fluoranthene	1.80E-06	1.6E-07	6.9E-07
Benzo(g,h,i)perylene	1.20E-06	1.1E-07	4.6E-07
Benzo(k)fluoranthene	1.80E-06	1.6E-07	6.9E-07
Chrysene	1.80E-06	1.6E-07	6.9E-07
Dibenzo(a,h)anthracene	1.20E-06	1.1E-07	4.6E-07
Dichlorobenzene	1.20E-03	1.1E-04	4.6E-04
Fluoranthene	3.00E-06	2.6E-07	1.2E-06
Fluorene	2.80E-06	2.5E-07	1.1E-06
Formaldehyde	7.50E-02	6.6E-03	2.9E-02
Hexane	1.80E+00	1.6E-01	6.9E-01
Indeno(1,2,3-cd)pyrene	1.80E-06	1.6E-07	6.9E-07
Napthalene	6.10E-04	5.4E-05	2.4E-04
Phenanathrene	1.70E-05	1.5E-06	6.6E-06
Pyrene	5.00E-06	4.4E-07	1.9E-06
Toluene	3.40E-03	3.0E-04	1.3E-03
Arsenic	2.00E-04	1.8E-05	7.7E-05
beryllium	1.20E-05	1.1E-06	4.6E-06
cadmium	1.10E-03	9.7E-05	4.2E-04
chromium	1.40E-03	1.2E-04	5.4E-04
cobalt	8.40E-05	7.4E-06	3.2E-05
manganese	3.80E-04	3.3E-05	1.5E-04
mercury	2.60E-04	2.3E-05	1.0E-04
nickel	2.10E-03	1.8E-04	8.1E-04
selenium	2.40E-05	2.1E-06	9.3E-06
Total HAPs		**0.17**	**0.73**
Max Single (Hexane)		**0.16**	**0.69**
Contribution to Facility Max Single (Acetaldehyde)		**neg**	**neg**

Emission Factors are from AP-42, 5th Edition, Section 1.4-6, "External Combustion Sources," 7/98

HAP emissions are estimated for Natural Gas only. Natural Gas emissions are exempted from the MPCA Air Emission Risk Analysis (AERA) in section 2.3.2 of the AERA guidance document current as of March 2004.

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Natural Gas HAP Emissions Boiler#1 and Boiler#2

SV023	**CE024**	**EU029**	**Boiler#2**
Firing Capacity	**92.40**	**MMBtu/hr**	
	1050	**Btu/Scf**	
	0.09	**MMCf/hr**	

HAP Emissions

Pollutant	**Emission Factor* (lb/MMCf)**	**Potential to Emit Emissions (lb/hr)**	**(ton/yr)**
2-Methylnaphthalene	2.40E-05	2.1E-06	9.3E-06
3-Methylchloranthrene	1.80E-06	1.6E-07	6.9E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.4E-06	6.2E-06
Acenaphthene	1.80E-06	1.6E-07	6.9E-07
Acenaphthlyene	1.80E-06	1.6E-07	6.9E-07
Anthracene	2.40E-06	2.1E-07	9.3E-07
Benz(a)anthracene	1.80E-06	1.6E-07	6.9E-07
Benzene	2.10E-03	1.8E-04	8.1E-04
Benzo(a)pyrene	1.20E-06	1.1E-07	4.6E-07
Benzo(b)fluoranthene	1.80E-06	1.6E-07	6.9E-07
Benzo(g,h,i)perylene	1.20E-06	1.1E-07	4.6E-07
Benzo(k)fluoranthene	1.80E-06	1.6E-07	6.9E-07
Chrysene	1.80E-06	1.6E-07	6.9E-07
Dibenzo(a,h)anthracene	1.20E-06	1.1E-07	4.6E-07
Dichlorobenzene	1.20E-03	1.1E-04	4.6E-04
Fluoranthene	3.00E-06	2.6E-07	1.2E-06
Fluorene	2.80E-06	2.5E-07	1.1E-06
Formaldehyde	7.50E-02	6.6E-03	2.9E-02
Hexane	1.80E+00	1.6E-01	6.9E-01
Indeno(1,2,3-cd)pyrene	1.80E-06	1.6E-07	6.9E-07
Napthalene	6.10E-04	5.4E-05	2.4E-04
Phenanathrene	1.70E-05	1.5E-06	6.6E-06
Pyrene	5.00E-06	4.4E-07	1.9E-06
Toluene	3.40E-03	3.0E-04	1.3E-03
Arsenic	2.00E-04	1.8E-05	7.7E-05
beryllium	1.20E-05	1.1E-06	4.6E-06
cadmium	1.10E-03	9.7E-05	4.2E-04
chromium	1.40E-03	1.2E-04	5.4E-04
cobalt	8.40E-05	7.4E-06	3.2E-05
manganese	3.80E-04	3.3E-05	1.5E-04
mercury	2.60E-04	2.3E-05	1.0E-04
nickel	2.10E-03	1.8E-04	8.1E-04
selenium	2.40E-05	2.1E-06	9.3E-06
Total HAPs		**0.17**	**0.73**
Max Single (Hexane)		**0.16**	**0.69**
Contribution to Facility Max Single (Acetaldehyde)		**neg**	**neg**

Emission Factors are from AP-42, 5th Edition, Section 1.4-6, "External Combustion Sources," 7/98

HAP emissions are estimated for Natural Gas only. Natural Gas emissions are exempted from the MPCA Air Emission Risk Analysis (AERA) in section 2.3.2 of the AERA guidance document current as of March 2004.

Green Plains Otter Tail, LLC
Regenerative Thermal Oxidizer Emissions

SV028	**CE030**	**EU052**	**RTO**
Permitted (-003) Limits	**lb/hr**	**TPY**	
PM/PM10/PM2.5	5.15	22.56	
NOx	11.32	49.58	
VOC	1.11	4.86	
CO	12.91	56.55	
SO2	3.00	13.14	

Initial Permitting Support Data

TO Inlet (uncontrolled) Concentration Supporting Data

	Average	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
Carbon Monoxide (CO) (ppm,d)	243.26	254.58	4	571.13	< zero	---	0
VOC as Carbon (ppm,d)	1803.67	555.50	16	2161.39	1445.95	715.44	2
[dscfm/(ton DDGS/hr)]	2469.71	1624.59	13	3630.32	1309.09	2321.23	1

TO Outlet (controlled) Emissions Supporting Data

	Average (ppm,d)	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
Particulate Matter (PM) (gr/dscf)	0.00902	0.00688	14	0.01376	0.00429	0.00947	0
Nitrogen Oxides (NOx) (ppm,d)	38.47367	11.17310	10	47.57470	29.37263	18.20207	0
Carbon Monoxide (CO) (ppm,d)	73.63	19.02	14	86.72	60.53	26.19	0
VOC as Carbon (ppm,d)	29.67	27.71	13	49.47	9.87	39.59	3
Ethanol (ppm,d)	1.67	2.41	8	3.87	< zero	---	0
Ethyl Acetate (ppm,d)	0.10	0.06	4	0.10	0.03	0.07	0
Formaldehyde (ppm,d)	0.64	0.56	8	1.16	0.13	1.03	0
Methanol (ppm,d)	0.40	0.31	8	0.69	0.12	0.57	0
Acetaldehyde (ppm,d)	0.85	0.39	7	1.23	0.48	0.76	2
Acetic Acid (ppm,d)	2.42	1.91	8	2.42	0.67	1.74	1
Acrolein (ND) (ppm,d)	0.13	0.07	8	0.19	0.06	0.13	0
2-Furaldehyde (ppm,d)	0.06	0.02	6	0.08	0.04	0.04	0
Lactic Acid (ND) (ppm,d)	0.74	0.25	7	0.99	0.50	0.49	0
Formic Acid (ND) (ppm,d)	2.23	0.90	5	3.27	1.19	2.08	0
Iso-amyl Alcohol (ppm,d)	0.05	0.04	3	0.05	< zero	---	0
Mw/Cw ratio	2.18	0.18	8	2.34	2.02	0.32	0
%reduction	98.35%	---	---	99.54%	96.58%	2.96%	0

DRYER Uncontrolled Potential Emissions

DDGS mass rate 24.23 tph
[dscfm / (ton DDGS/hr)] 2469.71

TOTAL Flow Rate Based on DDGS 59,831 dscfm

TOTAL Flow **59,831 dscfm**

"Uncontrolled Potential Emissions"

Mw/Cw ratio 2.34 mass VOC/mass Carbon
Statistical Confidence Interval AVERAGE

	Uncontrolled Estimate (ppm,d)	MW	lb/hr	tpy
Carbon Monoxide	243.2625	28	63.45	277.93
VOC (as Carbon)	1803.67	12	201.64	883.17
VOC, (scaled as VOC)	---	---	472.19	**2068.18**

Green Plains Otter Tail, LLC
Regenerative Thermal Oxidizer Emissions

DDGS Dryer Controlled Emissions (w/RTO)			
Dryer Burner Capacity	90	MMBtu/hr	
RTO Burner Capacity	8.8	MMBtu/hr	(normal operation is expected to be 8.8 MMBtu/hr
Total Firing Capacity of System	98.80	MMBtu/hr	
F-Factor Nat. Gas	8,710	dscf/MMBtu	
Oxygen at Stack	10.00%	% O2	
Excess Air Factor	1.9174		
TOTAL Flow	**27,501**	**dscfm**	

Mw/Cw ratio	2.18	mass VOC/mass Carbon
Data Basis	VeraSun Aurora Performance	

	Projected Actuals Estimate (ppm,d)	**MW**	**lb/hr**	**tpy**	**Emission Factor (lb/MMBtu)**	**% Conservative compared to Proj Actual**
Particulate Matter (PM) (gr/dscf)	**0.00902**	**NA**	**2.12735**	**9.32**	**0.022**	**0.0%**
Nitrogen Oxides (NOx) (ppm,d)	**29.67**	**46.0055**	6.39	**27.99**	**0.065**	**0.0%**
Sulfur Dioxide (SO2) (ppm,d)	**5**	**64.0588**	1.50	**6.57**	**0.015**	**0.0%**
Carbon Monoxide (CO) (ppm,d)	**73.63**	**28.0104**	9.65	**42.28**	**0.098**	**0.0%**
VOC (as Carbon) **(1)**	29.67	12.00	1.52	6.68		
VOC, (scaled as VOC)	**---**	**---**	**3.32**	**14.56**		
					HAP?	**has IHB?**
Ethanol	1.67	46.07	0.33	1.45		yes
Ethyl Acetate	0.10	88.00	0.04	0.17		yes
Formaldehyde	0.64	**33.03**	**0.09**	**0.40**	**yes**	**yes**
Methanol	0.40	**32.04**	**0.055**	**0.242**	**yes**	**yes**
Acetaldehyde	0.85	**44.05**	**0.16**	**0.71**	**yes**	**yes**
Acetic Acid	2.42	60.05	0.62	2.72		yes
Acrolein (ND)	0.10	**56.06**	**0.024**	**0.105**	**yes**	**yes**
2-Furaldehyde	0.06	96.09	0.025	0.108		yes
Lactic Acid (ND)	0.74	90.08	0.29	1.26		yes
Formic Acid (ND)	2.23	46.03	0.44	1.92		yes
Iso-amyl Alcohol	0.05	88.15	0.02	0.08		yes
Speciated Total	9.27		2.09	9.16		

"Projected Actual" Emissions

Green Plains Otter Tail, LLC
Regenerative Thermal Oxidizer Emissions

DDGS Dryer Controlled Emissions (w/RTO)		
Dryer Burner Capacity	90	MMBtu/hr
RTO Burner Capacity	18	MMBtu/hr
Total Firing Capacity of System	108.00	MMBtu/hr
F-Factor Nat. Gas	8,710	dscf/MMBtu
Oxygen at Stack	10.00%	% O2
Excess Air Factor	1.9174	
TOTAL Flow	**30,061**	**dscfm**
VOC Mw/Cw ratio	2.34	mass VOC/mass Carbon

	Potential to Emit Estimate	**MW**	**lb/hr**	**tpy**	**Emission Factor (lb/MMBtu)**	**% Conservative compared to Proj Actual**
Particulate Matter (PM) (gr/dscf)	**0.020**	**NA**	**5.15**	**22.57**	**0.048**	**142.2%**
Nitrogen Oxides (Nox) (ppm,d)	**52.5**	**46.0055**	**11.32**	**49.56**	**0.105**	**77.1%**
Sulfur Dioxide (SO2) (ppm,d)	**10.0**	**64.0588**	**3.00**	**13.13**	**0.028**	**100.0%**
Carbon Monoxide (CO) (ppm,d)	**98.4**	**28.0104**	**12.91**	**56.54**	**0.120**	**33.7%**
VOC (as Carbon)	**12.00**	12.00	0.67	2.95		44.21%
VOC, (scaled as VOC)	**---**	**---**	**1.11**	**4.86**		33.40%
					HAP?	**has IHB?**
Ethanol	3.87	46.07	0.83	3.66		yes
Ethyl Acetate	0.10	88.00	0.04	**0.19**		yes
Formaldehyde	1.16	**33.03**	0.18	**0.78**	**yes**	**yes**
Methanol	0.69	**32.04**	0.10	**0.45**	**yes**	**yes**
Acetaldehyde	2.77	**44.05**	0.57	**2.50**	**yes**	**yes**
Acetic Acid	2.42	60.05	0.68	2.98		yes
Acrolein	0.10	**56.06**	0.026	**0.115**	**yes**	**yes**
2-Furaldehyde	0.08	96.09	0.036	0.16		yes
Lactic Acid (ND)	0.99	90.08	0.42	1.83		yes
Formic Acid (ND)	3.27	46.03	0.70	3.08		yes
Iso-amyl Alcohol	0.05	88.15	0.02	0.09		yes
Speciated Total	15.49		3.61	15.83		

"Potential to Emit" Emissions

VOC and Acetaldehyde emissions have been set based on stack test data from the source.

PM, NOx, and CO estimates have all been arbitrarily increased above the high-end data in the dataset to increase facility limited PTE to regulatory thresholds.

Acrolein is consistently non-detect at 0.20 ppm at this source. The distribution in the dataset is created only by varying detection limits between tests. There is significant uncertainty about whether acrolein is present at this source at all, so the emission projection is 0.10 ppm on the basis of expectation of non-detect at 0.20 ppm.

Green Plains Otter Tail, LLC
CO2 Scrubber Emissions

SV026 **CE027** **---** **CO2 Scrubber**

Permitted VOC Limit (-003)	11.28	lb/hr
Limited Potential Emissions	49.41	ton/yr
Required Control Efficiency	95%	
Uncontrolled Emissions	225.60	lb/hr
	988.13	ton/yr

Initial Permitting Support Data

CO2 Scrubber Inlet (uncontrolled) Concentration Supporting Data

CO2 Scrubber Inlet (uncontrolled) Concentration Supporting Data

	Average	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
VOC as Carbon (ppm,d)	25,861	8,202	6	34,486	17,237	17,249	0

CO2 Scrubber (controlled) Emissions Supporting Data

	Average (ppm,d)	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
VOC as Carbon (ppm,d)	**103.73**	37.33	7	**140.08**	**67.39**	72.68	3
Ethanol (ppm,d)	**5.60**	5.26	7	**10.72**	**0.48**	NA	3
Ethyl Acetate (ppm,d)	**7.83**	4.31	5	**12.79**	**2.86**	9.93	2
Formaldehyde (ppm,d)	**0.24**	0.16	10	**0.37**	**0.11**	0.26	0
Methanol (ppm,d)	**0.24**	0.17	9	**0.38**	**0.09**	0.29	0
Acetaldehyde (ppm,d)	**9.87**	11.42	8	**20.27**	**< zero**	---	2
Acetic Acid (ppm,d)	**2.81**	3.88	10	**5.96**	**< zero**	NA	0
Acrolein (ND) (ppm,d)	**0.08**	0.03	10	**0.10**	**0.06**	0.04	0
2-Furaldehyde (ppm,d)	**0.07**	0.04	6	**0.11**	**0.03**	0.08	0
Lactic Acid (ND) (ppm,d)	**0.54**	0.18	8	**0.71**	**0.38**	0.33	0
Formic Acid (ND) (ppm,d)	**1.86**	0.60	4	**2.62**	**1.09**	1.54	0
Iso-amyl Alcohol (ppm,d)	**2.49**	2.87	3	**6.76**	**< zero**	---	0
Mw/Cw ratio	**1.98**	0.19	10	**2.13**	**1.83**	0.30	0
(dscfm / MMGal/yr EtOH)	**108.24**	23.17	7	**130.80**	**85.68**	45.12	1
%reduction	**99.60%**	---	---	**99.80%**	**99.19%**	0.62%	NA

CO2 Scrubber Uncontrolled Potential Emissions

gallons of EtOH produced	65.0	MMGal/yr
Noncondensible factor	108.24	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	7,036	dscfm
Mw/Cw ratio	1.98	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	AVERAGE	

	Uncontrolled Estimate (ppm,d)	MW	lb/hr	tpy
VOC (as Carbon)	25861.10	12	339.97	1489.07
VOC, (scaled as VOC)	---	---	672.14	**2943.96**

"Uncontrolled Potential" Calculations

Green Plains Otter Tail, LLC
CO2 Scrubber Emissions

CO2 Scrubber Projected Actual Emissions

gallons of EtOH produced	65.0	MMGal/yr
Noncondensible factor	108.24	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	7,036	dscfm
Mw/Cw ratio	1.98	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	AVERAGE	

	Projected Actuals Estimate (ppm,d)	MW	lb/hr	tpy	HAP?	Has IHB?
VOC (as Carbon)	103.73	12.00	1.36	5.97		
VOC, (scaled as VOC)	---	---	**2.70**	**11.81**		
Ethanol	5.60	46.07	0.28	1.24		yes
Ethyl Acetate	7.83	88.00	0.755	3.305		yes
Formaldehyde	**0.24**	**33.03**	**0.0086**	**0.0376**	**yes**	**yes**
Methanol (non-detect)	**0.24**	**32.04**	**0.0083**	**0.0364**	**yes**	**yes**
Acetaldehyde	**9.87**	**44.05**	**0.477**	**2.087**	**yes**	**yes**
Acetic Acid	2.81	60.05	0.18	0.81		yes
Acrolein (non-detect)	**0.08**	**56.06**	**0.0051**	**0.0222**	**yes**	**yes**
2-Furaldehyde (non-detect)	0.07	96.09	0.0072	0.0314		yes
Lactic Acid (non-detect)	0.54	90.08	0.05	0.24		yes
Formic Acid (non-detect)	1.86	46.03	0.09	0.41		yes
Iso-amyl Alcohol	2.49	88.15	0.24	1.05		yes
Speciated Total	31.62		2.12	9.26		

"Projected Actuals" Calculations

CO2 Scrubber Controlled Potential to Emit Emissions

gallons of EtOH produced	65.0	MMGal/yr
Noncondensible factor	130.80	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	8,502	dscfm
Mw/Cw ratio	2.1289	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	99%	

	Potential to Emit Estimate (ppm,d)	MW	lb/hr	tpy	HAP?	has IHB?
VOC (as Carbon)	320.00	12.00	5.08	22.27		
VOC, (scaled as VOC)	---	---	**11.28**	**49.41**		
Ethanol	10.72	46.07	0.65	2.86		yes
Ethyl Acetate	12.79	88.00	1.49	6.53		yes
Formaldehyde	**0.37**	**33.03**	**0.016**	**0.070**	**yes**	**yes**
Methanol	**0.38**	**32.04**	**0.016**	**0.071**	**yes**	**yes**
Acetaldehyde	**24.27**	**44.05**	**1.416**	**6.200**	**yes**	**yes**
Acetic Acid	5.96	60.05	0.474	2.076		yes
Acrolein (ND)	**0.10**	**56.06**	**0.0074**	**0.03251**	**yes**	**yes**
2-Furaldehyde	0.11	96.09	0.014	0.061		yes
Lactic Acid (ND)	0.71	90.08	0.08	0.37		yes
Formic Acid (ND)	2.62	46.03	0.16	0.70		yes
Iso-amyl Alcohol	6.76	88.15	0.79	3.46		yes
Speciated Total	64.79		5.12	22.43		

"Potential to Emit (PTE)" Calculations

VOC and Acetaldehyde estimates have been scaled up add additional conservatism based on stack test results.

Acrolein is consistently non-detect at 0.20 ppm at this source. There is significant uncertainty about whether acrolein is present at this source at all, so the emission projection is 0.10 ppm on the basis of expectation of non-detect at 0.20 ppm.

Green Plains Otter Tail, LLC
Vent Gas Scrubber Emissions (aka "Distillation" Scrubber)

SV027 **CE028** **---** **Vent Gas Scrubber**

Permitted VOC Limit (-003) 1.74 lb/hr
7.62 ton/yr

Based on stack test results the facility is proposing increasing the vent gas scrubber emission rate to the following:

Proposed VOC Limit 4.75 lb/hr
20.81 ton/yr

Required Control Efficiency 95%
Uncontrolled Emissions 95.00 lb/hr
416.10 ton/yr

Initial Permitting Support Data

Distillation Scrubber Inlet (uncontrolled) Concentration Supporting Data

	Average	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
VOC as Carbon (ppm,d)	**19766**	14423	3	**41215.43**	**< zero**	41,215	**2**

Distillation Scrubber (controlled) Emissions Supporting Data

	Average	Std. Dev	n	99% Confidence (high) Value	99% Confidence (low) Value	RANGE BETWEEN CONFIDENCE VALUES	Number of Rejected Values
VOC as VOC (ppm,d)	25.97	2.26	3	29.33	22.61	6.73	0
VOC as Carbon (ppm,d)	311.48	191.70	6	513.07	109.90	403.17	1
Ethanol (ppm,d)	15.92	9.70	3	30.35	1.49	28.86	0
Ethyl Acetate (ppm,d)	0.97	1.27	2	3.29	< zero	---	0
Formaldehyde (ppm,d)	0.38	0.36	3	0.92	< zero	---	0
Methanol (ppm,d)	0.33	0.14	3	0.54	0.12	0.42	0
Acetaldehyde (ppm,d)	5.23	7.20	3	15.95	< zero	---	0
Acetic Acid (ppm,d)	1.79	1.08	3	3.39	0.18	3.21	0
Acrolein (ND) (ppm,d)	0.08	na	1	0.08	na	---	0
2-Furaldehyde (ppm,d)	0.15	0.19	3	0.42	< zero	---	0
Lactic Acid (ND) (ppm,d)	1.41	1.29	2	3.75	< zero	---	0
Formic Acid (ND) (ppm,d)	1.66	NA	1	NA	NA	NA	0
Iso-amyl Alcohol (ppm,d)	---	---	0	---	---	---	0
Mw/Cw ratio	1.94	0.09	3	2.07	1.82	0.26	0
(dscfm / MMGal/yr EtOH)	5.86	3.11	7	8.89	2.84	6.05	0
%reduction	98.42%	---	---	99.73%	97.40%	2.33%	NA

Green Plains Otter Tail, LLC
Vent Gas Scrubber Emissions (aka "Distillation" Scrubber)

Distillation Scrubber Uncontrolled Potential Emissions

gallons of EtOH produced	65.00	MMGal/yr
Noncondensible factor	5.86	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	381	dscfm
Mw/Cw ratio	1.94	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	AVERAGE	

	Uncontrolled Estimate (ppm,d)	MW	lb/hr	tpy
VOC (as Carbon)	19766.11	12	14.07	61.64
VOC, (scaled as VOC)	---	---	27.37	**119.87**

"Uncontrolled Potential" Calculations

Distillation Scrubber Projected Actual Emissions

gallons of EtOH produced	65.00	MMGal/yr
Noncondensible factor	5.86	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	381	dscfm
Mw/Cw ratio	1.94	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	AVERAGE	

	Projected Actuals Estimate (ppm,d)	**MW**	**lb/hr**	**tpy**	**HAP?**	**has IHB?**
VOC (as Carbon)	311.48	12.00	0.22	0.97		
VOC, (scaled as VOC)	**---**	**---**	**0.43**	**1.89**		
Ethanol	15.92	46.07	0.0435	0.1906		yes
Ethyl Acetate	0.97	88.00	0.0051	0.0222		yes
Formaldehyde	0.38	33.03	**0.0008**	**0.0033**	yes	yes
Methanol	0.33	32.04	**0.0006**	**0.0028**	yes	yes
Acetaldehyde	5.23	44.05	**0.0137**	**0.0599**	yes	yes
Acetic Acid	1.79	60.05	0.01	0.03		yes
Acrolein (ND)	0.08	56.06	**0.0003**	**0.00119**	yes	yes
2-Furaldehyde	0.15	96.09	**0.0008**	**0.0036**		yes
Lactic Acid (ND)	1.41	90.08	0.0075	0.0331		yes
Formic Acid (ND)	1.66	46.03	0.0045	0.0198		yes
Iso-amyl Alcohol	---	88.15	---	---		yes
Speciated Total	27.93		0.08	0.36		

"Projected Actuals" Calculations

Green Plains Otter Tail, LLC
Vent Gas Scrubber Emissions (aka "Distillation" Scrubber)

Distillation Scrubber Potential to Emit Emissions

gallons of EtOH produced	65.0	MMGal/yr
Noncondensible factor	8.89	(dscfm / MMGal/yr EtOH)
Volume non-condensible gas	578	dscfm
Mw/Cw ratio	2.07	mass VOC/mass Carbon
Statistical Confidence Interval Above Data	99%	

	Potential to Emit Estimate (ppm,d)	MW	lb/hr	tpy	HAP?	has IHB?
VOC (as Carbon)	700.00	12.00	0.76	3.31		
VOC, (scaled as VOC)	**---**	**---**	**1.74**	**7.62**		
Ethanol	30.35	46.07	0.13	0.55		yes
Ethyl Acetate	**3.29**	**88.00**	**0.0261**	**0.1141**		**yes**
Formaldehyde	**0.92**	**33.03**	**0.0027**	**0.0119**	**yes**	**yes**
Methanol	**0.54**	**32.04**	**0.00157**	**0.00686**	**yes**	**yes**
Acetaldehyde [1]	**15.95**	**44.05**	**0.0632**	**0.2767**	**yes**	**yes**
Acetic Acid	**3.39**	**60.05**	**0.0183**	**0.0803**		**yes**
Acrolein (ND)	**0.08**	**56.06**	**0.00041**	**0.00180**	**yes**	**yes**
2-Furaldehyde	**0.42**	**96.09**	**0.0037**	**0.0160**		**yes**
Lactic Acid (ND)	**3.75**	90.08	0.030	0.133		yes
Formic Acid (ND)	**1.66**	46.03	0.007	0.030		yes
Iso-amyl Alcohol	**---**	88.15	---	---		yes
Speciated Total	60.36		0.28	1.22		

VOC emissions have been increased to add additional conservatism based on stack test results.

"Potential to Emit (PTE)" Calculations

Green Plains Otter Tail, LLC

Controlled HAP Emissions Sources

Assumptions

Controlled Emission Rates are based on the most recent compliant stack test

Total HAPs include acetaldehyde, acrolein, methanol, and formaldehyde.

The permitted VOC control efficiency of 95% is utilized to calculate the uncontrolled emission factors due to lack of speciated inlet data for the source.

Source	Test Date	Pollutant	Controlled Emission Rate (lb/hr)	Uncontrolled Emission Rate (tons/yr)
SV028 RTO	10/28/2008	Acetaldehyde	0.48	2.10
		Total HAPs	0.64	2.80
SV026 CO2 Scrubber	12/8/2011	Acetaldehyde	0.212	0.93
		Total HAPs	<0.407	1.78
SV027 Vent Gas Scrubber	12/9/2011	Acetaldehyde	0.68	2.98
		Total HAPs	<0.792	3.47

Green Plains Otter Tail, LLC
Equipment Leak VOC Emissions

FS005 CE031 --- Equipment Leaks

Process Stream	Equipment Component Source	Product	Component Count*	Emission Factor*** (Kg/comp.-hr)	Uncontrolled Rate**** (lb/hr)	Subpart VV Control Effectiveness***	Controlled Rate (lb/hr)	TOC weight** (%)	Emitted Water (lb/hr)	Emitted TOC (lb/hr)	Emitted TOC (tpy)
Fermentation	Valves	Gas/Vapor	0.0	0.00597	0.00	87%	0.00	13.00%	0.0	0.0	**0.0**
	Valves	Light Liquid	90.0	0.00403	0.80	84%	0.13	13.00%	0.111	0.017	**0.073**
	Pumps	Light Liquid	6.0	0.0199	0.26	69%	0.08	13.00%	0.071	0.011	**0.046**
	Compressor Seals	Gas/Vapor	0.0	0.228	0.00	0%	0.00	13.00%	0.0	0.0	**0.0**
	Pressure-Relief Valves	Gas/Vapor	5.0	0.104	1.14	87%	0.15	13.00%	0.129	0.019	**0.085**
	Sampling Connections	All	0.0	0.015	0.00	0%	0.00	13.00%	0.0	0.0	**0.0**
	Open-ended Lines	All	5.0	0.0017	0.02	0%	0.02	13.00%	0.016	2.4E-03	**1.1E-02**
	Flanges (connectors)	All	166.0	0.00183	0.67	0%	0.67	13.00%	0.581	0.087	**0.381**
Distillation	Valves	Gas/Vapor	45.0	0.00597	0.59	87%	0.08	81.70%	0.014	0.063	**0.275**
	Valves	Light Liquid	22.0	0.00403	0.20	84%	0.03	81.70%	0.0	0.0	**0.1**
	Pumps	Light Liquid	7.0	0.0199	0.31	69%	0.10	81.70%	0.017	0.078	**0.340**
	Compressor Seals	Gas/Vapor	0.0	0.228	0.00	0%	0.00	81.70%	0.0	0.0	**0.0**
	Pressure-Relief Valves	Gas/Vapor	7.0	0.104	1.60	87%	0.21	81.70%	0.038	0.170	**0.745**
	Sampling Connections	All	0.0	0.015	0.00	0%	0.00	81.70%	0.0	0.0	**0.0**
	Open-ended Lines	All	15.0	0.0017	0.06	0%	0.06	81.70%	0.010	0.046	**0.201**
	Flanges (connectors)	All	190.0	0.00183	0.76	0%	0.76	81.70%	0.140	0.625	**2.737**
Tank Farm	Valves	Gas/Vapor	0.0	0.00597	0.00	87%	0.00	100.00%	0.0	0.0	**0.0**
	Valves	Light Liquid	70.0	0.00403	0.62	84%	0.10	100.00%	0.0E+00	0.099	**0.435**
	Pumps	Light Liquid	5.0	0.0199	0.22	69%	0.07	100.00%	0.0E+00	0.068	**0.297**
	Compressor Seals	Gas/Vapor	0.0	0.228	0.00	0%	0.00	100.00%	0.0	0.0	**0.0**
	Pressure-Relief Valves	Gas/Vapor	5.0	0.104	1.14	87%	0.15	100.00%	0.0	0.1	**0.7**
	Sampling Connections	All	0.0	0.015	0.00	0%	0.00	100.00%	0.0	0.0	**0.0**
	Open-ended Lines	All	6.0	0.0017	0.02	0%	0.02	100.00%	0.0E+00	0.022	**0.098**
	Flanges (connectors)	All	110.0	0.00183	0.44	0%	0.44	100.00%	0.0E+00	0.443	**1.940**
	Total		754.0		8.86		3.06		1.13	1.92	**8.43**

*Component counts are based on similar Delta-T facilities.

**TOC is considered to be worst case for each process stream identified.

***Emission factors taken from Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017. Table 2-1 and Table 5-2.

****Emission rate is taken from Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, and based on the average emission factor approach for estimating emissions. See calculation in 2.3.1.

Emission Factors presented here are intended for use in such industries as gasoline refining etc. and are strongly believed to be highly conservative applied to the Ethanol Industry.

Green Plains Otter Tail, LLC
Wetcake Production Alternate Operating Scenario (AOS)

FS006 CE032 --- Wetcake (AOS)

Production of wetcake (undried distillers grains) is clearly not worst-case for emissions relative to controlled DDGS Dryer emissions for either VOC or HAP. Wetcake emissions have been evaluated in the AERA as if the facility were producing wetcake and drying it at the same time, a conservative simplification.

Production Rates:

18 tons/hr wetcake (wet basis) production @ DENCO

75.71 tons/hr wetcake (wet basis) production

DENCO Test Results -> Emission Factor

Detection?	Name	DENCO lb/hr @ 18 tph production rate	Emission Factor (lb/ton wetcake)	Unlimited Potential Estimated Emissions (lb/hr)	Unlimited Potential Estimated Emissions (tpy)
	VOC as Carbon	0.07	3.89E-03	0.2944	1.289532
	VOC w Ethanol Response Factor	0.15	8.33E-03	**0.6309**	**2.763283**
Speciated Results					
non-detect	Acetaldehyde	0.001	5.56E-05	0.0042	0.0184
non-detect	Acrolein	1.50E-04	8.33E-06	0.0006	0.002763
	Acetic Acid	0.08	4.44E-03	0.3365	1.4738
	Ethanol	0.02	1.11E-03	0.0841	0.3684
non-detect	Formaldehyde	0.006	3.33E-04	0.0252	0.1105
non-detect	Formic Acid	NA	NA	NA	NA
non-detect	2-furaldehyde	NA	NA	NA	NA
non-detect	Methanol	0.00125	6.94E-05	0.0053	0.0230
			Speciated TOTALS	0.456	1.997

*1/2 the detection limit used as emission estimate for non-detect results.

** Emission estimates based on November 2, 2004 emission testing at wetcake storage building at DENCO, LLC in Morris, MN

Green Plains Otter Tail, LLC
Product Storage Tank Emissions

Emissions estimated using EPA TANKS 4.09 software. Detailed program reports are included on the following pages.

SV ID#	CE ID#	TK ID#	Description	Volume (gal)	Throughput (MMgal/yr)	Height (ft)	Diameter (ft)	VOC Emission (lb/yr)	VOC Emission (tpy)
SV029	CE033	TK001	200 Proof Tank	175,000	32.50	38	30	329.92	0.16
SV030	CE034	TK002	200 Proof Tank	175,000	32.50	38	30	329.92	0.16
SV031	CE035	TK003	Denaturant Storage Tank	64,000	3.42	32	20	1380.77	0.69
SV032	CE036	TK004	Denatured Ethanol Tank#1	1,000,000	34.21	50	60	309.11	0.15
SV033	CE037	TK005	Denatured Ethanol Tank#2	1,000,000	34.21	50	60	309.11	0.15

Toxics	CAS#	Natural Gasoline MSDS Liquid %	Denatured Ethanol (Calculated)	HAP?	TK001	TK002	TK003	TK004	TK005
					(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
HAP TOTAL					0.0000	0.0000	0.0131	0.0007	0.0007
n-Pentane	00-07-7	24.40%	1.22%		---	---	2.76E-01	1.09E-02	1.09E-02
Isopentane	00-07-7	20%	1.00%		---	---	3.14E-01	1.21E-02	1.21E-02
Heptane	00-07-7	7%	0.75%		---	---	7.27E-03	1.03E-03	1.03E-03
n-Octane	00-07-7	5.50%	0.350%		---	---	2.20E-03	3.15E-04	3.15E-04
Nonane	00-07-7	3%	0.28%		---	---	8.30E-04	2.30E-04	2.30E-04
Cyclopentane	00-07-7	3%	0.25%		---	---	2.03E-02	1.40E-03	1.40E-03
TOTAL	**00-07-7**						**6.20E-01**	**2.60E-02**	**2.60E-02**
n-Hexane	110-54-3	15%	0.25%		---	---	4.61E-02	7.15E-04	7.15E-04
Benzene	71-43-2	5%	0.15%	yes	---	---	9.43E-03	3.00E-04	3.00E-04
Methylcyclohexane	108-87-2	5%	0.15%		---	---	4.87E-03	2.00E-04	2.00E-04
Cyclohexane	110-82-7	3%	0.15%	no	---	---	5.92E-03	3.10E-04	3.10E-04
Toluene	108-88-3	3%	0.15%	yes	---	---	1.89E-03	1.60E-04	1.60E-04
Ethyl Benzene	100-41-4	1%	0.05%	yes	---	---	3.15E-04	4.00E-05	4.00E-05
1,2,4-TrimethylBenzene	95-63-6	0.10%	0.005%	no	---	---	2.00E-05	5.00E-06	5.00E-06
Xylene	1330-20-7	5%	0.25%	yes	---	---	1.44E-03	2.05E-04	2.05E-04
Ethanol	67-17-5	0.00	0.95	no	1.65E-01	1.65E-01	---	1.30E-01	1.30E-01

Green Plains Otter Tail, LLC
Projected Actual Emissions @ 65.0 million gallons ethanol production

Stack/ Vent ID	Control Eq. ID	Emission Unit ID	Emission Sources Associated with Ethanol Operations	Criteria Pollutants (Limited Emissions) PM (tpy)	PM10 (tpy)	PM2.5 (tpy)	SO2 (tpy)	NOx (tpy)	VOC (tpy)	CO (tpy)	HAP Emissions HAP (Single) Acetaldehyde (tpy)	HAP (Total) (tpy)
---	---	EU001	Corn Dump Pit/Auger#1	CE001	CE001	CE001	---	---	---	---	---	---
---	---	EU002	Corn Conveyor#1	CE001	CE001	CE001	---	---	---	---	---	---
---	---	EU003	Corn Elevator#1	0.65	0.16	0.03	---	---	---	---	---	---
---	---	EU004	Corn Dump Pit/Auger#2	CE001	CE001	CE001	---	---	---	---	---	---
---	---	EU005	Corn Conveyor#2	CE001	CE001	CE001	---	---	---	---	---	---
---	---	EU006	Corn Elevator#2	0.65	0.16	0.03	---	---	---	---	---	---
---	---	EU007	Transfer Conveyor#1	CE001	CE001	CE001	---	---	---	---	---	---
---	---	EU008	Transfer Conveyor#2	0.65	0.16	0.03	---	---	---	---	---	---
SV001	CE001	---	Grain Receiving Baghouse#1	1.39	1.39	1.39	---	---	---	---	---	---
---	---	EU009	Reclaim System	CE008	CE008	CE008	---	---	---	---	---	---
---	---	EU010	Ginder Surge Bin	CE008	CE008	CE008	---	---	---	---	---	---
---	---	EU011	Hammermill#1	CE008	CE008	CE008	---	---	---	---	---	---
---	---	EU012	Hammermill#2	CE008	CE008	CE008	---	---	---	---	---	---
		EU055	Hammermill #3	CE008	CE008	CE008						
SV008	CE008	---	Hammermill Baghouse	0.89	0.89	0.89	---	---	---	---	---	---
---	---	EU013	DDGS Storage Reclaim	CE011	CE011	CE011	---	---	---	---	---	---
---	---	EU014	Bulkweigher	CE011	CE011	CE011						
---	---	EU015	DDGS Conveyor	CE011	CE011	CE011	---	---	---	---	---	---
---	---	EU016	DDGS Load Spout	CE011	CE011	CE011	---	---	---	---	---	---
SV011	CE011	---	DDGS Loadout Baghouse	0.18	0.18	(FN4)	---	---	---	---	---	---
SV012	CE012	EU017	Cooling Tower Cell#1	0.96	0.67	0.67	---	---	---	---	---	---
SV013	CE013	EU018	Cooling Tower Cell#2	0.96	0.67	0.67	---	---	---	---	---	---
SV014	CE014	EU019	Cooling Tower Cell#3	0.96	0.67	0.67	---	---	---	---	---	---
FS001	(CE001, CE002)	(EU001, EU004)	Grain Receiving Fug.	3.71	0.83	(FN4)	---	---	---	---	---	---
FS002	(CE011)	(EU016)	DDGS Loadout Fug.	0.35	0.08	(FN4)	---	---	---	---	---	---
FS003	(CE009)	(EU013)	DDGS Storage Fug.	1.05	0.25	(FN4)	---	---	---	---	---	---
FS004	CE020	EU025	Truck Traffic	3.77	0.75	0.19	---	---	---	---	---	---
SV020	CE021	EU026	Fire Pump (test only) (@0%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SV021	CE022	EU027	Emergency Generator (@0%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SV022	CE023	EU028	Boiler#1 (@75%)	2.20	2.20	2.20	0.17	12.14	1.59	11.23	neg	0.55
SV023	CE024	EU029	Boiler#2 (@75%)	2.20	2.20	2.20	0.17	12.14	1.59	11.23	neg	0.55
---	---	EU031	Non-dedicated Fleet EtOH Loadout	---	---	---	---	---	CE026	---	CE026	CE026

SV025	CE026	EU032	Loadout Flare (50% use)	0.005	0.005	0.005	neg	0.29	2.62	0.67	neg	#REF!
---	---	EU033	Yeast Tank	---	---	---	---	---	CE027	---	CE027	CE027
---	---	EU034	Fermenter#1	---	---	---	---	---	CE027	---	CE027	CE027
---	---	EU035	Fermenter#2	---	---	---	---	---	CE027	---	CE027	CE027
---	---	EU036	Fermenter#3	---	---	---	---	---	CE027	---	CE027	CE027
---	---	EU037	Fermenter#4	---	---	---	---	---	CE027	---	CE027	CE027
---	---	EU038	Beerwell	---	---	---	---	---	CE027	---	CE027	CE027
SV026	CE027	---	CO2 Scrubber (average data)	---	---	---	---	---	11.81	---	2.09	2.18
---	---	EU039	Liquefaction Tank	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU040	Beer Stripper	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU041	Side Stripper	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU042	Rectifier	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU043	Molecular Sieve	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU044	Evaporator	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU045	Centrifuge#1	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU046	Centrifuge#2	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU047	Centrifuge#3	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU048	Centrifuge#4	---	---	---	---	---	CE028	---	CE028	CE028
---	---	EU049	Centrate Tank	---	---	---	---	---	CE028	---	CE028	CE028
SV027	CE028	---	Vent Gas Scrubber (average data)	---	---	---	---	---	1.89	---	0.06	0.07
---	CE029	EU050	DDGS Dryer	CE030	CE030	CE030	---	---	CE030	CE030	CE030	CE030
---	---	EU051	DDGS Cooler	CE030	CE030	CE030	---	---	CE030	CE030	CE030	CE030
SV028	CE030	EU052	RTO (average data)	9.32	9.32	9.32	6.57	27.99	14.56	42.28	0.71	1.45
FS005	CE031	EU053	Equipment Leaks (FN3) (@50%)	---	---	---	---	---	4.21	---	---	---
FS006	CE032	EU054	Wetcake (AOS)	---	---	---	---	---	(FN2)	---	(FN2)	(FN2)
FS007	---	---	Temporary Flat Storage	0.13	0.04	0.01	---	---	---	---	---	---
SV029	CE033	TK001	200 Proof Tank	---	---	---	---	---	0.16	---	neg	neg
SV030	CE034	TK002	200 Proof Tank	---	---	---	---	---	0.16	---	neg	neg
SV031	CE035	TK003	Denaturant Storage Tank	---	---	---	---	---	0.69	---	neg	0.0131
SV032	CE036	TK004	Denatured Ethanol Tank#1	---	---	---	---	---	0.15	---	neg	0.0007
SV033	CE037	TK005	Denatured Ethanol Tank#2	---	---	---	---	---	0.15	---	neg	0.0007
			TOTALS	30.0	20.7	18.3	6.9	52.6	39.6	65.4	2.9	#REF!
			Regulatory Caps	100.0	100.0	100.0	100.0	100.0	100.0	100.0	10.0	25.0

"Projected Actual" Emission Estimates are estimates of actual emissions predicted by some reasoned basis or based on average data. These estimates serve no regulatory purpose and are only provided because MPCA staff have suggested they are useful.

(FN1) Product (denatured Ethanol) occurs to either of two scenerios. Loading to a dedicated fleet (carry only denatuired ethanol) or loading to a non-dedicated fleet (may have previosly carried gasoline. Dedicated Fleet loadout is not flared. Non-dedicated loadout is flared. Projected Actual is based on equal use of each scenerio. Dedicated fleet loadout is worst case for VOC, Non-dedicated is worst case for PM, NOx and CO due to use of a flare.

(FN2) FS006 Wetcake (AOS) is an alternate operating scenerio that is not worst case for emissions therefore does not contribute to facility Potential to Emit.

(FN3) Equipment Leak emission factors are most applicable to gasoline-like operations such as refineries. It is assumed that these factors overestimate emissions at a fuel ethanol plant by at least a factor of 2.

(FN4) There is no data about PM2.5 underlying the PTE estimates. The PM2.5 = PM10 assumption is likely a very bad one and actual PM2.5 emissions are likely very

Attachment 3
Facility Description and CD-01 Forms

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: EMISSION UNIT (EU)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Emission Unit Status	Added By (Action)	Retired By (Action)	Insignif-icant Activity	Operator ID for Item	Stack/ Vent ID No(s).	Control Equip. ID No(s).	Operator Description	Manufacturer	Model Number	SIC	Max. Design Capacity	Maximum Design Capacity			Max Fuel Input (mil Btu)
														Materials	Units n	Units d	
1	EU 001	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Dump Pit/Auger 1	Howell	218265050	2869	20000		Bushel	Hr	
2	EU 002	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Conveyor 1	Howell	2018LARB-U-91'81/4"	2869	20000		Bushel	Hr	
3	EU 003	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Elevator 1	Howell	42EW22 LEG 130'	2869	20000		Bushel	Hr	
4	EU 004	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Dump Pit/Auger 2	Howell	218265050	2869	20000		Bushel	Hr	
5	EU 005	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Conveyor 2	Howell	2018LARB-U 137'	2869	20000		Bushel	Hr	
6	EU 006	Active	PER 004		☐		SV 001 (M)	CE 001	Corn Elevator 2	Howell	42EW22 LEG 130'	2869	20000		Bushel	Hr	
7	EU 007	Active	PER 004		☐		SV 001 (M)	CE 001	Transfer Conveyor 1	Howell	3024LARBU-U 149'6'	2869	20000		Bushel	Hr	
8	EU 008	Active	PER 004		☐		SV 008 (M)	CE 008	Scalper	Morot	Milpro CS-450/43407	2869	20000		Bushel	Hr	
9	EU 009	Active	PER 004		☐		SV 008 (M)	CE 008	Reclaim System	Howell	1214LARBU 190'	2869	2800		Bushel	Hr	
10	EU 010	Active	PER 004		☐		SV 008 (M)	CE 008	Grinder Surge Bin	Lorrich	TK-1405	2869	1200		Bushel		
11	EU 011	Active	PER 004		☐		SV 008 (M)	CE 008	Hammermill 1	Bliss	E-4436-TF	2869	1124		Bushel	Hr	
12	EU 012	Active	PER 004		☐		SV 008 (M)	CE 008	Hammermill 2	Bliss	E-4436-TF	2869	1124		Bushel	Hr	
13	EU 013	Active	PER 004		☐		SV 011 (M)	CE 011	DDGS Storage Reclaim	MAC	111786-006-1/WG-10	2869	4500		Bushel	Hr	
14	EU 014	Active	PER 004		☐		SV 011 (M)	CE 011	Bulkweigher	MICADA/CompuWeigh	1431200006	2869	4500		Bushel	Hr	
15	EU 015	Active	PER 004		☐		SV 011 (M)	CE 011	DDGS Conveyor	Howell	1210LARBU 105'	2869	4500		Bushel	Hr	
16	EU 016	Active	PER 004		☐		SV 011 (M)	CE 011	DDGS Load Spout	DCL	UN800EV-8HC	2869	4500		Bushel	Hr	
17	EU 017	Active	PER 004		☐		SV 012 (M)	CE 012	Cooling Tower Cell 1	EvapTech	ECW336-530N/S73072	2869	40000		Gal	Min	
18	EU 018	Active	PER 004		☐		SV 013 (M)	CE 013	Cooling Tower Cell 2	EvapTech	ECW336-530N/S73072	2869	40000		Gal	Min	
19	EU 019	Active	PER 004		☐		SV 014 (M)	CE 014	Cooling Tower Cell 3	EvapTech	ECW336-530N/S73072	2869	40000		Gal	Min	
20	EU 020	Removed	PER 004		☐				Not installed			2869			0	0	
21	EU 021	Removed	PER 004		☐				Not installed			2869			0	0	
22	EU 022	Removed	PER 004		☐				Not installed			2869			0	0	
23	EU 023	Removed	PER 004		☐				Not installed			2869			0	0	
24	EU 024	Removed	PER 004		☐				Not installed			2869			0	0	
25	EU 025	Removed	PER 004		☐				Truck Traffic	NA	NA	2869	0.85		Mile		
26	EU 026	Active	PER 004		☐		SV 020 (M)	CE 021	Fire Pump	Clarke	JX6H-UF-40	2869	460		Hp		

FACILITY DESCRIPTION: EMISSION UNIT (EU)

	ID No.	Emission Unit Status	Added By (Action)	Comm-ence Const. Date	Initial Startup Date	Removal Date	Firing Method	Pct. Fuel/ Space Heat	Bottleneck	Elevator Type
1	EU 001	Active	PER 004							
2	EU 002	Active	PER 004							
3	EU 003	Active	PER 004							
4	EU 004	Active	PER 004							
5	EU 005	Active	PER 004							
6	EU 006	Active	PER 004							
7	EU 007	Active	PER 004							
8	EU 008	Active	PER 004							
9	EU 009	Active	PER 004							
10	EU 010	Active	PER 004							
11	EU 011	Active	PER 004							
12	EU 012	Active	PER 004							
13	EU 013	Active	PER 004							
14	EU 014	Active	PER 004							
15	EU 015	Active	PER 004							
16	EU 016	Active	PER 004							
17	EU 017	Active	PER 004							
18	EU 018	Active	PER 004							
19	EU 019	Active	PER 004							
20	EU 020	Removed	PER 004							
21	EU 021	Removed	PER 004							
22	EU 022	Removed	PER 004							
23	EU 023	Removed	PER 004							
24	EU 024	Removed	PER 004							
25	EU 025	Removed	PER 004							
26	EU 026	Active	PER 004	01/01/2006	02/18/2008					

FACILITY DESCRIPTION: EMISSION UNIT (EU)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Emission Unit Status	Added By (Action)	Retired By (Action)	Insignif-icant Activity	Operator ID for Item	Stack/ Vent ID No(s).	Control Equip. ID No(s).	Operator Description	Manufacturer	Model Number	SIC	Max. Design Capacity	Maximum Design Capacity			Max Fuel Input (mil Btu)
														Materials	Units n	Units d	
27	EU 027	Active	PER 004		☐		SV 034 (M) SV 035 (M)		Emergency Generator	Katolite	D1500FRY4	2869	1700	Energy	BHp		
28	EU 028	Active	PER 004		☐		SV 022 (M)	CE 023	Boiler 1	Superior Boiler	8-5-11000-S 150-WB-C	2869	92.4	Heat	Mmbtu	Hr	92.4
29	EU 029	Active	PER 004		☐		SV 023 (M)	CE 024	Boiler 2	Superior Boiler	8-5-11000-S 150-WB-C	2869	92.4	Heat	Mmbtu	Hr	92.4
30	EU 030	Removed	PER 004		☐							2869			0	0	
31	EU 031	Active	PER 004		☐			CE 026	Truck Loadout	Determan Brownie	K2GEA003C00-T6446	2869	68.42		Mgal	Yr	
32	EU 032	Active	PER 004		☐		SV 025 (M)		Loadout Flare	John Zink	LH-1-12-20-x-1/6	2869	68.42	Ethanol	Mgal	Yr	
33	EU 033	Active	PER 004		☐		SV 026 (M)	CE 027	Yeast Tank	Brown Tank	10623-02	2869	146000		Gal		
34	EU 034	Active	PER 004		☐		SV 026 (M)	CE 027	Fermenter 1	Brown Tank	10623-03A	2869	1000000		Gal		
35	EU 035	Active	PER 004		☐		SV 026 (M)	CE 027	Fermenter 2	Brown Tank	10623-03B	2869	1000000		Gal		
36	EU 036	Active	PER 004		☐		SV 026 (M)	CE 027	Fermenter 3	Brown Tank	10623-03C	2869	1000000		Gal		
37	EU 037	Active	PER 004		☐		SV 026 (M)	CE 027	Fermenter 4	Brown Tank	10623-03D	2869	1000000		Gal		
38	EU 038	Active	PER 004		☐		SV 026 (M)	CE 027	Beerwell	Brown Tank	10623-04	2869	883504		Gal		
39	EU 039	Active	PER 004		☐		SV 027 (M)	CE 028	Liquefaction Tank	August Winter & Co	TK-2101	2869	58200		Gal		
40	EU 040	Active	PER 004		☐		SV 027 (M)	CE 028	Beer Stripper	Industrial Alloy Fabrica	S1013-7	2869	26000		Gal		
41	EU 041	Active	PER 004		☐		SV 027 (M)	CE 028	Side Stripper	Chattannoga Boiler Co	0970-09-1554	2869	10100		Gal		
42	EU 042	Active	PER 004		☐		SV 027 (M)	CE 028	Rectifier	Chattannoga Boiler Co	0970-09-1553	2869	27400		Gal		
43	EU 043	Active	PER 004		☐		SV 027 (M)	CE 028	Molecular Sieve	Chattannoga Boiler Co	0970-01/-02	2869	65	Ethanol	Mgal	Yr	
44	EU 044	Active	PER 004		☐		SV 027 (M)	CE 028	Evaporator	Mueller & Co	354726-1-4	2869	65	Ethanol	Mgal	Yr	
45	EU 045	Active	PER 004		☐		SV 027 (M)	CE 028	Centrifuge 1	Alpha Laval	CHNX944B-31G	2869	58400		Lb	Hr	
46	EU 046	Active	PER 004		☐		SV 027 (M)	CE 028	Centrifuge 2	Alpha Laval	CHNX944B-31G	2869	58400		Lb	Hr	
47	EU 047	Active	PER 004		☐		SV 027 (M)	CE 028	Centrifuge 3	Alpha Laval	CHNX944B-31G	2869	58400		Lb	Hr	
48	EU 048	Active	PER 004		☐		SV 027 (M)	CE 028	Centrifuge 4	Alpha Laval	CHNX944B-31G	2869	58400		Lb	Hr	
49	EU 049	Active	PER 004		☐		SV 027 (M)	CE 028	Centrate Tank	August Winter & Co	TK-5101	2869	102000		Gal		
50	EU 050	Active	PER 004		☐		SV 028 (M)	CE 029 CE 030	DDGS Dryer	GEA Barr-Rosin	2410-ROTD 15-0 x 69-(	2869	100	Grain	Ton	Hr	94.9
51	EU 051	Active	PER 004		☐		SV 028 (M)	CE 030	DDGS Cooler	GEA Barr-Rosin	FBST-31	2869	30		Ton	Hr	

FACILITY DESCRIPTION: EMISSION UNIT (EU)

	ID No.	Emission Unit Status	Added By (Action)	Comm-ence Const. Date	Initial Startup Date	Removal Date	Firing Method	Pct. Fuel/ Space Heat	Bottleneck	Elevator Type
27	EU 027	Active	PER 004							
28	EU 028	Active	PER 004							
29	EU 029	Active	PER 004							
30	EU 030	Removed	PER 004							
31	EU 031	Active	PER 004							
32	EU 032	Active	PER 004							
33	EU 033	Active	PER 004							
34	EU 034	Active	PER 004							
35	EU 035	Active	PER 004							
36	EU 036	Active	PER 004							
37	EU 037	Active	PER 004							
38	EU 038	Active	PER 004							
39	EU 039	Active	PER 004							
40	EU 040	Active	PER 004							
41	EU 041	Active	PER 004							
42	EU 042	Active	PER 004							
43	EU 043	Active	PER 004							
44	EU 044	Active	PER 004							
45	EU 045	Active	PER 004							
46	EU 046	Active	PER 004							
47	EU 047	Active	PER 004							
48	EU 048	Active	PER 004							
49	EU 049	Active	PER 004							
50	EU 050	Active	PER 004							
51	EU 051	Active	PER 004							

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: EMISSION UNIT (EU)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Emission Unit Status	Added By (Action)	Retired By (Action)	Insignif-icant Activity	Operator ID for Item	Stack/ Vent ID No(s).	Control Equip. ID No(s).	Operator Description	Manufacturer	Model Number	SIC	Max. Design Capacity	Maximum Design Capacity			Max Fuel Input (mil Btu)
														Materials	Units n	Units d	
52	EU 052	Active	PER 004		☐		SV 028 (M)	CE 030	Regenerative Thermal Oxidizer	Pro-Environmental	52000 SCFM Job 1033	2869	18	Heat	Mmbtu	Hr	18
53	EU 053	Removed	PER 004		☐				Equipment Leaks	NA	NA	2869	878	Product	Each		
54	EU 054	Removed	PER 004		☐				Wetcake - AOS	NA	NA	2869	76		Ton	Hr	
55	EU 055	Active	PER 004		☐		SV 008 (M)		Hammermill #3	Bliss	E-4436-F	2869	1124	Corn	Bushel	Hr	
56	EU 056	Active	PER 004		☐		SV 001 (M)	CE 001	Silo #3 Conveyer	S-M Howell	3024	2869	15000	Corn	Bushel	Hr	
57	EU 057	Active	PER 004		☐		SV 008 (M)	CE 008	Silo #3 Reclaim	S-M Howell	1214	2869	6000	Corn	Bushel	Hr	
58	EU 058	Active	PER 004		☐		SV 036		Corn Storage Silo #1	Brock	10570	2869	308373	Corn	Bushel	Each	
59	EU 059	Active	PER 004		☐		SV 037		Corn Storage Silo #2	Brock	10570	2869	308373	Corn	Bushel	Each	
60	EU 060	Active	PER 004		☐		SV 038		Corn Storage Silo #3	Brock	10570	2869	576255	Corn	Bushel	Each	
61	EU 061	Active	PER 004		☐		SV 001 (M)	CE 001	Silo #4 Conveyer	S-M Howell	TBD	2869	15000	Corn	Bushel	Hr	
62	EU 062	Active	PER 004		☐		SV 008 (M)	CE 008	Silo #4 Reclaim	S-M Howell	TBD	2869	6000	Corn	Bushel	Hr	
63	EU 063	Active	PER 004		☐		SV 039		Corn Storage Silo #4	Brock	10577	2869	629750	Corn	Bushel	Each	
64	EU 064	Active	PER 004		☐		SV 001 (M)	CE 001	Silo #5 Conveyer	S-M Howell	TBD	2869	15000	Corn	Bushel	Hr	
65	EU 065	Active	PER 004		☐		SV 008 (M)	CE 008	Silo #5 Reclaim	S-M Howell	TBD	2869	6000	Corn	Bushel	Hr	
66	EU 066	Active	PER 004		☐		SV 040		Corn Storage Silo #5	Brock	10577	2869	629750	Corn	Bushel	Each	

FACILITY DESCRIPTION: EMISSION UNIT (EU)

	ID No.	Emission Unit Status	Added By (Action)	Comm-ence Const. Date	Initial Startup Date	Removal Date	Firing Method	Pct. Fuel/ Space Heat	Bottleneck	Elevator Type
52	EU 052	Active	PER 004							
53	EU 053	Removed	PER 004							
54	EU 054	Removed	PER 004							
55	EU 055	Active	PER 004							
56	EU 056	Active	PER 004							
57	EU 057	Active	PER 004							
58	EU 058	Active	PER 004							
59	EU 059	Active	PER 004							
60	EU 060	Active	PER 004							
61	EU 061	Active	PER 004							
62	EU 062	Active	PER 004							
63	EU 063	Active	PER 004							
64	EU 064	Active	PER 004							
65	EU 065	Active	PER 004							
66	EU 066	Active	PER 004							

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: CONTROL EQUIPMENT (CE)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Control Equip. Status	Added By (Action)	Retired By (Action)	Operator ID for Item	Control Equip. Type	Control Equipment Description	Manufacturer	Model	Pollutants Controlled	Capture Efficiency (%)	Destruction/ Collection Efficiency (%)	Afterburner Combustion Parameters
1	CE 001	Active	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	MAC Equipment	144MCF 255-255	PM10 PM	80 80	99 99	
2	CE 002	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
3	CE 003	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
4	CE 004	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
5	CE 005	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
6	CE 006	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
7	CE 007	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
8	CE 008	Active	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	MAC Equipement	120MCF 255-255	PM10 PM	80 80	99 99	
9	CE 009	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	50 50	99 99	
10	CE 010	Removed	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	TBD	TBD	PM10 PM	80 80	99 99	
11	CE 011	Active	PER 004			018	Fabric Filter - Low Temperature, i.e., T<180 Degrees F	MAC Equipment 96 ST 49-19	TBD	PM10 PM	50 50	99 99	
12	CE 012	Active	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	Evaptech, Inc	EC336-530N	PM10 PM	100 100	75 75	
13	CE 013	Active	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	Evaptech, Inc	EC336-530N	PM10 PM	100 100	75 75	
14	CE 014	Active	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	Evaptech, Inc	EC336-530N	PM10 PM	100 100	75 75	
15	CE 015	Removed	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	TBD	TBD	PM10 PM	100 100	75 75	
16	CE 016	Removed	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	TBD	TBD	PM10 PM	100 100	75 75	
17	CE 017	Removed	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	TBD	TBD	PM10 PM	100 100	75 75	
18	CE 018	Removed	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	TBD	TBD	PM10 PM	100 100	75 75	
19	CE 019	Removed	PER 004			015	Mist Eliminator - Low Velocity, i.e., V<250 Ft/Min	TBD	TBD	PM10 PM	100 100	75 75	
20	CE 020	Removed	PER 004			099	Other	TBD	TBD	PM			

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: CONTROL EQUIPMENT (CE)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Control Equip. Status	Added By (Action)	Retired By (Action)	Operator ID for Item	Control Equip. Type	Control Equipment Description	Manufacturer	Model	Pollutants Controlled	Capture Efficiency (%)	Destruction/ Collection Efficiency (%)	Afterburner Combustion Parameters
21	CE 021	Removed	PER 004			099	Other	TBD	TBD				
22	CE 022	Removed	PER 004			099	Other	TBD	TBD				
23	CE 023	Active	PER 004			099	Low NOx Burners	TBD	TBD	NOx NOx	 100	0.04 50	
24	CE 024	Active	PER 004			099	Low NOx Burners	TBD	TBD	NOx NOx	 100	0.04 50	
25	CE 025	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC			
26	CE 026	Active	PER 004			023	Flaring	JohnZink	LHT-1-12-20-X-1/6	CO HAPs PM2.5 PM10 PM VOC	100 100 100 100 100 100	98 98 61 61 61 98	
27	CE 027	Active	PER 004			050	Packed-Gas Adsorption Column	Delta-T	C-3201	HAPs VOC	100 100	98 98	
28	CE 028	Active	PER 004			050	Packed-Gas Adsorption Column	Delta-T	C-3202	HAPs VOC	100 100	98 98	
29	CE 029	Active	PER 004			076	Multiple Cyclone w/o Fly Ash Reinjection - Most Multiclones	Barr Rosin	Custom	PM	100	50	
30	CE 030	Active	PER 004			131	Thermal Oxidizer	Pro Environmental	PEI Job No. 1033	CO CO HAPs PM10 PM PM VOC VOC	100 100 100 100 100 100 100 100	99 97 95 62 95 62 60 97	
31	CE 031	Removed	PER 004			099	Other	TBD	TBD	VOC			
32	CE 032	Removed	PER 004			099	Other	TBD	TBD	VOC			
33	CE 033	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC		95 90	
34	CE 034	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC		95 90	
35	CE 035	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC		95 90	
36	CE 036	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC		95 90	
37	CE 037	Removed	PER 004			099	Other	TBD	TBD	HAPs VOC		95 90	

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: STACK/VENTS (SV)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Stack/ Vent Status	Added By (Action)	Retired By (Action)	Operator ID for Item	Operators Description	Height of Opening From Ground (feet)	Inside Dimensions		Design Flow Rate at Top (ACFM)	Exit Gas Temperature at Top (ºF)	Flow Rate/ Temperature Information Source	Discharge Direction
								Diameter or Length (feet)	Width (feet)				
1	SV 001	Active	PER 004			Grain Receiving with Baghouse - CE 001	96.25	3.67		37000			Up, No Cap
2	SV 002	Removec	PER 004			not installed							
3	SV 003	Removec	PER 004			not installed							
4	SV 004	Removec	PER 004			not installed							
5	SV 005	Removec	PER 004			not installed							
6	SV 006	Removec	PER 004			not installed							
7	SV 007	Removec	PER 004			not installed							
8	SV 008	Active	PER 004			Hammermill with Baghouse - CE 008	40	3.00		23800			Up, No Cap
9	SV 009	Removec	PER 004			not installed							
10	SV 010	Removec	PER 004			not installed							
11	SV 011	Active	PER 004			DDGS Loadout with Baghouse - CE 011	33	1.40		4800			Up, No Cap
12	SV 012	Active	PER 004			Cooling Cell 1	36.7	25		75000	70		Up, No Cap
13	SV 013	Active	PER 004			Cooling Cell 2	36.7	25		75000	70		Up, No Cap
14	SV 014	Active	PER 004			Cooling Cell 3	36.7	25		75000	70		Up, No Cap
15	SV 015	Removec	PER 004			not installed							
16	SV 016	Removec	PER 004			not installed							
17	SV 017	Removec	PER 004			not installed							
18	SV 018	Removec	PER 004			not installed							
19	SV 019	Removec	PER 004			not installed							
20	SV 020	Active	PER 004			Fire Pump	8	0.5		8000	800		Up, No Cap
21	SV 021	Removec	PER 004			Not Installed							
22	SV 022	Active	PER 004			Boiler 1	45	3		35000	250		Up, No Cap
23	SV 023	Active	PER 004			Boiler 2	45	3		35000	250		Up, No Cap
24	SV 024	Removec	PER 004			Dedicated Fleet EtOH Loadout	15	1.5		110			Down
25	SV 025	Active	PER 004			Loadout Flare	35	3.5		47500	800		Up, No Cap
26	SV 026	Active	PER 004			Fermentation with CO2 Scrubber - CE 027	37	2		8500	70		Up, No Cap
27	SV 027	Active	PER 004			Distillation (Vent Gas) Scrubber	39	1.33333		575	70		Up, No Cap

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: STACK/VENTS (SV)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Stack/ Vent Status	Added By (Action)	Retired By (Action)	Operator ID for Item	Operators Description	Height of Opening From Ground (feet)	Inside Dimensions		Design Flow Rate at Top (ACFM)	Exit Gas Temperature at Top (ºF)	Flow Rate/ Temperature Information Source	Discharge Direction
								Diameter or Length (feet)	Width (feet)				
28	SV 028	Active	PER 004			DDGS with Thermal Oxidizer - CE 030	90	6.00		75000	200		Up, No Cap
29	SV 029	Removec	PER 004			TK001 200 Proof EtOH 1	32	1					Horizontal
30	SV 030	Removec	PER 004			TK002 200 Proof EtOH 2	32	1					Horizontal
31	SV 031	Removec	PER 004			TK003 Denaturant Tank	24	1					Horizontal
32	SV 032	Removec	PER 004			TK004 Denatured Ethanol Tank 1	50	1					Horizontal
33	SV 033	Removec	PER 004			TK005 Denatured Ethanol Tank 2	50	1					Horizontal
34	SV 034	Active	PER 004			Emergency Generator	10	0.83		5617	800	Estimate	Up, No Cap
35	SV 035	Active	PER 004			Emergency Generator	10	0.83		5617	800	Estimate	Up, No Cap
36	SV 036	Active	PER 004			Grain Bin #1	69.75	4.48		0.003	68	Estimate	Up, No Cap
37	SV 037	Active	PER 004			Grain Bin #2	69.75	4.48		0.003	68	Estimate	Up, No Cap
38	SV 038	Active	PER 004			Grain Bin #3	69.75	4.48		0.003	68	Estimate	Up, No Cap
39	SV 039	Active	PER 004			Grain Bin #4	69.75	4.48		0.003	68	Estimate	Up, No Cap
40	SV 040	Active	PER 004			Grain Bin #5	69.75	4.48		0.003	68	Estimate	Up, No Cap

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: GROUPS (GP)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Group Status	Added By (Action)	Retired By (Action)	Include in EI	Operator ID for Item	Group Description	Group Items
1	GP 001	Active	PER 004		☐		Tanks subject to NSPS Subpart Kb	TK 001, TK 002, TK 003, TK 004, TK 005
2	GP 002	Active	PER 004		☐		Grain Handling Fabric Filters	CE 001, CE 008, CE 011
3	GP 003	Retired	PER 004		☐			

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: FUGITIVE SOURCES (FS)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Fugitive Source Status	Added By (Action)	Retired By (Action)	Insignif-icant Activity	Operator ID for Item	Pollutant(s) Emitted	Control Equip. ID No(s).	Fugitive Source Description	Year Installed	Year Removed
1	FS 001	Active	PER 004		☐		PM		Grain Receiving Fugitives		
2	FS 002	Active	PER 004		☐		PM		DDGS Loadout Fugitives		
3	FS 003	Active	PER 004		☐		PM		DDGS Storage Fugitives		
4	FS 004	Active	PER 004		☐		PM		Truck Traffic		
5	FS 005	Active	PER 004		☐		VOC		Equipment Leaks		
6	FS 006	Active	PER 004		☐		VOC		Wetcake -AOS		
7	FS 007	Active	PER 004		☐		PM		Temporary Flat Storage		

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: STORAGE TANKS (TK)

Show: Pending Records Only
Action: PER 004
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

	ID No.	Tank Status	Added By (Action)	Retired By (Action)	Insignif-icant Activity	Operator ID for Item	Control Equip. ID No(s).	Product Stored	Interior Height (ft.)	Interior Diameter (ft.)	Capacity (1000 gal)	Construction Type
1	TK 001	Active	PER 004		☐			200 Proof Tank	32	30	159	Internal Floating Roof
2	TK 002	Active	PER 004		☐			200 Proof Tank	32	30	159	Internal Floating Roof
3	TK 003	Active	PER 004		☐			Denaturant Storage Tank	24	20	51	Internal Floating Roof
4	TK 004	Active	PER 004		☐			Denatured Ethanol Tank 1	50	60	1000	Internal Floating Roof
5	TK 005	Active	PER 004		☐			Denatured Ethanol Tank 2	50	60	1000	Internal Floating Roof

FACILITY DESCRIPTION: STORAGE TANKS (TK)

	ID No.	Tank Status	Added By (Action)	Support Type (floating roof only)	Column Count	Column Diameter (ft.)	Deck Type (floating roof only)	Seal Type (floating roof only)	Year Installed	Year Removed
1	TK 001	Active	PER 004	Column Supported Roof, Construction Type I	1	1	Bolted, Detail Not Specified	Resilient seal (nonmetallic), vapor mounted, p		
2	TK 002	Active	PER 004	Column Supported Roof, Construction Type I	1	1	Bolted, Detail Not Specified	Resilient seal (nonmetallic), vapor mounted, p		
3	TK 003	Active	PER 004	Column Supported Roof, Construction Type I	1	1	Bolted, Detail Not Specified	Resilient seal (nonmetallic), vapor mounted, p		
4	TK 004	Active	PER 004	Column Supported Roof, Construction Type I	1	1	Bolted, Detail Not Specified	Resilient seal (nonmetallic), vapor mounted, p		
5	TK 005	Active	PER 004	Column Supported Roof, Construction Type I	1	1	Bolted, Detail Not Specified	Resilient seal (nonmetallic), vapor mounted, p		

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

FACILITY DESCRIPTION: Potential-to-emit (by item)

Show: Pending Records Only
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

Item	Pollutant	Added By (Action)	Retired By (Action)	Hourly Potential (lbs per hr)	Unrestricted Potential (tons per yr)	Limited Potential (tons per yr)	Actual Emissions (tons per yr)
FS 001							
	PM < 2.5 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	PM < 10 micron	PER 004		1.90E-01	8.30E-01	8.30E-01	
	Total Particulate Matter	PER 004		8.50E-01	3.71E+00	3.71E+00	
FS 002							
	PM < 2.5 micron	PER 004		1.40E-01	8.00E-02	8.00E-02	
	PM < 10 micron	PER 004		1.40E-01	8.00E-02	8.00E-02	
	Total Particulate Matter	PER 004		5.90E-01	3.50E-01	3.50E-01	
FS 003							
	PM < 2.5 micron	PER 004		6.00E-02	2.50E-01	2.50E-01	
	PM < 10 micron	PER 004		6.00E-02	2.50E-01	2.50E-01	
	Total Particulate Matter	PER 004		2.40E-01	1.05E+00	1.05E+00	
FS 004							
	PM < 2.5 micron	PER 004		4.00E-02	1.90E-01	1.90E-01	
	PM < 10 micron	PER 004		1.70E-01	7.50E-01	7.50E-01	
	Total Particulate Matter	PER 004		8.60E-01	3.77E+00	3.77E+00	
FS 005							
	Volatile Organic Compounds	PER 004		1.92E+00	8.43E+00	8.43E+00	
FS 007							
	PM < 2.5 micron	PER 004		2.00E-03	1.00E-02	1.00E-02	
	PM < 10 micron	PER 004		1.00E-02	4.00E-02	4.00E-02	
	Total Particulate Matter	PER 004		3.00E-02	1.30E-01	1.30E-01	
SV 001							
	PM < 2.5 micron	PER 004		3.17E+00	1.39E+01	1.39E+01	
	PM < 10 micron	PER 004		3.17E+00	1.39E+01	1.39E+01	
	Total Particulate Matter	PER 004		3.17E+00	1.39E+01	1.39E+01	
SV 008							
	PM < 2.5 micron	PER 004		2.04E+00	8.94E+00	8.94E+00	
	PM < 10 micron	PER 004		2.04E+00	8.94E+00	8.94E+00	
	Total Particulate Matter	PER 004		2.04E+00	8.94E+00	8.94E+00	
SV 011							
	PM < 2.5 micron	PER 004		4.10E-01	1.80E+00	1.80E+00	
	PM < 10 micron	PER 004		4.10E-01	1.80E+00	1.80E+00	
	Total Particulate Matter	PER 004		4.10E-01	1.80E+00	1.80E+00	
SV 012							
	PM < 2.5 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	
	PM < 10 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	
	Total Particulate Matter	PER 004		8.30E-01	3.65E+00	3.65E+00	
SV 013							
	PM < 2.5 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	
	PM < 10 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	
	Total Particulate Matter	PER 004		8.30E-01	3.65E+00	3.65E+00	
SV 014							
	PM < 2.5 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	
	PM < 10 micron	PER 004		5.80E-01	2.55E+00	2.55E+00	

FACILITY DESCRIPTION: Potential-to-emit (by item)

Show: Pending Records Only
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

Item	Pollutant	Added By (Action)	Retired By (Action)	Hourly Potential (lbs per hr)	Unrestricted Potential (tons per yr)	Limited Potential (tons per yr)	Actual Emissions (tons per yr)
SV 014							
	Total Particulate Matter	PER 004		8.30E-01	3.65E+00	3.65E+00	
SV 020							
	Acetaldehyde	PER 004		2.00E-03	1.00E-03	4.00E-03	
	Carbon Dioxide Equivalent	PER 004		5.27E+02	2.31E+03	1.32E+02	
	Methane	PER 004		2.00E-02	4.50E-01	1.00E-02	
	Carbon Monoxide	PER 004		4.80E-01	2.09E+00	1.20E-01	
	Carbon Dioxide	PER 004		5.25E+02	2.30E+03	1.31E+02	
	HAPs - Total	PER 004		2.00E-02	9.10E-02	9.10E-02	
	Nitrous Oxide	PER 004			2.00E-02		
	Nitrogen Oxides	PER 004		5.18E+00	2.27E+01	1.30E+00	
	PM < 2.5 micron	PER 004		7.00E-02	3.10E-01	2.00E-02	
	PM < 10 micron	PER 004		7.00E-02	3.10E-01	2.00E-02	
	Total Particulate Matter	PER 004		7.00E-02	3.10E-01	2.00E-02	
	Sulfur Dioxide	PER 004		1.00E-03	1.00E-02		
	Volatile Organic Compounds	PER 004		9.00E-02	4.00E-02	2.00E-02	
SV 022							
	Carbon Dioxide Equivalent	PER 004		1.08E+04	4.74E+04	4.74E+04	
	Methane	PER 004		2.00E-01	8.90E-01	8.90E-01	
	Carbon Monoxide	PER 004		4.16E+00	1.82E+01	1.82E+01	
	Carbon Dioxide	PER 004		1.08E+04	4.73E+04	4.73E+04	
	HAPs - Total	PER 004		1.70E-01	7.30E-01	7.30E-01	
	Nitrous Oxide	PER 004		2.00E-02	1.00E-01	1.00E-01	
	Nitrogen Oxides	PER 004		4.62E+00	2.02E+01	2.02E+01	
	PM < 2.5 micron	PER 004		6.70E-01	2.93E+00	2.93E+00	
	PM < 10 micron	PER 004		6.70E-01	2.93E+00	2.93E+00	
	Total Particulate Matter	PER 004		6.70E-01	2.93E+00	2.93E+00	
	Sulfur Dioxide	PER 004		5.00E-02	2.30E-01	2.30E-01	
	Volatile Organic Compounds	PER 004		4.80E-01	2.12E+00	2.12E+00	
SV 023							
	Carbon Dioxide Equivalent	PER 004		1.08E+04	4.74E+04	4.74E+04	
	Methane	PER 004		2.00E-01	8.90E-01	8.90E-01	
	Carbon Monoxide	PER 004		4.16E+00	1.82E+01	1.82E+01	
	Carbon Dioxide	PER 004		1.08E+04	4.73E+04	4.73E+04	
	HAPs - Total	PER 004		1.70E-01	7.30E-01	7.30E-01	
	Nitrous Oxide	PER 004		2.00E-02	1.00E-01	1.00E-01	
	Nitrogen Oxides	PER 004		4.62E+00	2.02E+01	2.02E+01	
	PM < 2.5 micron	PER 004		6.70E-01	2.93E+00	2.93E+00	
	PM < 10 micron	PER 004		6.70E-01	2.93E+00	2.93E+00	
	Total Particulate Matter	PER 004		6.70E-01	2.93E+00	2.93E+00	
	Sulfur Dioxide	PER 004		5.00E-02	2.30E-01	2.30E-01	
	Volatile Organic Compounds	PER 004		4.80E-01	2.12E+00	2.12E+00	
SV 024							
	Volatile Organic Compounds	PER 004					
SV 025							
	Carbon Dioxide Equivalent	PER 004		2.39E+00	1.05E+01	1.05E+01	

FACILITY DESCRIPTION: Potential-to-emit (by item)

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AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

Item	Pollutant	Added By (Action)	Retired By (Action)	Hourly Potential (lbs per hr)	Unrestricted Potential (tons per yr)	Limited Potential (tons per yr)	Actual Emissions (tons per yr)
SV 025							
	Methane	PER 004					
	Carbon Monoxide	PER 004		1.41E+00	1.34E+00	1.34E+00	
	Carbon Dioxide	PER 004		2.38E+00	1.04E+01	1.04E+01	
	Nitrogen Oxides	PER 004		6.00E-01	5.70E-01	5.70E-01	
	PM < 2.5 micron	PER 004			1.00E-02	1.00E-02	
	PM < 10 micron	PER 004			1.00E-02	1.00E-02	
	Total Particulate Matter	PER 004			1.00E-02	1.00E-02	
	Volatile Organic Compounds	PER 004		5.51E+00	5.24E+00	5.24E+00	
SV 026							
	Acetaldehyde	PER 004		1.06E+01	4.65E+01	9.30E-01	
	HAPs - Total	PER 004		2.03E+01	8.90E+01	1.78E+00	
	Volatile Organic Compounds	PER 004		1.13E+01	4.94E+01	4.94E+01	
SV 027							
	Acetaldehyde	PER 004		3.40E+01	1.49E+02	2.98E+00	
	HAPs - Total	PER 004		3.96E+01	1.74E+02	3.47E+00	
	Volatile Organic Compounds	PER 004		4.75E+00	2.08E+01	2.08E+01	
SV 028							
	Acetaldehyde	PER 004		1.60E+01	7.00E+01	2.10E+00	
	Carbon Dioxide Equivalent	PER 004		1.16E+04	5.06E+04	5.06E+04	
	Methane	PER 004		2.00E-01	8.00E-02	9.50E-01	
	Carbon Monoxide	PER 004		1.29E+01	5.66E+01	5.66E+01	
	Carbon Dioxide	PER 004		1.15E+04	5.06E+04	5.06E+04	
	HAPs - Total	PER 004		2.13E+01	9.33E+01	2.80E+00	
	Nitrous Oxide	PER 004		2.00E-02	1.00E-01	1.00E-01	
	Nitrogen Oxides	PER 004		1.13E+01	4.96E+01	4.96E+01	
	PM < 2.5 micron	PER 004		5.15E+00	2.26E+01	2.26E+01	
	PM < 10 micron	PER 004		5.15E+00	2.26E+01	2.26E+01	
	Total Particulate Matter	PER 004		5.15E+00	2.26E+01	2.26E+01	
	Sulfur Dioxide	PER 004		3.00E+00	1.31E+01	1.31E+01	
	Volatile Organic Compounds	PER 004		1.11E+00	4.86E+00	4.86E+00	
SV 034							
	Acetaldehyde	PER 004		1.40E-02	4.00E-02		
	Carbon Dioxide Equivalent	PER 004		1.95E+03	8.53E+03	2.43E+02	
	Methane	PER 004		8.00E-02	3.40E-01		
	Carbon Monoxide	PER 004		1.61E+00	7.06E+00	2.01E-01	
	Carbon Dioxide	PER 004		1.94E+03	8.50E+03	2.42E+02	
	HAPs - Total	PER 004		8.00E-02	3.36E-01		
	Nitrous Oxide	PER 004		2.00E-02	8.00E-02		
	Nitrogen Oxides	PER 004		2.41E+01	1.06E+02	3.02E+00	
	PM < 2.5 micron	PER 004		4.00E-02	1.81E+00	5.00E-02	
	PM < 10 micron	PER 004		4.00E-02	1.81E+00	5.00E-02	
	Total Particulate Matter	PER 004		4.00E-02	1.81E+00	5.00E-02	
	Sulfur Dioxide	PER 004		2.00E-02	9.00E-02		
	Volatile Organic Compounds	PER 004		1.16E+00	5.09E+00	1.50E-01	

FACILITY DESCRIPTION: Potential-to-emit (by item)

Show: Pending Records Only
AQD Facility ID: 11100077
Facility Name: Green Plains Otter Tail LLC

Item	Pollutant	Added By (Action)	Retired By (Action)	Hourly Potential (lbs per hr)	Unrestricted Potential (tons per yr)	Limited Potential (tons per yr)	Actual Emissions (tons per yr)
SV 035							
	Carbon Monoxide	PER 004					
	Nitrogen Oxides	PER 004					
	PM < 10 micron	PER 004					
	Total Particulate Matter	PER 004					
	Sulfur Dioxide	PER 004					
	Volatile Organic Compounds	PER 004					
SV 036							
	PM < 2.5 micron	PER 004		1.00E-02	2.00E-02	2.00E-02	
	PM < 10 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	Total Particulate Matter	PER 004		1.30E-01	5.70E-01	5.70E-01	
SV 037							
	PM < 2.5 micron	PER 004		1.00E-02	2.00E-02	2.00E-02	
	PM < 10 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	Total Particulate Matter	PER 004		1.30E-01	5.70E-01	5.70E-01	
SV 038							
	PM < 2.5 micron	PER 004		1.00E-02	2.00E-02	2.00E-02	
	PM < 10 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	Total Particulate Matter	PER 004		1.30E-01	5.70E-01	5.70E-01	
SV 039							
	PM < 2.5 micron	PER 004		1.00E-02	2.00E-02	2.00E-02	
	PM < 10 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	Total Particulate Matter	PER 004		1.30E-01	5.70E-01	5.70E-01	
SV 040							
	PM < 2.5 micron	PER 004		1.00E-02	2.00E-02	2.00E-02	
	PM < 10 micron	PER 004		3.00E-02	1.40E-01	1.40E-01	
	Total Particulate Matter	PER 004		1.30E-01	5.70E-01	5.70E-01	
TK 001							
	Volatile Organic Compounds	PER 004		4.00E-02	1.60E-01	1.60E-01	
TK 002							
	Volatile Organic Compounds	PER 004		4.00E-02	1.60E-01	1.60E-01	
TK 003							
	Volatile Organic Compounds	PER 004		1.60E-01	6.90E-01	6.90E-01	
TK 004							
	Volatile Organic Compounds	PER 004		4.00E-02	1.50E-01	1.50E-01	
TK 005							
	Volatile Organic Compounds	PER 004		4.00E-02	1.50E-01	1.50E-01	

Attachment 4
Additional Point Assessment

Points Calculator

1) AQ Facility ID No.:	11100077
2) Facility Name:	Green Plains Otter Tail LLC
3) Small business? y/n?	n
4) DQ Numbers (including all rolled) :	3940, 3663, 3427, 3753
5) Date of each Application Received:	6/12/12, 5/21/12, 3/16/11, 11/29/11
6) Final Permit No.	11100077-004
7) Permit Staff	Adriane Lenshek

Total Points 127

Application Type	**DQ No.**	**Qty.**	*Points*	**Total Points**	**Details**
Administrative Amendment	3427, 3753	2	*1*	2	
Minor Amendment			*4*	0	
Applicability Request			*10*	0	
Moderate Amendment			*15*	0	
Major Amendment	3663	1	*25*	25	
Individual State Permit (not reissuance)			*50*	0	
Individual Part 70 Permit (not reissuance)	3940	1	*75*	75	
Additional Points					
Modeling Review	3663	1	*15*	15	PM10
BACT Review			*15*	0	
LAER Review			*15*	0	
CAIR/Part 75 CEM analysis			*10*	0	
NSPS Review			*10*	0	
NESHAP Review	3940	1	*10*	10	ZZZZ
Case-by-case MACT Review			*20*	0	
Netting			*10*	0	
Limits to remain below threshold			*10*	0	
Plantwide Applicability Limit (PAL)			*20*	0	
AERA review			*15*	0	
Variance request under 7000.7000			*35*	0	
Confidentiality request under 7000.1300			*2*	0	
EAW review					
Part 4410.4300, subparts 18, item A; and 29			*15*	0	
Part 4410.4300, subparts 8, items A & B; 10, items A to C; 16, items A & D; 17, items A to C & E to G; and 18, items B & C			*35*	0	
Part 4410.4300, subparts 4; 5 items A & B; 13; 15; 16, items B & C; and 17 item D			*70*	0	
		Add'l Points		**25**	

NOTES:

Ultimately, GPOT did not need to perform refined modeling (emissions decreased).