Appendix A: Emissions Calculations

Summary of Emissions

Company Name: MGPI of Indiana, LLC

Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025

Significant Source Modification No.: 029-35496-00005

Significant Permit Modification No.: 029-35505-00005

Reviewer: Kristen Willoughby

Date: 12/22/14

Potential to Emit Before Controls (ton\yr)

	Significant Emission Units	**PM** (tons/yr)	**PM10** (tons/yr)	**PM2.5** (tons/yr)	**SO2** (tons/yr)	**NOx** (tons/yr)	**VOC** (tons/yr)	**CO** (tons/yr)	**GHG** (tons/yr)	**Total HAPs** (tons/yr)
14	One (1) pneumatic conveyor, identified as EU-11	189.22	189.22	16.08	-	-	-	-	-	-
15	One (1) corn receiving and storage system, identified as EU-12 (Stack S-111)	225.26	225.26	19.15	-	-	-	-	-	-
16	One (1) grain transport system, identified as EU-12 (Stack S-112)	20.33	20.33	1.73	-	-	-	-	-	-
17	Seven (7) storage bins, collectively identified as EU-13	20.33	20.33	1.73	-	-	-	-	-	-
18	Six (6) hammermills, collectively identified as EU-14	90.10	90.10	7.66	-	-	-	-	-	-
19	EU-21, which consists of fourteen (14) open fermenters	-	-	-	-	-	7.81	-	-	0.04
20	DDGS Storage (EU-34)	29.76	29.76	2.53	-	-	-	-	-	-
21	DDGS Rail/Truck Loadout (EU-35/EU-36)	27.18	27.18	2.31	-	-	-	-	-	-
22	DDGS Rail/Truck Loader(EU-37/EU-38)	0.27	0.27	0.05	-	-	-	-	-	-
23	Twenty-four (24) closed fermenters, collectively identified as EU-22	-	-	-	-	-	57.79	-	-	0.26
24	Two (2) beer wells, identified as EU-23 and EU-24	-	-	-	-	-	12.51	-	-	-
25	Distillation (EU-20 and EU-25 through EU-29)	-	-	-	-	-	0.09	-	-	3.43E-03
26	Four (4) paddle screens, identified as EU-31 and three (3) conveyors, identified as EU-33	-	-	-	-	-	440.00	-	-	2.00
27	Five (5) rotary dryers, collectively identified as EU-32	201.04	201.04	201.04	-	-	893.43	-	-	69.90
28	One (1) cooler, and one (1) transport system, collectively identified as EU-32	61.22	46.01	8.12	-	-	9.16	-	-	1.28
29	One (1) DDG Dryer, identified as EU-39	418.77	418.77	418.77	18.84	27.86	418.77	464.28	27,473	39.36
30	Wet Pad, identified as EU-40	-	-	-	-	-	See Note	-	-	See Note
31	One (1) wine room, identified as EU-41	-	-	-	-	-	19.52	-	-	-
32	One (1) tank farm, identified as EU-42	-	-	-	-	-	19.01	-	-	-
33	EU-43, which consists of Building 88	-	-	-	-	-	4.69	-	-	-
34	One (1) mini-tank farm, identified as EU-45	-	-	-	-	-	3.59	-	-	-
35	One (1) barrel and emptying operation, identified as EU-61	-	-	-	-	-	12.01	-	-	-
36	Six (6) warehouses, identified as EU-71 through EU-76	-	-	-	-	-	1867.41	-	-	-
37	One (1) steam boiler, identified as EU-96	1.99	7.96	7.96	0.63	293.37	5.76	88.01	126,479	1.98
38	One (1) steam boiler, identified as EU-97 (worst case fuel)	2.85	3.28	2.21	60.77	28.53	1.12	17.17	31,926	0.39
39	One (1) loading rack, identified as EU-46	-	-	-	-	-	6.69	-		0.05
40	**Subtotal Significant Emission Unit**	**1288.34**	**1279.53**	**689.34**	**80.25**	**349.76**	**3779**	**569.46**	**185878**	**115.2**
41	**Fugitive Emissions**	-	-	-	-	-	**128.2**	-		**0.90**
42	Emergency Generator-Diesel	0.28	0.16	0.16	1.62	9.60	0.28	2.20	462	4.41E-03
43	Emergency Generator-Natural gas	1.16E-03	1.46E-03	1.46E-03	1.78E-05	0.10	3.63E-03	0.01	4.29	2.38E-03
44	FW Pump-Diesel	0.13	0.13	0.13	0.12	1.82	0.15	0.39	67.79	1.59E-03
45	**Subtotal Insignificant Activities**	**0.41**	**0.29**	**0.29**	**1.74**	**11.5**	**0.43**	**2.60**	**533.65**	**8.38E-03**
46	**Total**	**1288.75**	**1279.82**	**689.63**	**81.99**	**361.28**	**3908**	**572.07**	**186412**	**116.15**

Note: This plant is capable to produce both DDGS and MDGS. The emissions from the DDGS production is the worst case scenario. Therefore, the PTE of the wet cake storage is not included in the PTE for the entire source.

Appendix A: Emissions Calculations

Summary of Emissions

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

	A	B	C	D	E	F	G	H	I	J
59				**Potential to Emit After Control (ton\yr)**						
60	***Significant Emission Units***	**PM**	**PM10**	**PM2.5**	**SO2**	**NOx**	**VOC**	**CO**	**GHG**	**Total HAPs**
61		(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
62	One (1) pneumatic conveyor, identified as EU-11	1.89	1.89	0.32	-	-	-	-	-	-
63	One (1) corn receiving and storage system, identified as EU-12 (Stack S-111)	2.25	2.25	0.38	-	-	-	-	-	-
64	One (1) grain transport system, identified as EU-12 (Stack S-112)	0.20	0.20	0.03	-	-	-	-	-	-
65	Seven (7) storage bins, collectively identified as EU-13	0.20	0.20	0.03	-	-	-	-	-	-
66	Six (6) hammermills, collectively identified as EU-14	0.90	0.90	0.15	-	-	-	-	-	-
67	EU-21, which consists of fourteen (14) open fermenters	-	-	-	-	-	7.81	-	-	0.04
68	DDGS Storage (EU-34)	0.30	0.30	0.05	-	-	-	-	-	-
69	DDGS Rail/Truck Loadout (EU-35/EU-36)	0.27	0.27	0.05	-	-	-	-	-	-
70	DDGS Rail/Truck Loader(EU-37/EU-38)	0.27	0.27	0.05	-	-	-	-	-	-
71	Twenty-four (24) closed fermenters, collectively identified as EU-22	-	-	-	-	-	57.79	-	-	0.26
72	Two (2) beer wells, identified as EU-23 and EU-24	-	-	-	-	-	12.51		-	
73	Distillation (EU-20 and EU-25 through EU-29)	-	-	-	-	-	0.09	-	-	3.43E-03
74	Four (4) paddle screens, identified as EU-31 and three (3) conveyors, identified as EU-33	-	-	-	-	-	440.00	-	-	2.00
75	Five (5) rotary dryers, collectively identified as EU-32	30.16	30.16	30.16	-	-	893.43	-	-	69.90
76	One (1) cooler, and one (1) transport system, collectively identified as EU-32	5.74	3.80	1.81	-	-	9.16	-	-	1.28
77	One (1) DDG Dryer, identified as EU-39	8.38	8.38	8.38	18.84	27.86	8.38	46.43	27,473	1.18
78	Wet Pad, identified as EU-40	-	-	-	-	-	See Note	-	-	-
79	One (1) wine room, identified as EU-41	-	-	-	-	-	19.52	-	-	-
80	One (1) tank farm, identified as EU-42	-	-	-	-	-	19.01	-	-	-
81	EU-43, which consists of Building 88	-	-	-	-	-	4.69	-	-	-
82	One (1) mini-tank farm, identified as EU-45	-	-	-	-	-	3.59	-	-	-
83	One (1) barrel and emptying operation, identified as EU-61	-	-	-	-	-	12.01	-	-	-
84	Six (6) warehouses, identified as EU-71 through EU-76	-	-	-	-	-	1867	-	-	-
85	One (1) steam boiler, identified as EU-96	1.99	7.96	7.96	0.63	293.37	5.76	88.01	126,479	1.98
86	One (1) steam boiler, identified as EU-97 (worst case fuel)	2.85	3.28	2.21	60.77	28.53	1.12	17.17	31,926	0.39
87	One (1) loading rack, identified as EU-46	-	-	-	-	-	6.69	-		0.05
88	**Subtotal Significant Emission Unit**	**55.41**	**59.87**	**51.58**	**80.25**	**349.76**	**3,369**	**151.61**	**185,878**	**77.07**
89	**Fugitive Emissions**	**-**	**-**	**-**	**-**	**-**	**128.2**	**-**		**0.90**
90	Emergency Generator-Diesel	0.28	0.16	0.16	1.62	9.60	0.28	2.20	462	4.41E-03
91	Emergency Generator-Natural gas	1.16E-03	1.46E-03	1.46E-03	1.78E-05	0.10	3.63E-03	0.01	4.29	2.38E-03
92	FW Pump-Diesel	0.13	0.13	0.13	0.12	1.82	0.15	0.39	67.8	1.59E-03
93	**Subtotal Insignificant Activities**	**0.41**	**0.29**	**0.29**	**1.74**	**11.52**	**0.43**	**2.60**	**534**	**8.38E-03**
94	**Total**	**55.82**	**60.16**	**51.87**	**81.99**	**361.28**	**3,498**	**154.21**	**186,412**	**77.97**

95 *Note: This plant is capable to produce both DDGS and MDGS. The emissions from the DDGS production is the worst case scenario. Therefore, the PTE*
96 *of the wet cake storage is not included in the PTE for the entire source.*

Appendix A: Emissions Calculations

Summary of Emissions

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Potential to Emit After Issuance of Permit (Limited PTE) (ton\yr)

	Significant Emission Units	PM (tons/yr)	PM10 (tons/yr)	PM2.5 (tons/yr)	SO2 (tons/yr)	NOx (tons/yr)	VOC (tons/yr)	CO (tons/yr)	GHG (tons/yr)	Total HAPs (tons/yr)
110	One (1) pneumatic conveyor, identified as EU-11	189.22	189.22	16.08	-	-	-	-	-	-
111	One (1) corn receiving and storage system, identified as EU-12 (Stack S-111)	5.26	5.26	19.15	-	-	-	-	-	-
112	One (1) grain transport system, identified as EU-12 (Stack S-112)	0.96	0.96	1.73	-	-	-	-	-	-
113	Seven (7) storage bins, collectively identified as EU-13	20.33	20.33	1.73	-	-	-	-	-	-
114	Six (6) hammermills, collectively identified as EU-14	90.1	90.1	7.66	-	-	-	-	-	-
115	EU-21, which consists of fourteen (14) open fermenters	-	-	-	-	-	7.81	-	-	0.04
116	DDGS Storage (EU-34)	0.60	0.60	2.53	-	-	-	-	-	-
117	DDGS Rail/Truck Loadout (EU-35/EU-36)	1.27	1.27	2.31	-	-	-	-	-	-
118	DDGS Rail/Truck Loader(EU-37/EU-38)	5.48	5.48	0.05	-	-	-	-	-	-
119	Twenty-four (24) closed fermenters, collectively identified as EU-22	-	-	-	-	-	57.79	-	-	0.26
120	Two (2) beer wells, identified as EU-23 and EU-24	-	-	-	-	-	12.51	-	-	-
121	Distillation (EU-20 and EU-25 through EU-29)	-	-	-	-	-	0.09	-	-	0.00
122	Four (4) paddle screens, identified as EU-31 and three (3) conveyors, identified as EU-33	-	-	-	-	-	440.00	-	-	2.00
123	Five (5) rotary dryers, collectively identified as EU-32	19.85	19.85	19.85	-	-	893.43	-	-	69.90
124	One (1) cooler, and one (1) transport system, collectively identified as EU-32	7.91	5.01	2.01	-	-	9.16	-	-	1.28
125	One (1) DDG Dryer, identified as EU-39	8.4	8.4	8.4	18.84	27.86	8.38	46.43	27,473	20.30
126	Wet Pad, identified as EU-40	-	-	-	-	-	See Note	-	-	-
127	One (1) wine room, identified as EU-41	-	-	-	-	-	19.52	-	-	-
128	One (1) tank farm, identified as EU-42	-	-	-	-	-	19.01	-	-	-
129	EU-43, which consists of Building 88	-	-	-	-	-	4.69	-	-	-
130	One (1) mini-tank farm, identified as EU-45	-	-	-	-	-	3.59	-	-	-
131	One (1) barrel and emptying operation, identified as EU-61	-	-	-	-	-	12.01	-	-	-
132	Six (6) warehouses, identified as EU-71 through EU-76	-	-	-	-	-	1,867	-	-	-
133	One (1) steam boiler, identified as EU-96	1.99	7.96	7.96	0.63	293.4	5.76	88.0	126,479	1.98
134	One (1) steam boiler, identified as EU-97 (worst case fuel)	1.98	2.65	1.96	39.77	25.38	0.56	10.42	56,600	0.40
135	One (1) loading rack, identified as EU-46	-	-	-	-	-	6.69	-	-	0.05
136	**Subtotal Significant Emission Unit**	**353.31**	**357.04**	**91.39**	**59.25**	**346.61**	**3,368**	**144.86**	**210,552**	**96.20**
137	**Fugitive Emissions**	**-**	**-**	**-**	**-**	**-**	**128.23**	**-**	**-**	**0.90**
138	Emergency Generator-Diesel	0.28	0.16	0.16	1.62	9.60	0.28	2.20	462	4.41E-03
139	Emergency Generator-Natural gas	1.16E-03	1.46E-03	1.46E-03	1.78E-05	0.10	3.63E-03	0.01	4.29	2.38E-03
140	FW Pump-Diesel	0.13	0.13	0.13	0.12	1.82	0.15	0.39	67.8	1.59E-03
141	**Subtotal Insignificant Activities**	**0.41**	**0.29**	**0.29**	**1.74**	**11.5**	**0.43**	**2.60**	**534**	**8.38E-03**
142	**Total**	**353.72**	**357.33**	**91.68**	**60.99**	**358.13**	**3,497**	**147.46**	**211,085**	**97.11**

Note: This plant is capable to produce both DDGS and MDGS. The emissions from the DDGS production is the worst case scenario. Therefore, the PTE of the wet cake storage is not included in the PTE for the entire source.

Summary of HAP Emissions

Company Name:
Address:
Significant Source Modification No.:
Significant Permit Modification No.:
Reviewer:
Date:

	A	B	C	D	E	F	G
11	***Significant Emission Units***	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	Lead
12		ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
13							
14	One (1) pneumatic conveyor, identified as EU-11	-	-	-	-	-	-
15	One (1) corn receiving and storage system, identified as EU-12	-	-	-	-	-	-
16	Seven (7) storage bins, collectively identified as EU-13	-	-	-	-	-	-
17	Six (6) hammermills, collectively identified as EU-14	-	-	-	-	-	-
18	EU-21, which consists of fourteen (14) open fermenters	-	-	1.04E-03	-	-	-
19	Silos, surge hopper, and transport system: EU-34 through EU-36	-	-	-	-	-	-
20	Twenty-four (24) closed fermenters, collectively identified as EU-22	-	-	7.69E-03	-	-	-
21	Two (2) beer wells, identified as EU-23 and EU-24	-	-	-	-	-	-
22	Distillation (EU-20 and EU-25 through EU-29)	-	-	2.04E-04	-	-	-
23	Four (4) paddle screens, identified as EU-31 and three (3) conveyors, identified as EU-33	-	-	5.84E-02	-	-	-
24	Five (5) rotary dryers, collectively identified as EU-32	-	-	0.32	-	-	-
25	One (1) cooler, and one (1) transport system, collectively identified as EU-32	-	-	0.43	-	-	-
26	One (1) DDG Dryer, identified as EU-39	4.78E-04	2.73E-04	12.98	0.41	7.74E-04	1.14E-04
27	Wet Pad, identified as EU-40						
28	One (1) rail car loader and one (1) truck loader, identified as EU-37 and EU-38	-	-	-	-	-	-
29	One (1) wine room, identified as EU-41	-	-	-	-	-	-
30	One (1) tank farm, identified as EU-42	-	-	-	-	-	-
31	EU-43, which consists of Building 88	-	-	-	-	-	-
32	One (1) mini-tank farm, identified as EU-45	-	-	-	-	-	-
33	One (1) barrel and emptying operation, identified as EU-61	-	-	-	-	-	-
34	Six (6) warehouses, identified as EU-71 through EU-76	-	-	-	-	-	-
35	One (1) steam boiler, identified as EU-96	2.20E-03	1.26E-03	0.08	1.89	3.56E-03	5.24E-04
36	One (1) steam boiler, identified as EU-97 (worst case fuel)	4.29E-04	2.45E-04	0.02	0.37	6.95E-04	1.80E-03
37	One (1) loading rack, identified as EU-46	-	-	6.69E-03	-	-	-
38	Fugitive Emissions	-	-	0.13	-	-	-
39	**Subtotal Significant Emission Unit**	**3.11E-03**	**1.78E-03**	**14.02**	**2.66**	**5.03E-03**	**2.44E-03**
40	Emergency Generator-Diesel	2.17E-03	-	2.21E-04	-	7.87E-04	-
41	Emergency Generator-Natural gas	5.87E-05	-	1.67E-03	1.35E-05	-	-
42	FW Pump-Diesel	3.84E-04	-	4.85E-04	-	1.68E-04	-
43	**Subtotal Insignificant Activities**	**2.62E-03**	**0.00E+00**	**2.38E-03**	**1.35E-05**	**9.55E-04**	**0.00E+00**
44	**Total**	**5.72E-03**	**1.78E-03**	**14.03**	**2.66**	**5.99E-03**	**2.44E-03**

45 *Note: This plant is capable to produce both DDGS and MDGS. The emissions from the DDGS production is the worst case scenario. Therefore, the PTE*
46 *of the wet cake storage is not included in the PTE for the entire source.*

	H	I	J	K	L	M	N	O	P	Q	R	S
1	**Appendix A: Emissions Calculations**											
2												
3												
4	**MGPI of Indiana, LLC**											
5	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**											
6	**029-35496-00005**											
7	**029-35505-00005**											
8	**Kristen Willoughby**											
9	**12/22/2014**											
10												
11	Cadmium	Chromium	Manganese	Nickel	Acetaldehyde	Propionaldehyde	Methanol	Acrolein	PAH	1,3-Butadiene	Xylene	Total HAP
12	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
13												
14	-	-	-	-	-	-	-	-	-	-	-	0.00
15	-	-	-	-	-	-	-	-	-	-	-	0.00
16	-	-	-	-	-	-	-	-	-	-	-	0.00
17	-	-	-	-	-	-	-	-	-	-	-	0.00
18	-	-	-	-	0.03	2.09E-03	1.04E-03	-	-	-	-	0.04
19	-	-	-	-	-	-	-	-	-	-	-	0.00
20	-	-	-	-	0.23	1.54E-02	7.69E-03	-	-	-	-	0.26
21	-	-	-	-	-	-	-	-	-	-	-	0.00
22	-	-	-	-	2.81E-03	2.04E-04	2.04E-04	-	-	-	-	3.43E-03
23	-	-	-	-	1.77	0.12	0.06	-	-	-	-	2.00
24	-	-	-	-	55.24	-	11.05	3.28	-	-	-	69.90
25	-	-	-	-	0.69	-	0.15	0.01	-	-	-	1.28
26	2.50E-04	3.19E-04	8.65E-05	4.78E-04	20.94	-	4.61	0.42				39.36
27	See Note											-
28	-	-	-	-	-	-	-	-	-	-	-	0.00
29	-	-	-	-	-	-	-	-	-	-	-	0.00
30	-	-	-	-	-	-	-	-	-	-	-	0.00
31	-	-	-	-	-	-	-	-	-	-	-	0.00
32	-	-	-	-	-	-	-	-	-	-	-	0.00
33	-	-	-	-	-	-	-	-	-	-	-	0.00
34	-	-	-	-	-	-	-	-	-	-	-	0.00
35	1.15E-03	1.47E-03	3.98E-04	2.20E-03	-	-	-	-	-	-	-	1.98
36	5.99E-04	5.99E-04	1.20E-03	5.99E-04	-	-	-	-	-	-	-	0.39
37	-	-	-	-	6.69E-03	-	3.34E-02	-	-	-	-	0.05
38	-	-	-	-	1.28E-01	-	6.41E-01	-	-	-	-	0.90
39	**2.00E-03**	**2.38E-03**	**1.68E-03**	**3.28E-03**	**79.0**	**0.14**	**16.55**	**3.71**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**116.15**
40	-	-	-	-	7.06E-05	-	-	2.21E-05	5.94E-04	-	5.40E-04	4.41E-03
41	-	-	-	-	2.35E-04	-	7.50E-05	2.35E-04	4.05E-06	2.48E-05	-	2.32E-03
42	-	-	-	-	3.15E-04	-	-	3.80E-05	6.91E-05	-	1.17E-04	1.58E-03
43	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**6.21E-04**	**0.00E+00**	**7.50E-05**	**2.95E-04**	**6.67E-04**	**2.48E-05**	**6.58E-04**	**0.008**
44	**2.00E-03**	**2.38E-03**	**1.68E-03**	**3.28E-03**	**79.0**	**0.14**	**16.55**	**3.71**	**6.67E-04**	**2.48E-05**	**6.58E-04**	**116.155**
45												
46												

	A	B	C	D	E	F	G	H
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11	Stack ID	Process Description	Control Device	Outlet Grain Loading (gr/dscf)	Maximum Air Flow Rate (scfm)	PTE of PM/PM10 after Control* (lb/hr)	PTE of PM/PM10 after Control (ton/yr)	PTE of PM2.5 after Control** (lb/hr)
12	S-103	Grain Receiving and pneumatic conveyor EU-11	Baghouse	0.004	12,600	0.43	1.89	0.07
13	S-111	Corn Receiving and storage system EU-12	Baghouse	0.004	15,000	0.51	2.25	0.09
14	S-112	Grain Transport system EU-12	Baghouse	0.004	1,354	0.05	0.20	0.01
15	inside	Storage: (7) Grain Storage Silos (EU-13)	Baghouse	0.004	1,354	0.05	0.20	0.01
16	S-104	(6) Hammermills and hopper (EU-14)	Baghouse	0.004	6,000	0.21	0.90	0.03
17		**DDGS Storage (EU-34)**						
18	S-341	Storage silo	Baghouse	0.004	905	0.03	0.14	0.01
19	S-342	Storage silo	Baghouse	0.004	905	0.03	0.14	0.01
20	S-343	Surge Hopper	Baghouse	0.004	86	0.00	0.01	0.00
21	S-344	Surge Hopper	Baghouse	0.004	86	0.00	0.01	0.00
22	S-350	DDGS Rail Loadout (EU-35)	Baghouse	0.004	905	0.03	0.14	0.01
23	S-360	DDGS Truck Loadout (EU-36)	Baghouse	0.004	905	0.03	0.14	0.01
24	S-370	DDGS Rail Car Loader (EU-37)	None	0.004	905	0.03	0.14	0.01
25	S-380	DDGS Truck Loader (EU-38)	None	0.004	905	0.03	0.14	0.01
26	**Total**					**1.4**	**6.3**	**0.2**
27	*Assume all PM emissions equal PM10 emissions.							
28	** Assume controlled PM2.5 emissions equal 17% PM/PM10 emissions (AP-42 Table 9.9.1-1 Reference 40).							
29								
30	**Methodology:**							
31	outlet grain loading (gr/dscf) provided by source with maximum air flow rate (scfm)							
32	PTE of PM/PM10 after Control (lb/hr) = Outlet Grain Loading (gr/dscf) x Max. Air Flow Rate (scfm) x (60 min/hr) x (1 lb/7000 gr)							
33	PTE of PM/PM10 after Control (ton/yr) = Outlet Grain Loading (gr/dscf) x Max. Air Flow Rate (scfm) x (60 min/hr) x (1 lb/7000 gr) x (8760 hr/yr) x (1 ton/2000 lb)							
34	PTE before Control (ton/yr) = PTE after Control (ton/yr) / (1-Control Efficiency)							
35	PM2.5 Control Efficiency is assumed to be less than the PM/PM10 Control Efficiency.							

Appendix A: Emissions Calculations
Grain Handling

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

	I	J	K	L	M	N	O	P	Q	R
11	PTE of PM2.5 after Control (ton/yr)	PM/PM10 Control Efficiency	PM2.5 Control Efficiency	PTE of PM/PM10 before Control (ton/yr)	PTE of PM2.5 before Control (ton/yr)	Limited PTE PM (lb/hr)	Limited PTE PM10 (lb/hr)	Limited PTE PM2.5 (lb/hr)	Limited PTE PM (ton/yr)	Limited PTE PM10 (ton/yr)
12	0.32	99%	98%	189.2	16.1					
13	0.38	99%	98%	225.3	19.1	1.20	1.20	1.20	5.26	5.26
14	0.03	99%	98%	20.3	1.73	0.219	0.219	0.219	0.96	0.96
15	0.03	99%	98%	20.3	1.73					
16	0.15	99%	98%	90.1	7.66					
17										
18	0.02	99%	98%	13.6	1.16	0.136	0.136	0.136	0.60	0.60
19	0.02	99%	98%	13.6	1.16					
20	0.00	99%	98%	1.3	0.11					
21	0.00	99%	98%	1.3	0.11					
22	0.02	99%	98%	13.6	1.16	0.289	0.289	0.289	1.27	1.27
23	0.02	99%	98%	13.6	1.16					
24	0.02	0%	0%	0.14	0.02	1.25	1.25	1.25	5.48	5.48
25	0.02	0%	0%	0.14	0.02					
26	**1.1**	**10.9**	**10.8**	**602.5**	**51.2**	**3.1**	**3.1**	**3.1**	**13.6**	**13.6**

Appendix A: Emissions Calculations

VOC Emissions from Distillation and Beer Wells

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

EU-20, 25-29 Distillation

Potential to Emit (PTE) of VOC:

Maximum Usage (gal/hr)	VOC Emission Factor (lb/1000 gal)	VOC Emission rate (lb/hr)	VOC Emission rate (ton/yr)
31,221	0.000679	0.02	0.1

Methodology:

Emission factor is based on facility information and furnished by source.
Emission Rate (lb/hr) = Usage (gal/hr)/1,000 x EF (lb/1,000 gal)
Emission Rate (ton/yr) = Emission Rate (lb/hr) x 8,760 hr/yr / 2,000 lb/ton

EU-20, EU25- EU-29 Distillation Operations

VOC (lb/hr) = 0.02

	Distillation	
Uncontrolled PTE	**lb HAPs/lb VOC**	**ton/yr**
Acetaldehyde	3.03E-02	2.81E-03
Propionaldehyde	2.20E-03	2.04E-04
Methanol	2.20E-03	2.04E-04
Formaldehyde	2.20E-03	2.04E-04
Total Uncontrolled HAP		**3.43E-03**

Methodology:

lb HAPs/lb VOC emission factors are from uncontrolled distillation in Permit No. T133-31145-00003
HAP (ton/yr) = E.F. (lb HAPs/lb VOC) x VOC (lb/hr) x 8760 (hrs/yr) x 1/2000 (ton/lb)

EU-23 and EU-24 Beer Wells #3 and #1

Maximum Usage 1,050 1,000 bu/hr

Pollutant	Emission Factor (lb/1,000 bu)	VOC Emission rate (lb/yr)	VOC Emission rate (ton/yr)
VOC	2.72	2.86	12.5

Methodology:

Emission factor is based on facility information and furnished by source.
Emission rate (lb/hr) = Maximum usage (1,000 bu/hr) x EF (lb / 1,000 bu)
Emission Rate (lb/hr) = Emission Rate (ton/yr) x 2,000 lb/ton / 8,760 hr/yr

Appendix A: Emissions Calculations

VOC Emissions from Open and Closed Fermentation

Company Name: **MGPI of Indiana, LLC**
Address: **7 Ridge Avenue, Lawrenceburg, Indiana 47025**
Significant Source Modification No.: **029-35496-00005**
Significant Permit Modification No.: **029-35505-00005**
Reviewer: **Kristen Willoughby**
Date: **12/22/2014**

EU-21 Open Fermentation

Potential to Emit (PTE) of VOC from Open Fermentation:

Maximum Usage 1,095,000 bu/yr

Pollutant	Emission Factor (lb/1,000 bu)	VOC Emission rate (lb/yr)	VOC Emission rate (ton/yr)
Ethanol	14.2	15,549	7.77
Ethyl Acetate	0.046	50	0.03
Isoamyl Alcohol	0.013	14	0.007
Isobutyl Alcohol	0.004	4	0.002
Total VOC	14.3		7.81

Methodology:

Emission Factors taken from AP-42, Table 9.12.3-1
Emission Rate (ton/yr) = Usage (bu/yr)/1,000 x Emission Factor (lb/1,000 bu) / 2,000 lb/ton
Emission Rate (lb/hr) = Emission Rate (ton/yr) x 2,000 lb/ton / 8,760 hr/yr

Potential to Emit (PTE) of HAP from Open Fermentation:

VOC (lb/hr) = 1.78

	Open Fermentation	
Uncontrolled PTE	**lb HAPs/lb VOC**	**ton/yr**
Acetaldehyde	4.02E-03	3.14E-02
Propionaldehyde	2.67E-04	2.09E-03
Methanol	1.33E-04	1.04E-03
Formaldehyde	1.33E-04	1.04E-03
Total Uncontrolled HAP		**0.04**

Methodology:

lb HAPs/lb VOC emission factors are from uncontrolled distillation in Permit No. T133-31145-00003
HAP (ton/yr) = E.F. (lb HAPs/lb VOC) x VOC (lb/hr) x 8760 (hrs/yr) x 1/2000 (ton/lb)

EU-22 Closed Fermentation

Potential to Emit (PTE) of VOC Closed Fermentation:

Maximum Usage 8,103,000 bu/yr

Pollutant	Emission Factor (lb/1,000 bu)	VOC Emission rate (lb/yr)	VOC Emission rate (ton/yr)
Ethanol	14.2	115,063	57.53
Ethyl Acetate	0.046	373	0.19
Isoamyl Alcohol	0.013	105	0.05
Isobutyl Alcohol	0.004	32	0.02
Uncontrolled VOC	**14.263**		**57.8**

Methodology:

Emission Factors taken from AP-42, Table 9.12.3-1
Emission Rate (ton/yr) = Usage (bu/yr)/1,000 x Emission Factor (lb/1,000 bu) / 2,000 lb/ton
Emission Rate (lb/hr) = Emission Rate (ton/yr) x 2,000 lb/ton / 8,760 hr/yr

	A	B	C	D	E
108					
109		**Potential to Emit (PTE) of HAP from Closed Fermentation:**			
110					
111		**VOC (lb/hr)**	**=**	**13.19**	
112					
113			Closed Fermentation		
114		**Uncontrolled PTE**	**lb HAPs/lb VOC**	**ton/yr**	
115		Acetaldehyde	4.02E-03	2.32E-01	
116		Propionaldehyde	2.67E-04	1.54E-02	
117		Methanol	1.33E-04	7.69E-03	
118		Formaldehyde	1.33E-04	7.69E-03	
119		**Total Uncontrolled HAP**		**0.26**	
120					
121	**Methodology:**				
122		lb HAPs/lb VOC emission factors are from uncontrolled distillation in Permit No. T133-31145-00003			
123		HAP (ton/yr) = E.F. (lb HAPs/lb VOC) x VOC (lb/hr) x 8760 (hrs/yr) x 1/2000 (ton/lb)			

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64	**VOC Emission rate (lb/hr)**
65	1.78
66	0.006
67	0.002
68	0.0005
69	1.78
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97	**VOC Emission rate (lb/hr)**
98	13.14
99	0.04
100	0.01
101	0.004
102	**13.2**
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Appendix A: Em

Company Name:
Address:
Significant Source Modification No.:
Significant Permit Modification No.:
Reviewer:
Date:

EU-31 and EU-33 Paddle Screens/ Conveyors

Source	Max Usage (gal/hr)
Spirits System	20,859
Whisky System	4,319

Methodology:

Emission Rate = Maximum Usage (gal/hr)/1,000 x VOC Emission factor (lb/1,000 gal)
* Spirits System analysis of stillage based on 0.05% alcohol concentration.
*Whisky System analysis of stillage based on 0.1% alcohol concentration.

VOC (lb/hr) =

Uncontrolled PTE	**lb HAPs/lb VOC**
Acetaldehyde	4.02E-03
Propionaldehyde	2.67E-04
Methanol	1.33E-04
Formaldehyde	1.33E-04
Total Uncontrolled HAP	

Methodology:

lb HAPs/lb VOC emission factors are from uncontrolled distillation in Permit No. T133-31145-00003 and derived from the mash scrubber emissions
HAP (ton/yr) = E.F. (lb HAPs/lb VOC) x VOC (lb/hr) x 8760 (hrs/yr) x 1/2000 (ton/lb)

	D	E	F
1	**issions Calculations**		
2	**Summary of Emissions**		
3			
4	**MGPI of Indiana, LLC**		
5	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**		
6	**029-35496-00005**		
7	**029-35505-00005**		
8	**Kristen Willoughby**		
9	**12/22/2014**		
10			
11			
12	**VOC Emission Factor* (lb/1,000 gal)**	**VOC Emission rate (lb/hr)**	**VOC Emission rate (ton/yr)**
13	3.4	70.92	311
14	6.8	29.37	129
15	**Total:**	**100**	**440**
16			
17			
18			
19			
20			
21			
22	**100.29**		
23			
24	**Stillage**		
25	**ton/yr**		
26	1.77		
27	1.17E-01		
28	5.84E-02		
29	5.84E-02		
30	**2.00**		
31			
32			
33			

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10	**EU-32 Rotary Dryers**		
11			Maximum Usage:
12			
13			Controlled Emission Factor (lb/ton)
14		PM	0.27
15		PM10	0.27
16		PM2.5	0.27
17			
18	**Methodology:**		
19		Controlled emission Factor from AP-42, Table 9.9.7-1	
20		Controlled Emissions (ton/yr) = Usage (ton/yr) x EF (lb/ton) x 8,760 hr/yr / 2,000 lb/ton	
21		Uncontrolled emissions estimated based on an 85% control efficiency for controlled emissions.	
22		PM2.5 emissions conservatively assumed to be equal to PM10 emissions.	
23			
24		**VOC Emissions from the Dryers**	
25		Dryer Feed Rate (ton/hr)	Water Content (% by wt)
26		25.5	66.66%
27			
28	**Methodology**		
29		Potential VOC Emissions from Dryers (lb/hr) = Dryer Feed Rate (25.5 ton/hr) x Water Content of Feed (% by wt) x (lb VOC/lb water) x (2000 lb/1 ton)	
30		Potential VOC Emissions from Dryers (ton/yr) = Potential VOC Emissions from Dryers (lb/hr) x (8760 hr/yr) x (1 ton/2000 lb)	
31			
32		**HAP Emissions from the Dryers**	
33		**HAP**	HAP % (by wt of VOC)
34		Acetaldehyde	6.18%
35		Acrolein	0.37%
36		Methanol	1.24%
37		Formaldehyde	0.04%
38		**Total**	
39		Note: HAP emission rates based on performance tests at similar facilities.	
40	**Methodology**		
41		Potential HAP Emissions from Dryers (lb/hr) = Potential VOC emissions from dryer (lb/hr) x HAP % by wt of VOC	
42		Potential HAP Emissions from Dryers (ton/yr) = Potential HAP Emissions from Dryers (lb/hr) x (8760 hr/yr) x (1 ton/2000 lb)	

	D	E	F	G	H
1	**Appendix A: Emissions Calculations**				
2		**Five (5) rotary dryers**			
3					
4	**Company Name:**	**MGPI of Indiana, LLC**			
5	**Address:**	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**			
6	**Significant Source Modification No.:**	**029-35496-00005**			
7	**Significant Permit Modification No.:**	**029-35505-00005**			
8	**Reviewer:**	**Kristen Willoughby**			
9	**Date:**	**12/22/2014**			
10					
11	25.5 ton/hr		Limited Usage:	147,000	ton/yr
12					
13	Controlled Emissions (lb/hr)	Controlled Emissions (ton/yr)	Uncontrolled Emissions (lb/hr)	Uncontrolled Emissions (ton/yr)	Limited Emissions (ton/yr)
14	6.885	30.2	45.90	201.0	19.85
15	6.885	30.2	45.90	201.0	19.85
16	6.885	30.2	45.90	201.0	19.85
17					
18					
19					
20					
21					
22					
23					
24					
25	VOC Content of Water (lb VOC/lb water)	Potential VOC from Dryers (lb/hr)	Potential VOCs from Dryers (ton/yr)		
26	0.006	204.0	893.4		
27					
28					
29					
30					
31					
32					
33	Potential HAP from Dryers (lb/hr)	Potential HAP from Dryers (ton/yr)			
34	12.61	55.24			
35	0.75	3.28			
36	2.52	11.05			
37	0.07	0.32			
38		**69.9**			
39					
40					
41					
42					

Appendix A: Emissions Calculations
DDG Cooler and Transport System Emission Estimates

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Emission Unit	Emission Point	Description	Uncontrolled PM Emission Factor	Uncontrolled PM_{10} Emission Factor	Uncontrolled $PM_{2.5}$ Emission Factor	DDG throughput		Uncontrolled PM Emission Rate		Uncontrolled PM_{10} Emission Rate		Uncontrolled $PM_{2.5}$ Emission Rate		Controlled PM Emission Rate		Controlled PM_{10} Emission Rate		Controlled $PM_{2.5}$ Emission Rate	
			(lb/ton)	(lb/ton)	(lb/ton)	(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EU-32	4 Screw Conveyors, 2 Drag Conveyors, 3 Product Conveyors, 1 K-Valve	Grain Conveying	0.061	0.034	0.0058	9.56	83,754	0.58	2.55	0.33	1.42	0.06	0.24	0.09	0.38	0.05	0.21	0.01	0.04
	Drum Cooler	Grain Conveying	0.061	0.034	0.0058			0.58	2.55	0.33	1.42	0.06	0.24	0.58	2.55	0.33	1.42	0.06	0.24
							Totals	**1.17**	**5.11**	**0.65**	**2.85**	**0.11**	**0.49**	**0.67**	**2.94**	**0.37**	**1.64**	**0.06**	**0.28**

Emission Unit	Emission Point	Description	Controlled PM Emission Factor	Controlled PM_{10} Emission Factor	Controlled $PM_{2.5}$ Emission Factor	DDG throughput		Controlled PM Emission Rate		Controlled PM_{10} Emission Rate		Controlled $PM_{2.5}$ Emission Rate		Uncontrolled PM Emission Rate		Uncontrolled PM_{10} Emission Rate		Uncontrolled $PM_{2.5}$ Emission Rate	
			(lb/ton)	(lb/ton)	(lb/ton)	(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EU-32	Hammer Mill	Hammer Milling[(b)]	0.067	0.052	0.036	9.56	83,754	0.64	2.81	0.49	2.16	0.35	1.53	12.81	56.12	9.86	43.17	1.74	7.64
							Totals	**0.64**	**2.81**	**0.49**	**2.16**	**0.35**	**1.53**	**12.81**	**56.12**	**9.86**	**43.17**	**1.74**	**7.64**

Emission Unit	Emission Point	Description	Limited PM Emission Rate		Limited PM_{10} Emission Rate		Limited $PM_{2.5}$ Emission Rate	
			(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EU-32	4 Screw Conveyors, 2 Drag Conveyors, 3 Product Conveyors, 1 K-Valve	Grain Conveying	0.58	2.55	0.33	1.42	0.06	0.24
	Drum Cooler	Grain Conveying	0.58	2.55	0.33	1.42	0.06	0.24
EU-32	Hammer Mill	Hammer Milling[(b)]	0.64	2.81	0.49	2.16	0.35	1.53
		Totals	**1.81**	**7.91**	**1.14**	**5.01**	**0.46**	**2.01**

Methodology:

(a) Factors taken from AP-42, Fifth Edition, Volume 1, Section 9.9.1 (Grain Elevators and Processes).

(b) As recommended by AP-42 Appendix B.2, Table B.2.2 for Category 7 - "Grain Processing" on Page 17, the particle size distribution for PM_{10} is 61% of Total PM and for $PM_{2.5}$ is 23% of Total PM for

PM Size Range	Uncontrolled wt%	Collection Efficiency	Controlled Wt	Controlled wt%
$PM_{2.5}$	23%	80%	0.046	54%
$PM_{2.5}$ to PM_{10}	38%	95%	0.019	22%
PM_{10} and higher	39%	95%	0.0195	23%
	1		0.0845	

Overall control: 91.6%

(c) Methodology:
Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]
Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]
Controlled PTE Hammermill (lb/hr) = [Controlled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]
Controlled PTE Hammermill (ton/yr) = [Controlled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]
Uncontrolled PTE PM2.5 Hammermill (lb/hr) = Controlled PTE Hammermill (lb/hr) / (1 - 80%)
Uncontrolled PTE PM/PM10 Hammermill (lb/hr) = Controlled PTE Hammermill (lb/hr) / (1 - 95%)
Uncontrolled PTE PM2.5 Hammermill (ton/yr) = Controlled PTE Hammermill (ton/yr) / (1 - 80%)
Uncontrolled PTE PM/PM10 Hammermill (ton/yr) = Controlled PTE Hammermill (ton/yr) / (1 - 95%)

Emission Unit	Emission Point	Description	Uncontrolled Emission Factors[a]		0.219 lb/ton DDG		0.016 lbs/ton DDG		0.00033 lbs/ton DDG		0.010 lbs/ton DDG		0.0036 lbs/ton DDG		Total HAP Emissions	
			DDG throughput		VOC		Acetaldehyde		Acrolein		Formaldehyde		Methanol			
			(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
EU-32	Drum Cooler	Cooling Drum Apparatus	10	83,754	2.09	9.16	0.16	0.69	0.0031	0.014	0.10	0.43	0.034	0.15	0.292	1.28
	Existing Screw Conveyor	Grain Conveying														
	New 3 Screw Conveyors, 2 Drag Conveyors, 3 Product Conveyors, 1 K-Valve	Grain Conveying														
	Existing Hammer Mill and Cyclone	Hammer Milling														

Methodology:

(a) VOC emission factor for DDG cooling taken from a similar operation permitted in Indiana under Permit #T169-31191-00068 (POET Biorefining - North Manchester). HAP emission factors are derived as a percentage of the VOC emission factor

(b) Methodology :

Emission rate (lb/hr) = DDG Throughput (ton/hr) X DDG Cooling Emission factor (lb/ton)

Emission rate (ton/yr) = DDG Throughput (ton/yr) X DDG Cooling Emission factor (lb/ton) x ton/2,000 lb

Dryer emissions

	tpy from Drying	% of VOC
VOC	8.38	--
Acetaldehyde	0.63	7.50%
Acrolein	0.01	0.15%
Formaldehyde	0.39	4.65%
Methanol	0.14	1.65%

Other DDG Cooler Emission Factors

POET Biorefining - N Manchester

5.685 lb VOC/hr From June 2004 testing at POET-Biorefining Jewell (IA)

26 ton DDG/hr

0.218653846 lb VOC / ton DDG

Appendix B: Emissions Calculations
DDG Dryer (EU-39)

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Combustion Source	Hourly MMBtu/hr	Annual MMBtu/yr	Heat Content (Btu/scf)	Fuel Usage (MMcf/yr)
Direct-fired Dryer Heat Input Capacity[a]	45	394,200	1,020	386.47
RTO Heat Input Capacity[a]	8	70,080	1,020	68.71
Total Heat Input Capacity	53	464,280		455.18

Production Capacity	ton/hr	ton/yr
Short-term Distiller's Dry Grain (DDG) Production[b]	9.6	83,754

Control Efficiency For Criteria Emissions (% Removal)[c]	Pollutant	Control Efficiency
	HAPs	97%
	VOC	98%
	CO	90%
	$PM/PM_{10}/PM_{2.5}$	98%

Emissions From DDG Drying (EU-39)	Pollutant	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
	Uncontrolled Emission Factor	0.12 lbs/MMBtu		2.0 lbs/MMBtu		0.45 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG		10.0 lbs/ton DDG	
	Units	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Uncontrolled PTE		6.36	27.86	106.00	464.28	4.30	18.84	95.61	418.77	95.61	418.77	95.61	418.77	95.61	418.77
Controlled PTE		-	-	10.60	46.43	-	-	1.91	8.38	1.91	8.38	1.91	8.38	1.91	8.38
Limited PTE		6.36	27.86	10.60	46.43	4.30	18.84	1.91	8.38	1.91	8.38	1.91	8.38	1.91	8.38

HAP Emissions From DDG Drying (EU-39)	Pollutant	Acetaldehyde		Formaldehyde		Acrolein		Methanol		Total HAP (from Natural Gas Combustion)		Total HAP Emissions[e]	
	Uncontrolled Emission Factors[c]	0.5 lbs/ton DDGS		0.31 lbs/ton DDGS		0.01 lbs/ton DDGS		0.11 lbs/ton DDGS		See Below			
	Units	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Uncontrolled PTE		4.78	20.94	2.96	12.98	0.10	0.42	1.05	4.61	0.09	0.41	8.99	39.36
Controlled PTE		0.14	0.63	0.09	0.39	0.00	0.01	0.03	0.14	2.82E-03	0.01	0.27	1.18
Limited PTE		1.91	8.38	1.48	6.49	0.10	0.42	1.05	4.61	0.09	0.41	8.99	20.30

	Combustion HAPs - Organics					
	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	**Total - Organics**
Emission Factor in lb/MMcf	2.1E-03	1.2E-03	Included Above	1.8E+00	3.4E-03	
Potential Emission in tons/yr	4.779E-04	2.731E-04		4.097E-01	7.738E-04	**4.112E-01**

	Combustion HAPs - Metals					
	Lead	Cadmium	Chromium	Manganese	Nickel	**Total - Metals**
Emission Factor in lb/MMcf	5.0E-04	1.1E-03	1.4E-03	3.8E-04	2.1E-03	
Potential Emission in tons/yr	1.138E-04	2.503E-04	3.186E-04	8.648E-05	4.779E-04	**1.247E-03**

Notes: Design heat inputs of direct fired dryer and of thermal oxidizer provided by the manufacturer (ICM, Inc.).

(a) Maximum short-term distiller's dry grain (DDG) production rate taken from facility information. Capacity of proposed system will be equivalent to combined capacity of the existing steam-tube dryers (portion of existing EU-32). Material balance is as follows:

(b)

	(lb/hr)	%solids
Dryer feed	35,508	35.5%
Water / Evaporation	21,508	0%
DDG Production	14,000	90%

Annual operations assume that the proposed dryer will operate at capacity continuously throughout the year.

Dryer uncontrolled emission factors and cyclone/thermal oxidizer control efficiencies provided by the manufacturer (ICM, Inc.). Assume PM/PM_{10} emissions are equivalent. Under the Part 70 Permit

(c) Dryer uncontrolled emission factors and thermal oxidizer control efficiencies provided by the manufacturer (ICM, Inc.). Emission factors for specific HAPs include both process emissions from

Methodology:

(d) Nox and CO:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/MMBtu) x Design Firing Rate (MMBtu/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/MMBtu) x Design Firing Rate (MMBtu/yr) / 2,000 lb/ton]

SO2:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

VOC, PM/PM10/PM2.5:

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

Controlled PTE (lb/hr) = [Uncontrolled Emission Rate (lb/hr) x (1 - Control Efficiency)]

Controlled PTE (ton/yr) = [Uncontrolled Emission Rate (ton/yr) x (1-Control Efficiency)]

HAPs (lb/ton emission factor):

Uncontrolled PTE (lb/hr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/hr)]

Uncontrolled PTE (ton/yr) = [Uncontrolled Emission Factor (lb/ton DDG) x Production Rate (ton/yr) / 2,000 lb/ton]

Controlled PTE (lb/hr) = [Uncontrolled Emission Rate (lb/hr) x (1 - Control Efficiency)]

Controlled PTE (ton/yr) = [Uncontrolled Emission Rate (ton/yr) x (1-Control Efficiency)]

HAPs (lb/MMcf emission factor):

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Greenhouse Gas Calculations

	Greenhouse Gas		
	CO2	CH4	N2O
Emission Factor in lb/MMcf	120,000	2.3	2.2
Potential Emission in tons/yr	27,311	0.52	0.50
Summed Potential Emissions in tons/yr	27,312		
CO2e Total in tons/yr	27,473		

Methodology

The N2O Emission Factor for uncontrolled is 2.2. The N2O Emission Factor for low Nox burner is 0.64.

Emission Factors are from AP 42, Table 1.4-2 SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03.

Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O

Appendix A: Emissions Calculations
Wet Pad (EU-40)

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Emission Unit	Emission Point[a]	Uncontrolled Emission Factors[b]		0.0083 lb/ton wet cake		0.0001 lb/ton wet cake		0.00002 lb/ton wet cake		0.0002 lb/ton wet cake		0.00004 lb/ton wet cake		Tota Emis
		Dryer Feed[c]		VOC[d]		Acetaldehyde[d]		Acrolein[d]		Formaldehyde[		Methanol[d]		
		(ton/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)	(lb/hr)
EU-40	Wet Cake Production, Storage, and Loadout	24.56	215,154	0.20	0.89	0.002	0.0108	0.0005	0.0022	0.005	0.022	0.001	0.0043	0.009

Notes:

(a) VOC and HAP emissions can result during periods of dryer start-up and shutdown, when the dryer throughput may be diverted to a wet pad so that wet feed is not sent to dry storage.

(b) Emission factor for wet cake taken from a similar operation permitted in Indiana under Permit #T095-30443-00127 (POET Biorefining - Alexandria).

(c) Hourly dryer feed is maximum as taken from the material balance provided by ICM dated 1/30/2015.

(d) Methodology and Sample Calculations:

Emission rate (lb/hr) = Dryer Feed (ton/hr) X Wet Cake Emission factor (lb/ton)

Emission rate (ton/yr) = Dryer Feed (ton/yr) X Wet Cake Emission factor (lb/ton) x ton/2,000 lb

	R
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9	
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	A	B	C
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7			**Sign**
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10			
11	**EU-41 through EU-43, EU-45, EU-61 Tanks and Bottling Operations**		
12		**Source**	
13		EU-41 (Wine Room)	
14		EU-42 (Tank Farm)	
15		EU-43 (Bldg 88)	
16		EU-45 (Mini Tank Farm)	
17		EU-61 (Whiskey System)	
18		EU-61 (Gin System)	
19		**Total**	
20			
21	**Methodology:**		
22		From Permit No. 24407: Emission Factors based on source estimates. No AP-42 or FIRE emission factors are available	
23		Emissions (ton/yr) = Maximum usage (pg/yr)/1,000 x EF (lb/1,000 gal) / 2,000 lb/ton	
24		Emissions (lb/hr) = Emissions (ton/yr) x 2,000 lb/ton / 8,760 hr/yr	
25			
26	**EU-71 through EU-76 Warehouse Emissions**		
27		**Source**	
28		EU-71 through EU-76	
29			
30	**Methodology:**		
31		Emission factor taken from AP-42 Table 9.12.3-1	
32		Emissions (ton/yr) = # barrels x EF (lb/barrel/yr) / 2,000 lb/ton	

	D	E	F	G
1		Appendix A:	Emissions Calculations	
2			Summary of Emissions	
3				
4		Company Name:	MGPI of Indiana, LLC	
5		Address:	7 Ridge Avenue, Lawrenceburg, Indiana 47025	
6	ficant Source Modification No.:		029-35496-00005	
7	ificant Permit Modification No.:		029-35505-00005	
8		Reviewer:	Kristen Willoughby	
9		Date:	12/22/2014	
10				
11				
12	Maximum Usage (PG/yr)	VOC Emission Factor (lb/1000 gal)	VOC Emissions (lb/hr)	VOC Emissions (ton/yr)
13	32,000,000	1.22	4.46	19.5
14	30,000,000	1.27	4.34	19.0
15	14,000,000	0.67	1.07	4.69
16	10,000,000	0.718	0.82	3.59
17	13,000,000	0.95	1.41	6.18
18	12,775,000	0.913	1.33	5.83
19			**13.43**	**58.8**
20				
21				
22				
23				
24				
25				
26				
27	Emission Factor (lb/barrel/yr)	# Barrels	VOC Emissions (lb/yr)	VOC Emissions (ton/yr)
28	6.9	541278	3,734,818	1,867
29				
30				
31				
32				

Appendix A: Emissions Calculations
Rail Car and Truck Loading Emissions.

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

EU-46 Rail Car and Truck Loading Emissions

Emission Point	Loading Properties[a]				Throughput[b]
	Loading Temperature (F)	Loading Temperature (R)	Vapor Pressure (psi)	Vapor Molecular Weight (lb/lb-mol)	Annual (1,000 gal/yr)
Rail Car and Truck Loading	62	521.67	0.689	46	29,450

Emission Point	Saturation Factor[c]	Loading Loss[d] ($lb/10^3$ gal)	Uncontrolled VOC Emissions[e]
			Annual (ton/yr)
Rail Car and Truck Loading	0.6	0.454	6.69
Total			6.69

Methodology:

(a) Vapor pressure and molecular weight taken from the material property information for ethanol.
Antoine's Coefficients for ethanol: log P = A - [B/(T+C)]; P in bar, T in K

A = 5.37229
B = 1670.409
C = -40.191
T = 289.667 K
P = 0.047 bar
P = 0.689 psi

(b) Maximum annual production of: 31,000,000 gal/yr
Product proof: 190 proof
Product Ethanol concentration: 95%
Maximum annual Ethanol throughput: 29,450,000 gal/yr

(c) Saturation factor for submerged, dedicated loading taken from Section 5.2 of AP-42, Fifth Edition, Volume 1.

(d) Loading loss estimate calculated according to the methodology in Section 5.2 of AP-42, Fifth Edition, Volume 1.
Sample Calculation, average loading loss:

L_L ($lb/10^3$ gal)= 12.46 SMP / T ; S = Saturation Factor (--)
M = Vapor Molecular Weight (lb/lb-mol)
P = Vapor Pressure (psi)
T = Loading Temperature (R)

$$L_L = \frac{(12.46)\ (0.6)\ (46\ lb/lb\text{-}mol)\ (0.689\ psi)}{521.67\ R} = 0.454\ lb / 10^3\ gal$$

(e) Emissions estimated by applying the loading loss to the applicable loading throughput.
sample calculation, annual emissions:

	A	B	C	D	E	F	G	H
48			0.454 lb	29,450 x1,000 gal	ton	=	6.69	ton
49			1000 gal	yr	2,000 lb			yr
50								
51								

52	HAP	Product	HAP Fraction	Uncontrolled PTE HAP (ton/yr)
53	Acetaldehyde [1]	ethanol	1.00E-03	6.69E-03
54	Methanol [2]	ethanol	5.00E-03	3.34E-02
55	Formaldehyde [1]	ethanol	1.00E-03	6.69E-03
56	**Total**			**4.68E-02**

57 1. Acetaldehyde and Formaldehyde are estimated to be at trace levels in ethanol. It will conservatively assume that these trace levels do not exceed 1000 ppm in the ethanol product.

58 2. Methanol concentration is based on maximum weight percent of 0.5% as per ASTM D 4806

59 Note: HAP emission rates based on performance tests at similar facilities.

Appendix A: Emissions Calculations
Equipment Leak Fugitive Emissions

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

EU-81 Equipment Leak Fugitive Emissions

Component	Count	Emission Factor (lb/hr/component)	% VOC	VOC Emissions (lb/hr)	VOC Emissions (ton/yr)
Pumps	124	0.0439	60%	3.27	14.31
Valves	4,481	0.0089	60%	23.93	104.81
Flanges	6,940	0.0005	60%	2.08	9.12
			Total	**29.28**	**128.23**

Methodology:

Component counts based on facility estimates. Counts exclude components within former bottling operation that are no longer owned or operated by MGPI of Indiana, LLC.
Average SOCMI emission factor, taken from "Protocol for Equipment Leak Emission Estimates", EPA-453/R-95-017, November 1995
Emissions (lb/hr) = # components x EF (lb/hr/component) x % VOC
Emissions (ton/yr) = Emissions (lb/hr) x 8,760 hr/yr / 2,000 lb/ton

Total Fugitive VOCs (ton/yr) **128.23**

HAP	HAP Fraction	Fugitive HAP Emissions (tons/yr)
Acetaldehyde [1]	1.00E-03	1.28E-01
Methanol [2]	5.00E-03	6.41E-01
Formaldehyde [1]	1.00E-03	1.28E-01
Total		**0.90**

1. Acetaldehyde and Formaldehyde are estimated to be at trace levels in ethanol. It is conservatively assume that these trace levels do not exceed 1000 ppm in the ethanol product.

2. Methanol concentration is based on maximum weight percent of 0.5% as per ASTM D 4806

	A	B	C	D	E	F	G
34	Fugitive HAP Emissions (tons/yr) = VOC (tons/yr) x HAP Fraction						

Appendix A: Emission Calculations
Natural Gas Combustion Only
Utility Boiler

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Heat Input Capacity MMBtu/hr	Potential Throughput MMCF/yr
244.0	2095.5

	Pollutant						
	PM*	PM10*	direct PM2.5*	SO2	NOx	VOC	CO
Emission Factor in lb.	1.9	7.6	7.6	0.6	280.0 **see below	5.5	84.0
Potential Emission in	1.99	7.96	7.96	0.63	293.4	5.76	88.0

*PM emission factor is filterable PM only. PM10 emission factor is condensable and filterable PM10 combined.
PM2.5 emission factor is condensable and filterable PM2.5 combined.
**Emission Factors for NOx: Uncontrolled = 280 (pre-NSPS) or 190 (post-NSPS), Low NOx Burner = 140, Flue gas recirculation = 100 (See Table 1.4-1)

Methodology
All emission factors are based on normal fi
MMBtu = 1,020,000 I
MMCF = 1,000,000 Cu
Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,020 MMBtu
Emission Factors from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, and 1.4-3, SCC #1-01-006-01, 1-01-006-04
(AP-42 Supplement D 3
Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

	HAPs - Organics				
	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene
Emission Factor in lb.	2.1E-03	1.2E-03	7.5E-02	1.8E+00	3.4E-03
Potential Emission in	2.20E-03	1.26E-03	7.86E-02	1.89E+00	3.56E-03

	HAPs - Metals					
	Lead	Cadmium	Chromium	Manganese	Nickel	
Emission Factor in lb.	5.0E-04	1.1E-03	1.4E-03	3.8E-04	2.1E-03	Total HAPs
Potential Emission in	5.24E-04	1.15E-03	1.47E-03	3.98E-04	2.20E-03	1.98

The five highest organic and metal HAPs emission factors are provided above.
Additional HAPs emission factors are available in AP-42, Chapter 1.4.

	Greenhouse Gas		
	CO2	CH4	N2O
Emission Factor in lb.	120,000	2.3	2.2
Potential Emission in	125,732	2.4	2.3

	A	B	C	D	E	F	G	H	I	J
63	Summed Potential Emissions in tons/yr				125,736					
64										
65										
66	CO2e Total in tons/yr				126,479					
67										
68										
69	**Methodology**									
70	The N2O Emission Factor for uncontrolled is 2.2. The N2O Emission Factor for low NOx burner is 0.64.									
71	Emission Factors are from AP 42, Table 1.4-2 SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03.									
72	Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.									
73	Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton									
74	CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x N2O GWP (298).									

Appendix A: Emission Calculations
Natural Gas Combustion Only
Utility Boiler

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Heat Input Capacity MMBtu/hr	HHV MMBtu/MMcf	Potential Throughput MMCF/yr
47.6	1020	408.8

Unrecognized Fuel Oil usage Heat Input Capacity MMBtu/yr	HHV MMBtu/MMcf	Potential Throughput MMCF/yr
140736.0	1020	138.0

	Pollutant						
	PM*	PM10*	direct PM2.5*	SO2	NOx	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	7.6	0.6	100 **see below	5.5	84
Potential Emission in t	0.39	1.55	1.55	0.12	20.4	1.12	17.2
Potential Emissions from Unre Fuel Oil consumption	0.13	0.52	0.52	0.04	6.90	0.38	5.80

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.
PM2.5 emission factor is filterable and condensable PM2.5 combined.
**Emission Factors for NOx: Uncontrolled = 100, Low NOx Burner = 50, Low NOx Burners/Flue gas recirculation = 32

Methodology
All emission factors are based on normal firing.
MMBtu = 1,000,000 B
MMCF = 1,000,000 Cubic Fee
Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03
Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,020 MMBtu
Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

HAPS Calculations

	HAPs - Organics					
	Benzene	Dichlorobenzene	Formaldehyde	Hexane	Toluene	**Total - Organics**
Emission Factor in lb/	2.1E-03	1.2E-03	7.5E-02	1.8E+00	3.4E-03	
Potential Emission in t	4.292E-04	2.453E-04	1.533E-02	3.679E-01	6.950E-04	**3.846E-01**

	HAPs - Metals					
	Lead	Cadmium	Chromium	Manganese	Nickel	**Total - Metals**
Emission Factor in lb/	5.0E-04	1.1E-03	1.4E-03	3.8E-04	2.1E-03	
Potential Emission in t	1.022E-04	2.248E-04	2.862E-04	7.767E-05	4.292E-04	**1.120E-03**

	H	I
	Total HAPs	**3.857E-01**
	Worst HAP	**3.679E-01**

Methodology is the same as ab

The five highest organic and metal HAPs emission factors are provided above.
Additional HAPs emission factors are available in AP-42, Chapter 1.4.

Greenhouse Gas Calculations

	Greenhouse Gas		
	CO2	CH4	N2O
Emission Factor in lb/	120,000	2.3	2.2
Potential Emission in t	24,528	0.5	0.4
Summed Potential Emissions in tons/yr		24,529	
CO2e Total in tons/yr		24,674	

Methodology

The N2O Emission Factor for uncontrolled is 2.2. The N2O Emission Factor for low NOx burner is 0.64.
Emission Factors are from AP 42, Table 1.4-2 SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03.
Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.
Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton
CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x

Appendix A: Emissions Calculations

Commercial/Institutional/Residential Combustors (< 100 MMBtu/hr)

#1 and #2 Fuel Oil

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Heat Input C:	Potential Throughput		Limited Throughput	S = Weight %
MMBtu/hr		kgals/year	kgals/yr	0.3
45.6		2853.3	1848	

Unrecognized Fuel Oil usage (kgals/year)	Unrecognized Heat Input Capacity MMBtu/yr
1005.3	140736.0

	Pollutant						
	PM*	PM10	direct PM2.5	SO2	NOx	VOC	CO
Emission Fac	2.0	2.3	1.55	42.6	20.0	0.20	5.0
				(142.0S)			
Limited Emission Factor in lb/kgal				43.00			
Potential Emission in tons/yr	2.85	3.28	2.21	60.8	28.5	0.29	7.1
Limited Emissions from fuel oil in tons/yr	1.85	2.13	1.43	39.7	18.5	0.185	4.62

Methodology
1 gallon of No. 2 Fuel Oil has a heating value of 140,000 Btu
Potential Throughput (kgals/year) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1kgal per 1000 gallon x 1 gal per 0.140 MM Btu
Emission Factors are from AP 42, Tables 1.3-1, 1.3-2, 1.3-3 and 1.3-6 (SCC 1-02-005-01/02/03) Supplement E 9/98 (see erata file)
*PM emission factor is filterable PM only. Condensable PM emission factor is 1.3 lb/kgal.
Emission (tons/yr) = Throughput (kgals/ yr) x Emission Factor (lb/kgal)/2,000 lb/ton

	HAPs - Metals				
	Arsenic	Beryllium	Cadmium	Chromium	Lead
Emission Factor in lb/MMBtu	4.0E-06	3.0E-06	3.0E-06	3.0E-06	9.0E-06
Potential Emission in tons/yr	7.99E-04	5.99E-04	5.99E-04	5.99E-04	1.80E-03

	HAPs - Metals (continued)				
	Mercury	Manganese	Nickel	Selenium	
Emission Factor in lb/MMBtu	3.0E-06	6.0E-06	3.0E-06	1.5E-05	
					Total
Potential Emission in tons/yr	5.99E-04	1.20E-03	5.99E-04	3.00E-03	9.8E-03

Methodolog
No data was available in AP-42 for organic HAPs.
Potential Emissions (tons/year) = Throughput (MMBtu/hr)*Emission Factor (lb/MMBtu)*8,760 hrs/yr / 2,000 lb/ton

	Greenhouse Gas		
	CO2	CH4	N2O
Emission Fac	22,300	0.052	0.26
Potential Emission in tons/yr	31,814	0.1	0.4
Summed Potential Emissions in tons/yr	31,814		
CO2e Total in tons/yr	31,926		

Methodology
The CO2 Emission Factor for #1 Fuel Oil is 21500. The CO2 Emission Factor for #2 Fuel Oil is 22300.
Emission Factors are from AP 42, Tables 1.3-3, 1.3-8, and 1.3-12 (SCC 1-02-005-01/02/03) Supplement E 9/99 (see erata file)
Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.
Emission (tons/yr) = Throughput (kgals/ yr) x Emission Factor (lb/kgal)/2,000 lb/ton
CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x N2O GWP (298).

	D	E
1		**Appendix A: Emission Calculations**
2		**Large Reciprocating Internal Combustion Engines - Diesel Fuel**
3		**Emergency Generator**
4		
5	**Company Name:**	**MGPI of Indiana, LLC**
6	**Address:**	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**
7	**Significant Source Modification No.:**	**029-35496-00005**
8	**Significant Permit Modification No.:**	**029-35505-00005**
9	**Reviewer:**	**Kristen Willoughby**
10	**Date:**	**12/22/2014**

B. Emissions calculated based on output rating (hp)

Output Horsepower Rating (hp)	1600.0
Maximum Hours Operated per Year	500
Potential Throughput (hp-hr/yr)	800,000
Sulfur Content (S) of Fuel (% by weight)	0.500

	Pollutant				
	PM*	PM10*	direct PM2.5*	SO2	NOx
Emission Factor in lb/hp-hr	7.00E-04	4.01E-04	4.01E-04	4.05E-03	2.40E-02
				(.00809S)	**see below
Potential Emission in tons/yr	0.28	0.16	0.16	1.62	9.60

*PM10 emission factor in lb/hp-hr was calculated using the emission factor in lb/MMBtu and a brake specific fuel consumption of 7,000 Btu / hp-hr (AP-42 Table 3.3-1).

**NOx emission factor: uncontrolled = 0.024 lb/hp-hr, controlled by ignition timing retard = 0.013 lb/hp-hr

Hazardous Air Pollutants (HAPs)

	Pollutant				
	Benzene	Toluene	Xylene	Formaldehyde	Acetaldehyde
Emission Factor in lb/hp-hr****	5.43E-06	1.97E-06	1.35E-06	5.52E-07	1.76E-07
Potential Emission in tons/yr	2.17E-03	7.87E-04	5.40E-04	2.21E-04	7.06E-05

***PAH = Polyaromatic Hydrocarbon (PAHs are considered HAPs, since they are considered Polycyclic Organic Matter)

****Emission factors in lb/hp-hr were calculated using emission factors in lb/MMBtu and a brake specific fuel consumption of 7,000 Btu / hp-hr (AP-42 Table 3.3-1).

Green House Gas Emissions (GHG)

	Pollutant		
	CO2	CH4	N2O
Emission Factor in lb/hp-hr	1.15E+00	4.62E-05	9.24E-06
Potential Emission in tons/yr	4.60E+02	1.85E-02	3.70E-03

Emission Factors are from AP 42 (Supplement B 10/96) Tables 3.4-1 , 3.4-2, 3.4-3, and 3.4-4.
CH4 and N2O Emission Factor from 40 CFR 98 Subpart C Table C-2.
Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.
Potential Throughput (hp-hr/yr) = [Output Horsepower Rating (hp)] * [Maximum Hours Operated per Year]
Potential Emission (tons/yr) = [Potential Throughput (hp-hr/yr)] * [Emission Factor (lb/hp-hr)] / [2,000 lb/ton]
CO2e (tons/yr)= CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x N2O GWP (298).

	H	I
12		
13		
14		
15		
16		
17		
18		
19		
20	VOC	CO
21	7.05E-04	5.50E-03
22		
23	0.28	2.20
24		
25		
26		
27		
28		
29		
30		Total PAH
31	Acrolein	HAPs***
32	5.52E-08	1.48E-06
33	2.21E-05	5.94E-04
34		
35		
36		
37		
38	**Potential Emission of Total HAPs (tons/yr)**	**4.41E-03**
39		
40		
41		
42		
43		
44		
45		
46	**Summed Potential Emissions in tons/yr**	**4.60E+02**
47	**CO2e Total in tons/yr**	**4.62E+02**
48		
49		
50		
51		
52		
53		
54		

Appendix A: Emission Calculations
Reciprocating Internal Combustion Engines - Natural Gas
2-Stroke Lean-Burn (2SLB) Engines

Company Name: MGPI of Indiana, LLC
Address: 7 Ridge Avenue, Lawrenceburg, Indiana 47025
Significant Source Modification No.: 029-35496-00005
Significant Permit Modification No.: 029-35505-00005
Reviewer: Kristen Willoughby
Date: 12/22/2014

Maximum Heat Input Capacity (MMBtu/hr)	0.121
Maximum Hours Operated per Year (hr/yr)	500
Potential Fuel Usage (MMBtu/yr)	60.5
High Heat Value (MMBtu/MMscf)	1020
Potential Fuel Usage (MMcf/yr)	0.06

	Pollutant						
Criteria Pollutants	PM*	PM10*	PM2.5*	SO2	NOx	VOC	CO
Emission Factor (lb/MMBtu)	3.84E-02	4.83E-02	4.83E-02	5.88E-04	3.17E+00	1.20E-01	3.86E-01
Potential Emissions (tons/yr)	0.001	0.001	0.001	1.78E-05	0.10	0.004	0.01

*PM emission factor is for filterable PM-10. PM10 emission factor is filterable PM10 + condensable PM.
PM2.5 emission factor is filterable PM2.5 + condensable PM.

Hazardous Air Pollutants (HAPs)

Pollutant	Emission Factor (lb/MMBtu)	Potential Emissions (tons/yr)
Acetaldehyde	7.76E-03	2.35E-04
Acrolein	7.78E-03	2.35E-04
Benzene	1.94E-03	5.87E-05
1,3-Butadiene	8.20E-04	2.48E-05
Ethylbenzene	1.08E-04	3.27E-06
Formaldehyde	5.52E-02	1.67E-03
Methanol	2.48E-03	7.50E-05
Methylene Chloride	1.47E-04	4.45E-06
Hexane	4.45E-04	1.35E-05
Toluene	9.63E-04	2.91E-05
2,2,4-Trimethylpentane	8.46E-04	2.56E-05
Total PAH**	1.34E-04	4.05E-06
	Total	**2.38E-03**

**PAH = Polyaromatic Hydrocarbon (PAHs are considered HAPs, since they are considered Polycyclic Organic Matter)

Methodology
Emission Factors are from AP-42 (Supplement F, July 2000), Table 3.2-1
Potential Fuel Usage (MMBtu/yr) = [Maximum Heat Input Capacity (MMBtu/hr)] * [Maximum Hours Operating per Year (hr/yr)]
Potential Emissions (tons/yr) = [Potential Fuel Usage (MMBtu/yr)] * [Emission Factor (lb/MMBtu)] / [2000 lb/ton]

	Greenhouse Gas (GHG)		
Greenhouse Gases (GHGs)	CO2	CH4	N2O
Emission Factor in lb/MMBtu*	110	1.25	
Emission Factor in lb/MMcf**			2.2
Potential Emission in tons/yr	3.33	0.04	0.00
Summed Potential Emissions in tons/yr	3.37		

	A	B	C	D	E	F	G	H
55								
56	CO2e Total in tons/y				4.29			
57								
58								
59	**Methodology**							
60	*The CO2 and CH4 emission factors are from Emission Factors are from AP-42 (Supplement F, July 2000), Table 3.2-2							
61	**The N2O emission factor is from AP 42, Table 1.4-2. The N2O Emission Factor for uncontrolled is 2.2. The N2O Emission Factor for low NOx burner is 0.64.							
62	Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.							
63	For CO2 and CH4: Emission (tons/yr) = [Potential Fuel Usage (MMBtu/yr)] * [Emission Factor (lb/MMBtu)] / [2,000 lb/ton]							
64	For N2O: Emission (tons/yr) = [Potential Fuel Usage (MMCF/yr)] * [Emission Factor (lb/MMCF)] / [2,000 lb/ton]							
65	CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x N2O GWP (298).							
66								
67	**Abbreviations**							
68	PM = Particulate Matter		NOx = Nitrous Oxides				CO2 = Carbon Dioxide	
69	PM10 = Particulate Matter (<10 um)		VOC - Volatile Organic Compounds				CH4 = Methane	
70	SO2 = Sulfur Dioxide		CO = Carbon Monoxide				N2O = Nitrous Oxide	
71							CO2e = CO2 equivalent emissions	

Appendix A: Emission Calculations
Reciprocating Internal Combustion Engines - Diesel Fuel
Output Rating (<=600 HP)
Maximum Input Rate (<=4.2 MMBtu/hr)

Company Name:	**MGPI of Indiana, LLC**
Address:	**7 Ridge Avenue, Lawrenceburg, Indiana 47025**
Significant Source Modification No.:	**029-35496-00005**
Significant Permit Modification No.:	**029-35505-00005**
Reviewer:	**Kristen Willoughby**
Date:	**12/22/2014**

Emissions calculated based on output rating (hp)

Output Horsepower Rating (hp)	235.0
Maximum Hours Operated per Year	500
Potential Throughput (hp-hr/yr)	117,500
Sulfur Content (S) of Fuel (% by weight)	0.500

	Pollutant			
	PM*	PM10*	direct PM2.5*	SO2
Emission Factor in lb/hp-hr	2.20E-03	2.20E-03	2.20E-03	2.05E-03
Potential Emission in tons/yr	0.13	0.13	0.13	0.12

*PM10 emission factor in lb/hp-hr was calculated using the emission factor in lb/MMBtu and a brake specific fuel consumption of 7,000 Btu / hp-hr (AP-42 Table 3.3-1).

**NOx emission factor: uncontrolled = 0.024 lb/hp-hr, controlled by ignition timing retard = 0.013 lb/hp-hr

Hazardous Air Pollutants (HAPs)

	Pollutant			
	Benzene	Toluene	Xylene	1,3-Butadiene
Emission Factor in lb/hp-hr****	6.53E-06	2.86E-06	2.00E-06	2.74E-07
Potential Emission in tons/yr	3.84E-04	1.68E-04	1.17E-04	1.61E-05

***PAH = Polyaromatic Hydrocarbon (PAHs are considered HAPs, since they are considered Polycyclic Organic Matter)

****Emission factors in lb/hp-hr were calculated using emission factors in lb/MMBtu and a brake specific fuel consumption of 7,000 Btu / hp-hr (AP-42 Table 3.3-1).

Green House Gas Emissions (GHG)

	Pollutant		
	CO2	CH4	N2O
Emission Factor in lb/hp-hr	1.15E+00	4.62E-05	9.24E-06
Potential Emission in tons/yr	6.76E+01	2.71E-03	5.43E-04

Methodology

	A	B	C	D	E	F
50	Emission Factors are from AP42 (Supplement B 10/96), Tables 3.3-1 and 3.3-2					
51	CH4 and N2O Emission Factor from 40 CFR 98 Subpart C Table C-2.					
52	Global Warming Potentials (GWP) from Table A-1 of 40 CFR Part 98 Subpart A.					
53	Potential Throughput (hp-hr/yr) = [Output Horsepower Rating (hp)] * [Maximum Hours Operated per Year]					
54	Potential Emission (tons/yr) = [Potential Throughput (hp-hr/yr)] * [Emission Factor (lb/hp-hr)] / [2,000 lb/ton]					
55	CO2e (tons/yr) = CO2 Potential Emission ton/yr x CO2 GWP (1) + CH4 Potential Emission ton/yr x CH4 GWP (25) + N2O Potential Emission ton/yr x N2O GWP (298).					

	G	H	I	J
1				
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3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20	NOx	VOC	CO	
21	3.10E-02	2.51E-03	6.68E-03	
22				
23	1.82	0.15	0.39	
24				
25				
26				
27				
28				
29				
30				Total PAH
31	Formaldehyde	Acetaldehyde	Acrolein	HAPs***
32	8.26E-06	5.37E-06	6.48E-07	1.18E-06
33	4.85E-04	3.15E-04	3.80E-05	6.91E-05
34				
35				
36				
37				
38		**Potential Emission of Total HAPs (tons/yr)**	**1.59E-03**	
39				
40				
41				
42				
43				
44				
45				
46		**Summed Potential Emissions in tons/yr**	**6.76E+01**	
47		**CO2e Total in tons/yr**	**6.78E+01**	
48				
49				

	G	H	I	J
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