Another Courtesy Draft 8/7/2025

Friday, August 8, 2025 1:48 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Re: Pre Draft for Permit App 13-3708

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Thu, Aug 7, 2025 at 8:58 AM
To: Michael Dearing <Michael.Dearing@erm.com>, William Calhoun <jack.calhoun@fidelisinfra.com>, Anand Rathinasamy <anand.rathinasamy@erm.com>

Michael,

Attached is an updated pre-draft for you to review as a courtesy.

Should you have any questions or concerns, please let me know.

Thanks,

Ed

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-414-1244

601 57th Street, SE

Charleston, WV 25304

On Wed, Aug 6, 2025 at 4:53 PM Michael Dearing <Michael.Dearing@erm.com> wrote:

> Ed,
>
> Attached is the updated throughput gallons on the attachment L for the water water treatment plant as we discussed on the call.
>
> Thanks

ERM
Sustainability is our business

Michael Dearing

Principal Consultant, Scientist

Charleston (WV) **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Monday, July 21, 2025 2:51 PM
To: Michael Dearing <Michael.Dearing@erm.com>; Anand Rathinasamy <anand.rathinasamy@erm.com>
Cc: William Calhoun <jack.calhoun@fidelisinfra.com>
Subject: Pre Draft for Permit App 13-3708

EXTERNAL MESSAGE

Michael and Anand,

Attached is a pre-draft for you to review as a courtesy.

Should you have any questions or concerns, please let me know.

Thanks,

Ed

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

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601 57th Street, SE

Charleston, WV 25304

053-00134_PERM_R13-3708-working_draft_V_1.pdf
601K

Wastewater Treatment update 8/6/2025

Thursday, August 7, 2025 8:46 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Pre Draft for Permit App 13-3708

1 message

Michael Dearing <Michael.Dearing@erm.com> Wed, Aug 6, 2025 at 4:53 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, Anand Rathinasamy <anand.rathinasamy@erm.com>
Cc: William Calhoun <jack.calhoun@fidelisinfra.com>

Ed,

Attached is the updated throughput gallons on the attachment L for the water water treatment plant as we discussed on the call.

Thanks

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Michael Dearing

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To: Michael Dearing <Michael.Dearing@erm.com>; Anand Rathinasamy <anand.rathinasamy@erm.com>
Cc: William Calhoun <jack.calhoun@fidelisinfra.com>
Subject: Pre Draft for Permit App 13-3708

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Should you have any questions or concerns, please let me know.

Thanks,

Ed

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-414-1244

601 57th Street, SE

Charleston, WV 25304

WWTP - Attachment-L.pdf
71K

Comment 8/4/2025

Monday, August 4, 2025 8:07 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Pre Draft for Permit App 13-3708

1 message

Michael Dearing <Michael.Dearing@erm.com> Fri, Aug 1, 2025 at 4:25 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, Anand Rathinasamy <anand.rathinasamy@erm.com>
Cc: William Calhoun <jack.calhoun@fidelisinfra.com>

Ed,

The only thing to jumped out to us was the wastewater treatment plant throughput limit. We would like to request it be increased to 646 gpm or 930,240 gpd.

9.1.7. The following requirements are specific to the wastewater treatment plant identified as 127-PKG-001:

a. HCl emissions from the collection of process units and fugitive sources associated with the wastewater treatment plant shall not exceed 0.57 tons per year on a 12-month rolling total basis.

b. Sulfuric acid mist (H2SO4) emissions from the collection of process units and fugitive sources associated with the wastewater treatment plant shall not exceed 2.79 tons per year on a 12-month rolling total basis.

c. The wastewater treatment plant shall not process/treat more than 4,152 gallons per day.

Thanks

ERM
Sustainability is our business

Michael Dearing

Principal Consultant, Scientist

Charleston (WV) **erm.com**

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From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Monday, July 21, 2025 2:51 PM
To: Michael Dearing <Michael.Dearing@erm.com>; Anand Rathinasamy <anand.rathinasamy@erm.com>
Cc: William Calhoun <jack.calhoun@fidelisinfra.com>
Subject: Pre Draft for Permit App 13-3708

EXTERNAL MESSAGE

Michael and Anand,

Attached is a pre-draft for you to review as a courtesy.

Should you have any questions or concerns, please let me know.

Thanks,

Ed

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-414-1244

601 57th Street, SE

Charleston, WV 25304

Complete App 6/23/2025

Monday, June 23, 2025 11:55 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

Complete App Email for R13-3708

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Mon, Jun 23, 2025 at 11:00 AM
To: William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Michael Dearing <Michael.Dearing@erm.com>, Anand Rathinasamy <anand.rathinasamy@erm.com>, Joseph R Kessler <joseph.r.kessler@wv.gov>

RE: Application Status: Complete
MGS CNP 1, LLC
Permit Application R13-3708
Plant ID No. 053-00134

Mr. Calhoun,

Your application for a biomass boiler was received by this Division of Air Quality on February 24, 2025, and assigned to the writer for review. Upon review of said application, it has been determined that the application is complete and, therefore, the statutory review period ***90*** commenced on June 23, 2025.

This determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit determination. **Please note that any additional information requests may pause the statutory review clock.**

Should you have any questions, please contact Ed Andrews at (304) 414-1244 or reply to this email.

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE
Charleston, WV 20304

Response to 6/6 Inc Email 6/20/2025

Monday, June 23, 2025 7:36 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Incomplete App Email for Permit Application R13-3708

1 message

Michael Dearing <Michael.Dearing@erm.com> Fri, Jun 20, 2025 at 3:56 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, Anand Rathinasamy <anand.rathinasamy@erm.com>, William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>

Ed,

Please see the attached file for a MGS CNP 1, LLC response to comments that were sent on 6/6/2025.

If you have any questions, please let us know.

Thanks

ERM
Sustainability is our business

Michael Dearing
Principal Consultant, Scientist

Charleston (WV) **erm.com**

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C +1-(304)-654-2227

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Friday, June 6, 2025 4:08 PM
To: Anand Rathinasamy <anand.rathinasamy@erm.com>; William Calhoun <jack.calhoun@fidelisinfra.com>;

Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>
Subject: Incomplete App Email for Permit Application R13-3708

EXTERNAL MESSAGE

RE: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. It has been determined that the application as submitted is incomplete based on the following items:

1. The emission of non methane hydrocarbons (NMHC) plus nitrogen oxides (NOx) presented in the application from the emergency engine for the firewater pump (Emission Unit ID 129-P-9402) indicate potentially non-compliance with the NMHC + NOx standard for stationary fire pump engines of Subpart IIII to 40CFR60. Please update your application accordingly.

Please address the above issue by June 23, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

Thanks,
Ed

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE

Charleston, WV 25304

6-6-25 Incomplete Notice Cover Leter V0.02.pdf
729K

6-6-25
Incomplet...

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

FIDELIS

June 18, 2025

Laura M. Crowder, Director
WV Department of Environmental Protection (WVDEP)
Division of Air Quality (DAQ)
601 57th Street SE
Charleston, WV 25304

Re: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Ms. Crowder,

Please find our responses to each of your questions/comments in the incomplete application notice sent to MGS CNP 1, LLC (MGS) on June 6th 2025. MGS has provided a response in italics to address all the questions surrounding the application for the BECCS plant.

The following items will be attached to address comments.

- Attachment N - Updated emission calculations
- Attachment L - Engine Data Sheet
- Emission Specification for the Fire Pump Engine

If you have additional questions, please do not hesitate to contact us.

Sincerely,

Jack Calhoun
Vice President

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

FIDELIS

RE: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. It has been determined that the application as submitted is incomplete based on the following items:

1. The emission of non methane hydrocarbons (NMHC) plus nitrogen oxides (NOx) presented in the application from the emergency engine for the firewater pump (Emission Unit ID 129-P-9402) indicate potentially non-compliance with the NMHC + NOx standard for stationary fire pump engines of Subpart IIII to 40CFR60. Please update your application accordingly.
   a. *Attachment N shows the updated emissions for the proposed fire pump unit.*
   b. *Attachment L has been updated with proposed fire pump engine information.*
   c. *The emission specification for the fire pump engine has been provided to demonstrate compliance NSPS IIII.*

Please address the above issue by June 23, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

Thanks,
Ed

MGS CNP 1, LLC

MGS CNP 1, LLC Biomass Fired Power Plant Initial Minor NSR Application Emission Calculations Summary

Emission ID	NO_x		CO		PM		PM_{10}		$PM_{2.5}$		PM-Filterable		PM_{10}-Filterable		$PM_{2.5}$-Filterable		VOC		SO_2		NH_3		H_2SO_4		Pb	
	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MGS CNP 1, LLC

MGS CNP 1, LLC Biomass Fired Power Plant Initial Minor NSR Application Emission Calculations HAPs Summary

Emission ID	Total HAPs		Acetaldehyde		Acrolein		Benzene		Formaldehyde		HCl		Styrene		Toluene	
	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr
[illegible]	[illegible]	[illegible]	--	8.14	--	[illegible]	--	[illegible]	--	[illegible]	[illegible]	[illegible]	--	0.85	--	[illegible]
[illegible]	[illegible]	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.01	--	--	--	--	--	<0.01
[illegible]	[illegible]	[illegible]	--	<0.01	--	<0.01	--	<0.01	--	[illegible]	--	--	--	<0.01	--	<0.01
[illegible]	[illegible]	0.27	--	--	--	--	--	--	--	--	[illegible]	0.27	--	--	--	--
Totals:	[illegible]	[illegible]	<0.01	8.14	<0.01	[illegible]	<0.01	[illegible]	<0.01	[illegible]	[illegible]	[illegible]	<0.01	0.85	<0.01	[illegible]

MGS CHP 1, LLC Biomass Fired Power Plant Initial Minor NSR Application Emission Calculations HAPs Summary

Emission ID	Total HAPs		Acetaldehyde		Acrolein		Benzene		Formaldehyde		HCl		Styrene		Toluene	
	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr	lb/Yr	Tons/Yr
123-H-2001	3.58	28.80	--	8.16	--	1.82	--	5.22	--	3.26	1.18	3.02	--	0.88	--	0.43
123-P-2002	0.22	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.01	--	--	--	--	--	<0.01
123-FUG-2001	1.58	0.01	--	<0.01	--	<0.01	--	<0.01	--	0.02	--	--	--	<0.01	--	<0.01
127-FUG-2001	0.12	0.17	--	--	--	--	--	--	--	--	0.12	0.17	--	--	--	--
Totals:	**5.89**	**28.98**	**<0.01**	**8.16**	**<0.01**	**1.82**	**<0.01**	**5.22**	**<0.01**	**3.28**	**1.30**	**3.19**	**<0.01**	**0.88**	**<0.01**	**0.43**

Table H-13 Fire Water Pump
MGS CHP 1, LLC

There will be one diesel fuel fire water pump, with rating of 600 hp.
Sulfur content of fuel used in engines will be 15 ppm sulfur or less.
Annual maintenance/ operating hours will be limited to 100 hr/yr.
Engines will be new (model year 2024 or later).

FWL	125 P 5103	FPWL	125 P 5103
Fuel Type	Diesel		
Rating	600	hp	
Hours of Operation	100	hr/yr	
Fuel Consumption per Engine	28.00	gal/hr	
Diesel Density	7.001	lb/gal	
Fuel Consumption per Engine	196.03	lb/hr	
Diesel Fuel Heat Content (HHV)	19,300	Btu/lb	
Fuel Input (HHV) per Engine	3.78	MMBtu/hr	
Engine Horsepower Output	571	hp	
Brake Specific	7.00	lb/hr	
Engine Efficiency	38	Percent	
Exhaust gas	1500	F	
Exhaust mass flow, Calculated	1,814	lb/hr per engine	
Brake Specific Fuel Consumption	0.007	lb/hp-hr	

Notes:
[1] 19,300 Btu/lb is the average heating value of diesel and 7.001 lb/gal is the density of diesel as provided by vendor.
[2] Brake specific fuel consumption per hour = [Mass Input (HHV)] / [Engine Horsepower Output (hp)].

Table Three Diesel Fueled Production Rules

Pollutant	Production Factor [1] [2]		Production Ratios (Per Engine)		
			Max Hourly	Annual Average [4]	Annual
			lb/hr	lb/hr	tpy
NOx [3]	3.54	g/bhp-hr	4.37	0.00	0.22
CO	3.69	g/bhp-hr	4.55	0.00	0.23
PM10 [3]	0.22	g/bhp-hr	0.28	0.00	0.01
PM2.5 [3]	0.22	g/bhp-hr	0.28	0.00	0.01
VOC [3]	0.41	g/bhp-hr	0.51	0.00	0.03
SO2 [3]	0.00	lb/mmbtu	0.01	0.00	0.000

Notes:
1. NOx, CO, PM, and VOC emission factors are from 40 CFR 60.4202(a) for engines with rated power greater than or equal to 600 hp (600 kW) but less than or equal to 750 hp (560 kW), NSPS Subpart IIII specifies to use emission factors from Table 4 to 40 CFR Subpart IIII.
2. Emission factors for SO2 based on 40 ppmw ULSD.
3. All PM is assumed to be less than 1.0 µm in diameter. Therefore, the PM emission factor is used to estimate emissions of PM10 and PM2.5.
4. Annual average hourly emission rates are (annual emissions in tpy)*(2000 lb/ton*1 year/8760 hours.

Example Calculation:

Hourly NO_x = 8.0 g/kWhr | 457.87 kW | 1 lb / 453.59 g | = 8.07 lb/hr

Annual NO_x = 8.07 lb/hr | 50 hrs/yr | 1 ton/2000 lbs | = 0.20 ton/yr

NAP Pollutants from Engines:

NAP Pollutants Pollutants:

Max Input = 4.32 MMBtu/hr each engine
Annual Hours @ Max Rating = 50.0 hrs/yr
Hourly Emissions = (Max Heat Input= MMBtu/hr) x [(EF*(2000 lbs)/(lb* = lb/MMBDF)
Annual Emissions = (Max Heat Input= MMBtu/hr) x [(EF*(2000 lbs)/(lb* = lb/MMBDF) x (Annual Operating Hours) / (2,000 lb/Ton)

Pollutant	EF [1] (lb/MMBtu)	Source	NAP HAP? [2]	Max Hourly Emissions [3] (lb/hr)	Annual Emissions [4] (tpy)	Potential Annual Emissions [5] (tpy)
Methane	0.000150	AP-42: Table 3.4-2 (10/96)	YES	1.84E-03	4.60E-05	1.84E-03
Propane	0.000251	AP-42: Table 3.4-2 (10/96)	YES	1.08E-03	2.71E-05	1.08E-03
Butane	0.000077	AP-42: Table 3.4-2 (10/96)	YES	1.66E-03	4.15E-05	1.66E-03
Pentane	0.000134	AP-42: Table 3.4-2 (10/96)	NO	1.61E-03	4.03E-05	1.61E-03
2-Methylbutane	0.000135	AP-42: Table 3.4-2 (10/96)	YES	1.62E-03	4.05E-05	1.62E-03
Methylpentane	0.000166	AP-42: Table 3.4-2 (10/96)	YES	1.99E-03	4.98E-05	1.99E-03
Cyclopentane	0.000046	AP-42: Table 3.4-2 (10/96)	YES	5.52E-04	1.38E-05	5.52E-04
Cyclohexane	0.000096	AP-42: Table 3.4-2 (10/96)	YES	1.15E-03	2.88E-05	1.15E-03
Methylcyclopentane	0.000227	AP-42: Table 3.4-2 (10/96)	YES	2.72E-03	6.81E-05	2.72E-03
Methylcyclohexane	0.000337	AP-42: Table 3.4-2 (10/96)	YES	4.04E-03	1.01E-04	4.04E-03
Pentene	0.000086	AP-42: Table 3.4-2 (10/96)	YES	1.03E-03	2.58E-05	1.03E-03
Propylene	0.000026	AP-42: Table 3.4-2 (10/96)	YES	3.12E-04	7.80E-06	3.12E-04
Acetylene	0.000077	AP-42: Table 3.4-2 (10/96)	YES	9.24E-04	2.31E-05	9.24E-04
Cyclohexene	0.000010	AP-42: Table 3.4-2 (10/96)	YES	1.20E-04	3.00E-06	1.20E-04
Pyrene	0.000002	AP-42: Table 3.4-2 (10/96)	YES	2.40E-05	6.00E-07	2.40E-05
Benzo(a)anthracene	0.000002	AP-42: Table 3.4-2 (10/96)	YES	2.40E-05	6.00E-07	2.40E-05
Chrysene	0.000004	AP-42: Table 3.4-2 (10/96)	YES	4.80E-05	1.20E-06	4.80E-05
Benzo(b)fluoranthene	0.000001	AP-42: Table 3.4-2 (10/96)	YES	1.20E-05	3.00E-07	1.20E-05
Benzo(k)fluoranthene	0.000002	AP-42: Table 3.4-2 (10/96)	YES	2.40E-05	6.00E-07	2.40E-05
Benzo(g,h,i)perylene	0.000001	AP-42: Table 3.4-2 (10/96)	YES	1.20E-05	3.00E-07	1.20E-05
Benzo(a)pyrene	0.000001	AP-42: Table 3.4-2 (10/96)	YES	1.20E-05	3.00E-07	1.20E-05
Indeno(1,2,3-cd)pyrene	0.000002	AP-42: Table 3.4-2 (10/96)	YES	2.40E-05	6.00E-07	2.40E-05
Total NAPs	0.0014			1.68E-02	4.20E-04	1.68E-02

Emission factors obtained from US EPA, AP-42 Section 3.3 Gasoline and Diesel Engines (10/96), Table 3.3-2.

[1] Units: LB EPA: Hazardous Air Pollutants.
[2] Max. Hourly Emissions = Emission Factor (lb/MMBtu) *Max Heat Input Capacity per Engine (MMBtu/hr)
[3] Maximum Annual Emission Rate (tpy) = Hourly Emissions (lb/hr) * Annual Operating Hours (hr/yr)
[4] Maximum Annual Emission Rate (tpy) = Hourly Emissions (lb/hr) * Annual Operating Hours (hr/yr)
[5] Maximum Potential Annual Emission Rate (tpy) = Hourly Emissions (lb/hr) * Annual Hours (hr/yr) (/ ton/2000 lb).

ATTACHMENT L – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID[1]	12P-FWD-0001	12P-F-9102	
Engine Manufacturer/Model	TBD	Cleire / C18HD-UFAD42	
Manufacturers Rated bhp/rpm	3,000	614	
Source Status[2]	NS	NS	
Date Installed/ Modified/Removed/Estimated[3]	2022	2022	
Engine Manufactured /Reconstruction Date[3]	2022	2022	
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[4]	☒ 40CFR60 Subpart IIII ☒ IIII Certified? ☐ 40CFR63 Subpart IIII ☐ IIII Certified? ☐ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐ 40CFR60 Subpart IIII ☐ IIII Certified? ☒ 40CFR63 Subpart IIII ☒ IIII Certified? ☐ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐ 40CFR60 Subpart IIII ☐ IIII Certified? ☐ 40CFR63 Subpart IIII ☐ IIII Certified? ☐ 40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[5]	4SLB		
APCD Type[6]			
Fuel Type[7]	FO	D	
%S (gr/100 scf)	0.03		
Operating bhp/rpm	3000	614	
BSFC (BTU/bhp-hr)	8289	7900.3	
Hourly Fuel Throughput	18.926 ft³/hr gal/hr	32.90 ft³/hr gal/hr	ft³/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	1.2E 165687[8]/yr gal/yr	288 165687[8]/yr gal/yr	165687[8]/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☐

Calculation Methodology[9]	Pollutant[10]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[12]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[12]	Hourly PTE (lb/hr)[11]	Annual PTE (tons/year)[12]
GT	NO_x	0.01	0.00	2.07	0.02		
GT	CO	13.23	0.02	2.33	0.02		
GT	VOC	0.07	0.00	0.11	<0.01		
GT	SO_2	0.03	0.002	0.01	<0.01		
GT	PM_{10}	0.20	0.01	0.02	0.01		
AP	Formaldehyde	1.04	0.03	<0.01	<0.01		
AP	Total HAPs	1.43	0.07	0.02	<0.01		
	GHG (CO2e)						

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.

2 Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	ES	Relocated Source
RS	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.

4 Enter the date that the engine was manufactured, modified or reconstructed.

5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.

Provide a manufacturer's data sheet for all engines being permitted.

6 Enter the Engine Type designation(s) using the following codes:

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	NSCC	Non-prechamber Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas / Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD	Manufacturer's Data	AP	AP-42
OL	Other(EPA/State/etc)	ST	Other (40 CFR, 60 JJJJ / IIII [please list]

10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the Emissions Summary Sheet.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Clarke Model			C18H0-UFAD42	
Derived Rating	458	kW	614	hp
Rated Speed	1760	rpm	1760	rpm
NOx	3.04	g/kW-hr	2.27	g/hp-hr
HC	0.11	g/kW-hr	0.08	g/hp-hr
PM	0.113	g/kW-hr	0.085	g/hp-hr
CO	3.30	g/kW-hr	2.46	g/hp-hr
Certified Rating	522 kW		700 hp	
Rated Speed	2100 rpm		2100 rpm	
NOx	4.25 g/kW-hr		3.17 g/hp-hr	
HC	0.07 g/kW-hr		0.05 g/hp-hr	
PM	0.12 g/kW-hr		0.09 g/hp-hr	
CO	0.54 g/kW-hr		0.40 g/hp-hr	

-Applicable to Cat C18 700hp Tier 3, 630hp Tier 3 fire pump driver engines.
-PQ3060, PQ3061 respectively
-700 hp and 630 hp ratings are U.S. EPA certified as variable speed Emergency Stationary engines per 40 CFR Part 60 Subpart IIII.
-Estimated Nominal Emissions data for the fire pump rating cycle emissions are shown above.
-These engines are Certified to the variable speed 8 Mode C1 cycle that can be used in either constant or variable speed applications.
-This information is Caterpillar Confidential. Unauthorized distribution of this information beyond its intended audience is prohibited.

INC RE: FWP 6/6/2025

Friday, June 6, 2025 4:08 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Incomplete App Email for Permit Application R13-3708

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Fri, Jun 6, 2025 at 4:07 PM
To: Anand Rathinasamy <anand.rathinasamy@erm.com>, William Calhoun <jack.calhoun@fidelisinfra.com>, Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>

RE: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. It has been determined that the application as submitted is incomplete based on the following items:

1. The emission of non methane hydrocarbons (NMHC) plus nitrogen oxides (NOx) presented in the application from the emergency engine for the firewater pump (Emission Unit ID 129-P-9402) indicate potentially non-compliance with the NMHC + NOx standard for stationary fire pump engines of Subpart IIII to 40CFR60. Please update your application accordingly.

Please address the above issue by June 23, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

Thanks,
Ed
--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE
Charleston, WV 20304

Emission Cals and Amine Absorber 5/9/2025

Friday, May 9, 2025 7:39 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

Re: Emission Calculations & The Amine Absorber

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Fri, May 9, 2025 at 7:38 AM
To: Michael Dearing <Michael.Dearing@erm.com>

Michael,

Here is the pdf of the caustic and amine scrubbers. I am still having issues getting a pipeline block to converge in a compression flow sheet.

Thanks
Ed

On Thu, May 8, 2025 at 2:51 PM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:

> Michael,
>
> Using US EPA Method 19 with the default Fd for wood (9400 dscf/MMBtu) and the conc. listed in the app, I am getting different results than presented in the application.

	Emission Data		Emission Rates		
Pollutant	ppmvd	% O2	lb/MMBtu	lb/hr	TPY
NOx	13.55	5.23	0.020	19.110	82.843
CO	11.24	5.23	0.010	9.651	41.836
SO2	5.58	5.23	0.012	10.957	47.499
H2SO4	2	5.23	0.006	6.013	26.066
HCl	1	5.23	0.001	1.105	4.790

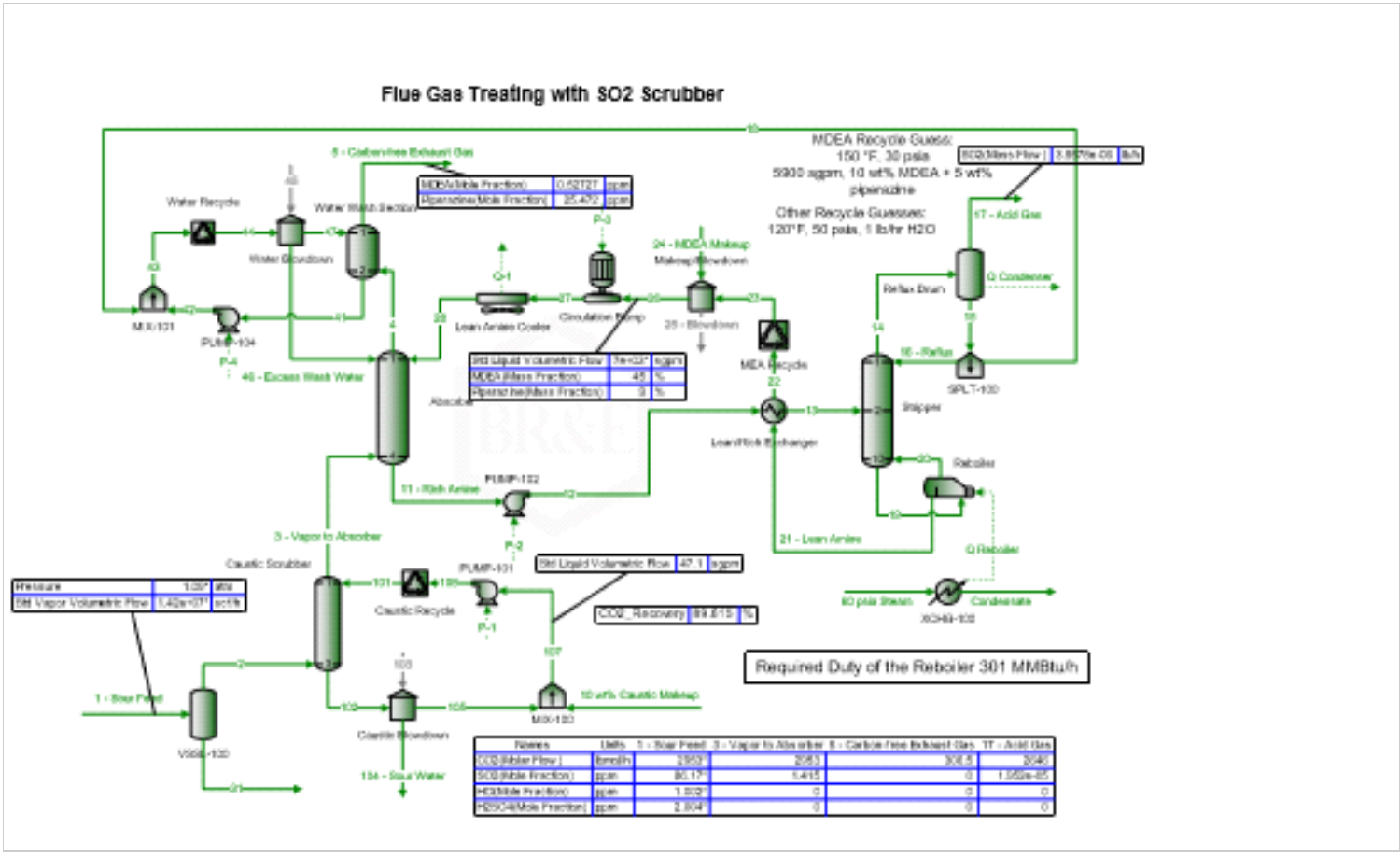
> Method 19 does outline a method to calculate the Fd for a specific fuel if ultimate analysis of the fuel is available.
>
> I notice the selected amine in the application is MDEA. MDEA a lone will be very difficult to achieve a 90% removal efficiency for CO2. I would have expected a see a mixture of MDEA plus piperazine (40 + 5 up to 10% by wt.) as the amine.
> Using either solely MDEA or a mixture of MDEA plus piperazine, any and all of the residual SO2 exiting the caustic scrubber with be absorbed in the rich amine or lockup in the amine. The real question is does the CO2 dehydrator release any of this captured SO2.
> I would assume it does. I found that if the caustic scrubber is ran a little harder the amine unit converges completely.
> Once I get the "compression and injection" and "dehydration" flow sheet intergraded completely, I will share the Promax file with you.
>
> Thanks,
> Ed

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality

304-414-1244
601 57th Street, SE
Charleston, WV 25304

Visio-SO2_CO2_scrubbers_W_Compression_Dehy_units.pdf
39K

Visio-SO2_
CO2_scru...



Stream	Units	1 - Boiler Feed	3 - Vapor to Absorber	5 - Carbon Free Exhaust Gas	17 - Acid Gas
CO2 Mole Flow	lbmol/h	2953	2063	308.5	2646
SO2 Mole Fraction	ppm	80.17	5.415	0	1.952e-05
H2S Mole Fraction	ppm	1.802	0	0	0
H2SO4 Mole Fraction	ppm	2.804	0	0	0

Updated Response 5/8/2028

Friday, May 9, 2025 7:42 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Incomplete App Email

1 message

Michael Dearing <Michael.Dearing@erm.com> Thu, May 8, 2025 at 3:47 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>, Anand Rathinasamy <anand.rathinasamy@erm.com>

Ed,

I just realized that one of the pages of comment responses got removed on accident I've attached the full comments here.

Thanks

ERM
Sustainability is our business

Michael Dearing

Principal Consultant, Scientist

Charleston (WV) **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Michael Dearing <Michael.Dearing@erm.com>
Sent: Thursday, May 8, 2025 10:57 AM
To: Andrews, Edward S <edward.s.andrews@wv.gov>; William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>; Anand Rathinasamy <anand.rathinasamy@erm.com>
Subject: RE: Incomplete App Email

Ed,

Attached is MGS CNP 1, LLC response to comments WV DEP issued on 4/22/2025 and 4/25/2025.

Let us know if you have additional questions.

Thanks

ERM
Sustainability is our business

Michael Dearing

Principal Consultant, Scientist

Charleston (WV) **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Tuesday, April 22, 2025 3:21 PM
To: William Calhoun <jack.calhoun@fidelisinfra.com>; Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>
Subject: Incomplete App Email

EXTERNAL MESSAGE

RE: Application Status: Incomplete

MGS CNP 1, LLC/BECCS Plant

Permit Application No. R13-3708

Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete. It has been determined that the application as submitted is incomplete based on the following items:

1. Missing an discussion on the purpose (e.g. sell of electricity) of the excess electricity generated by the proposed boiler/steam turbine generator. If your proposed generation is to be used for a data center or other use that requires a redundant (backup) supply of electrical, please identify this alternative/backup source of electricity for the primary end user. This discussion needs to clearly answer whether the electricity is being sold, the planned amount of electricity to be sold, is there a purchase power agreement in place, please note the source of required electricity for normal startup operations will be purchased/supplied from local electricity wholesaler/another generating unit, and the nameplate rating of the generator. Please note if the facility is going to be connected to the electrical grid system (e.g. PJM), please explain the relationship (e.g., solely purchaser/consumer, wholesaler/generator).

Please note the amount of excess steam will be utilized to provide heat energy for the amine regenerator (temperature and pressure is also needed). Please provide details of the energy consumption of the facility, type of energy consumed (e.g. electricity, steam, natural gas) for the CO2 dehydration unit and compression and whether these energy requirements for these activities will be part of the auxiliary load of the facility or require additional combustion units.

The DAQ has an unclear understanding of what will be the source of the electricity to start the proposed emissions units. Please keep in mind, the emergency engine for the emergency generator can only be operated for 50 hours per year of non-emergency use. This discussion needs to describe the electrical system that the steam turbine/generator will be connected to and the source of the electricity needed for normal startup/shutdown operations. Please explain in further detail exactly how the fluidized bed boiler will be preheated for startup with the use of steam from an auxiliary boiler or other steam generator.

2. Missing completed individual control device sheets for the SCR, OxyCat, Wet FGD, and DSI for the boiler. Please identify key parameters that will be monitored to ensure compliance with the proposed emissions with respect to the pollutant(s) being controlled by the associated control device. Also, provide additional information regarding your proposed wet FGD system to determine if the residual moisture exiting the scrubber will pose a possible interference issue with a continuous opacity monitoring system as required in 45CSR2 and 45CSR2A. Given that the application is proposed to be a synthetic minor source under the Title V Program, please provide a monitoring plan for the CO Catalyst, Wet FGD and DSI control device to ensure compliance with proposed emission limits.

3. Please provide supporting information to support the claim that the proposed fuel will have sulfur content to satisfy the exemption criteria of 40CFR60.42b(k)(2). Regarding the wood (primary fuel) to be used as fuel for the boiler, the application does not identify the source(s) and species of wood to be used as fuel. If the source(s) of the wood fuel is going to be discarded from a manufacturing process, this/these source(s) of wood need to be identified and evaluated whether the material is a waste/fuel in accordance with 40 CFR 241.

4. Please separate the startup emissions for control devices that the performance is impacted/cannot be operated during startup conditions (e.g. SCR, oxidation catalyst, wet FGD) on startup event basis. If a control device performance is impacted during an shutdown, thus shutdown emissions on a short term basis needs to be identified as well. Any by-passing of a proposed control device needs to be identified for startup and shutdown events. Please define the ending of a startup event. The emission calculations are based on NG firing for 10 hours per startup and a total of 55 hours per year for start operations. This accounts for 5 startup events per year with 5 hours unaccounted for. Please explain these 5 unaccounted for hours per year for startup and are the emissions based on firing 100% wood for these hours on an uncontrolled basis.

5. Please justify reducing the organic HAPs emission factors published in AP-42 by 88% for the use of CO catalyst when the VOC removal efficiency of 60% for the CO catalyst was applied to account for the control VOC emissions for the boiler.

7. Regarding haul road emissions: Please provide the minimum and maximum weight of the vehicles for each of the percentiles used to determine the average weight of the vehicle, and justification of the silt loading. Did the average weight of the vehicles and distance traveled account for equipment used to manage the open stockpile? Given that all haul roads are proposed to be paved, is the open stockpile going to be located on a paved surface?

8. Please provide additional details on how the HCl emissions from the wastewater treatment unit were determined and how these HCl emissions will be determined when the wastewater treatment unit is in operation.

Please address the above deficiencies in writing by no later than May 12, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-414-1244

601 57th Street, SE

Charleston, WV 25304

Incomplete Notice signed v0.04.pdf
975K

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Notice sig...

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Notice sig...

MGS CNP 1, LLC
109 Post Oak Lane, Suite 148
Houston, TX 77024

FIDELIS

May 6, 2025

Laura M. Crowder, Director
WV Department of Environmental Protection (WVDEP)
Division of Air Quality (DAQ)
601 57th Street SE
Charleston, WV 25304

Re: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Ms. Crowder,

Please find our responses to each of your questions/comments in the incomplete application notice sent to MGS CNP 1, LLC (MGS) on April 28th 2025. MGS has provided a detailed response in italics to address all the questions surrounding the application for the BECCS plant.

The following items will be attached to address comments:

- Updated emission calculations
- Fuel analysis
- Updated Equipment Table (Attachment I)

If you have additional questions, please do not hesitate to contact us.

Sincerely,

William D. (Bill) Calhoun, P.E.
Vice President, HSE

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

WVDEP Questions and MGS Response
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

WVDEP Question NO.1:

1. Missing an discussion on the purpose (e.g. sell of electricity) of the excess electricity generated by the proposed boiler/steam turbine generator. If your proposed generation is to be used for a data center or other use that requires a redundant (backup) supply of electrical, please identify this alternative/backup source of electricity for the primary end user. This discussion needs to clearly answer whether the electricity is being sold, the planned amount of electricity to be sold, is there a purchase power agreement in place, please note the source of required electricity for normal startup operations will be purchased/supplied from local electricity wholesaler/another generating unit, and the nameplate rating of the generator. Please note if the facility is going to be connected to the electrical grid system (e.g. PJM), please explain the relationship (e.g., solely purchaser/consumer, wholesaler/generator).

   MGS Response

   a. *All electricity generated by the steam turbine generator will be consumed by the biomass feed handling, biomass boiler, flue gas treatment, ash handling, post-combustion carbon capture, compression, chemical storage, raw water treatment, wastewater treatment, and utilities. The biomass boiler will combust sufficient biomass to produce approximately 2,300 metric tonnes per day of CO2 (210,000 lb/hr), which is the amount of carbon dioxide required to achieve the project's targeted carbon dioxide removal (CDR) credits. Steam generated in the boiler from the heat of combustion from the biomass is sent to the steam turbine generator to produce electricity to support the operating load of the facility. Any excess steam produced from the boiler will bypass the steam turbine generator to produce low-pressure steam or be condensed in the surface condenser. The steam turbine generator only produces electricity to support the operation of the facility and does not produce excess electricity for the local electrical grid or any onsite user such as a datacenter. The facility will be built to start-up and operate in island-mode and does not have a connection to the local electrical grid. Please note that only the onsite administration building, warehouse, and laboratory will have a connection to the local grid. Electricity for start-up will be provided by a 3,000 hp natural gas generator and start-up emissions from the natural gas generator have been accounted for in this application at emission (129-PWR-0001– EP)* .

   Please note the amount of excess steam will be utilized to provide heat energy for the amine regenerator (temperature and pressure is also needed). Please provide details of the energy consumption of the facility, type of energy consumed (e.g. electricity, steam,

natural gas) for the CO2 dehydration unit and compression and whether these energy requirements for these activities will be part of the auxiliary load of the facility or require additional combustion units.

MGS Response

Electricity and steam for CO2 dehydration and compression are included in the total energy consumption of the facility. The total normal operating electrical demand for the facility is approximately 40,000 hp, of which, 23,275 hp is required for the carbon capture unit, CO2 compression and conditioning systems (i.e., dehydration and deoxygenation). The biomass boiler produces approximately 672 klb/hr of high-pressure steam (1,710 psig at 1,000°F), of which, approximately half of the high-pressure steam bypasses the steam turbine and is flashed to generate 314 klb/hr of low-pressure steam (100 psig at 335°F) of which 267 klb/hr is used by the carbon capture unit. The balance of the high-pressure steam is used to generate electricity in the steam turbine.

The DAQ has an unclear understanding of what will be the source of the electricity to start the proposed emissions units. Please keep in mind, the emergency engine for the emergency generator can only be operated for 50 hours per year of non-emergency use. This discussion needs to describe the electrical system that the steam turbine/generator will be connected to and the source of the electricity needed for normal startup/shutdown operations. Please explain in further detail exactly how the fluidized bed boiler will be preheated for startup with the use of steam from an auxiliary boiler or other steam generator.

MGS Response

A 3,000 hp natural gas generator will be used to provide electricity to start-up the auxiliary and utility systems (e.g., raw water treatment, boiler feedwater, instrument air, etc.) required prior to starting up the biomass boiler. The biomass boiler will combust natural gas to pre-heat the fluidized bed. Boiler feedwater will be introduced to the biomass boiler to generate high-pressure steam. Once the heat input on the boiler has been established, biomass is introduced to the boiler, natural gas to the boiler as fuel is decreased, and the high-pressure steam production rate increases. The high-pressure steam is sent to the steam generator to produce electricity to support the operation of the facility, and the natural gas generator is slowly phased out. The application includes durations for operating the natural gas generator (100 hours) and for start-up of the biomass boiler (55 hours).

Please note, the emergency engine is only used for the firewater pumps. The application includes a duration of 100 hours for emissions from the firewater pumps; however, these pumps are only anticipated to be operated for testing and maintenance. If this needs to be reduced to 50 hours, we are accepting the recommendation and emission calculation have been updated..

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

DAQ Question No. 2:

2. Missing completed individual control device sheets for the SCR, OxyCat, Wet FGD, and DSI for the boiler. Please identify key parameters that will be monitored to ensure compliance with the proposed emissions with respect to the pollutant(s) being controlled by the associated control device. Also, provide additional information regarding your proposed wet FGD system to determine if the residual moisture exiting the scrubber will pose a possible interference issue with a continuous opacity monitoring system as required in 45CSR2 and 45CSR2A. Given that the application is proposed to be a synthetic minor source under the Title V Program, please provide a monitoring plan for the CO Catalyst, Wet FGD and DSI control device to ensure compliance with proposed emission limits.

MGS Response

a. *Currently MGS CNP 1 does not have specification sheets from its vendors for each of these control devices, as the design of the plant is ongoing, and equipment vendors have not been finalized yet. All emission calculations are based on minimum guarantees provided by the vendors.*
b. *At this Time MGS CNP 1 does not have a complete monitoring plan as the plant design is not complete. Once design is finalized a modification will be filed to update these requirements.*

DAQ Question No. 3:

3. Please provide supporting information to support the claim that the proposed fuel will have sulfur content to satisfy the exemption criteria of 40CFR60.42b(k)(2). Regarding the wood (primary fuel) to be used as fuel for the boiler, the application does not identify the source(s) and species of wood to be used as fuel. If the source(s) of the wood fuel is going to be discarded from a manufacturing process, this/these source(s) of wood need to be identified and evaluated whether the material is a waste/fuel in accordance with 40 CFR 241.

MGS REsponse

a. *At this time MGS CNP 1 has determined that the Biomass analysis is proprietary information and will be following all procedures to maintain confidentiality for this analysis and for any future biomass samples. A redacted analysis will be provided that will include only the necessary information to verify the emissions. The Natural gas sample will be attached to this response.*

DAQ Question No. 4:

4. separate the startup emissions for control devices that the performance is impacted/cannot be operated during startup conditions (e.g. SCR, oxidation catalyst, wet FGD) on startup event basis. If a control device performance is impacted during an shutdown, thus shutdown emissions on a short-term basis needs to be identified as well. Any bypassing of a proposed control device needs to be identified for startup and

shutdown events. Please define the ending of a startup event. The emission calculations are based on NG firing for 10 hours per startup and a total of 55 hours per year for start operations. This accounts for 5 startup events per year with 5 hours unaccounted for. Please explain these 5 unaccounted for hours per year for startup and are the emissions based on firing 100% wood for these hours on an uncontrolled basis.

MGS Response

a. *The SCR and CO Catalyst are bypassed for 11 hours during start-up of the biomass boiler (6 x 11 = 66 hrs). During this duration, the biomass boiler combusts natural gas for 10 hours to pre-heat the fluidized bed. The application includes allowances for start-up emissions based on guarantees provided by the biomass boiler vendor.*
b. *Please note, no reduction in emissions were assumed for the Direct Contact Cooler / Polishing Scrubber (DCCPS) – this is the same device as the wet FGD.*
c. *Emission have been separated into normal operation and startup operations and are attached to this email.*

DAQ Question No. 5:

5. Please justify reducing the organic HAPs emission factors published in AP-42 by 88% for the use of CO catalyst when the VOC removal efficiency of 60% for the CO catalyst was applied to account for the control VOC emissions for the boiler.

MGS Response

a. *The organic HAPs were adjusted by multiplying the ratio of the biomass boiler vendor's guaranteed VOC emission factor to the AP-42 VOC emission factor. These adjusted emission factors are also used to calculate the biomass boiler's organic HAPs.*

DAQ Question No. 6:

6. Regarding haul road emissions: Please provide the minimum and maximum weight of the vehicles for each of the percentiles used to determine the average weight of the vehicle, and justification of the silt loading. Did the average weight of the vehicles and distance traveled account for equipment used to manage the open stockpile? Given that all haul roads are proposed to be paved, is the open stockpile going to be located on a paved surface?

MGS Response

a. *In the updated calculations, min and max weight for each vehicle type have been provided.*
b. *Due to BECCS facility not fitting into one of the defined categories in table 13.2.1-3. BECCS facility used Table 13.2.1-2. The Ubiquitous Baseline 0.6 g/m² and a multiplier of 4 is applied for low volume roads (< 500 Average Daily Traffic) to obtain a wintertime baseline silt loading of 4 X 0.6 = 2.4 g/m².*

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

FIDELIS

c. *The biomass stockpile will be placed on a paved surface.*

DAQ Question No. 7:

7. provide additional details on how the HCl emissions from the wastewater treatment unit were determined and how these HCl emissions will be determined when the wastewater treatment unit is in operation.

MGS Response

a. *It was conservatively assumed that approximately 10% of the HCl would be absorbed in the solution from the flue gas in the Direct Contact Cooler/ Polishing Scrubber. The solution is then sent to WWTP and it is conservatively assumed that all the HCl will be emitted to the atmosphere.*
b. *Once the operation of the plant begins, HCL emissions from the WWTP will be determined by sampling for HCl periodically at the inlet and outlet of the WWTP. Sampling data will be used to estimate HCl emissions and verify compliance.*

Additional DAQ Questions:

8. I notice that some (not all) of the control devices have the same ID number as the emission point. Also, the equipment id is also used as the emission point id. A different ID needs to be used for the emission point.

MGS Response

The attachment I have been updated to have separate Emission unit IDs and Emission Point IDs. Control Device IDs have changed as well.

9. From Attachment I, I read that the makeup sand and sodium bicarbonate storage silos are venting into the BFB boiler and therefore the exhaust is controlled by the same boiler control devices. Also, there is a by-pass stack for the CCU (122-T-1001).

MGS Response

Correct; however, the bypass stack is 121-PKG-3001 not 122-T-1001.

10. For the Sand Receiving Bin (121-S-1002), it lists as the control device that vent is piped to BFB. If that is the case, the emission point for the sand receiving bin would be either 121-PKG-3001 or 122-T-1001 and not 121-S-1002.

MGS Response

The Sand Receiving Hopper (121-S-1002) is not vented to 121-PKG-3001 (BFB Boiler Stack) or 122-T-1001 (Absorber). The Sand Receiving Hopper collects sand from the truck and directs it to the Inclined Sand Conveyor. The sand from the conveyor is stored in the Makeup Sand Silo (121-S-6001) which vents to the BFB Boiler Stack, when the carbon capture unit is not in operation or the Absorber during normal operation. The Sand Receiving Hopper is open to the atmosphere.

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

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11. For the capacity of silo and bins, please list the mass capacity for the silo or bin and not the throughput rate. The open storage pile for the wood chips needs a capacity value either on a mass or area basis.

MGS Response

All sizes are preliminary and not finalized. It should also be noted that the emissions from these sources are based on the throughput handled and not depended on size of the silo or bins.

a. *121-LS-1001 – Biomass Receiving Hopper = approx. 6,000 ft3*
b. *121-LS-1002 – Biomass Receiving Hopper = approx. 6,000 ft3*
c. *121-S-1001 – Biomass Feed Hopper = 1,500 ft3*
d. *121-S-1002 – Sand Receiving Hopper = 6,000 ft3*
e. *121-S-2001A/B – Biomass Fuel Metering Bin = 4,200 ft3 each*
f. *121-S-4001A/B – Fly Ash Storage Silo = 9,500 ft3 each (100 tons each)*
g. *121-S-6001 – Makeup Sand Silo = 1,000 ft3*
h. *121-S-9001 – Sodium Bicarbonate Storage Silo = 2,000 ft3*
i. *Chip Pile = 14 days of storage (71,255.6 kibs = 212.1 klb/hr x 24 hrs/day x 14 days)*

Response to Incomplete App 5/8/2025

Thursday, May 8, 2025 10:59 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Incomplete App Email

1 message

Michael Dearing <Michael.Dearing@erm.com> Thu, May 8, 2025 at 10:57 AM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>, Anand Rathinasamy <anand.rathinasamy@erm.com>

Ed,

Attached is MGS CNP 1, LLC response to comments WV DEP issued on 4/22/2025 and 4/25/2025.

Let us know if you have additional questions.

Thanks

ERM
Sustainability is our business

Michael Dearing

Principal Consultant, Scientist

Charleston (WV) **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Tuesday, April 22, 2025 3:21 PM
To: William Calhoun <jack.calhoun@fidelisinfra.com>; Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>
Subject: Incomplete App Email

EXTERNAL MESSAGE

RE: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete. It has been determined that the application as submitted is incomplete based on the following items:

1. Missing an discussion on the purpose (e.g. sell of electricity) of the excess electricity generated by the proposed boiler/steam turbine generator. If your proposed generation is to be used for a data center or other use that requires a redundant (backup) supply of electrical, please identify this alternative/backup source of electricity for the primary end user. This discussion needs to clearly answer whether the electricity is being sold, the planned amount of electricity to be sold, is there a purchase power agreement in place, please note the source of required electricity for normal startup operations will be purchased/supplied from local electricity wholesaler/another generating unit, and the nameplate rating of the generator. Please note if the facility is going to be connected to the electrical grid system (e.g. PJM), please explain the relationship (e.g., solely purchaser/consumer, wholesaler/generator).

Please note the amount of excess steam will be utilized to provide heat energy for the amine regenerator (temperature and pressure is also needed). Please provide details of the energy consumption of the facility, type of energy consumed (e.g. electricity, steam, natural gas) for the CO2 dehydration unit and compression and whether these energy requirements for these activities will be part of the auxiliary load of the facility or require additional combustion units.

The DAQ has an unclear understanding of what will be the source of the electricity to start the proposed emissions units. Please keep in mind, the emergency engine for the emergency generator can only be operated for 50 hours per year of non-emergency use. This discussion needs to describe the electrical system that the steam turbine/generator will be connected to and the source of the electricity needed for normal startup/shutdown operations. Please explain in further detail exactly how the fluidized bed boiler will be preheated for startup with the use of steam from an auxiliary boiler or other steam generator.

2. Missing completed individual control device sheets for the SCR, OxyCat, Wet FGD, and DSI for the boiler. Please identify key parameters that will be monitored to ensure compliance with the proposed emissions with respect to the pollutant(s) being controlled by the associated control device. Also, provide additional information regarding your proposed wet FGD system to determine if the residual moisture exiting the scrubber will pose a possible interference issue with a continuous opacity monitoring system as required in 45CSR2 and 45CSR2A. Given that the application is proposed to be a synthetic minor source under the Title V Program, please provide a monitoring plan for the CO Catalyst, Wet FGD and DSI control device to ensure compliance with proposed emission limits.

3. Please provide supporting information to support the claim that the proposed fuel will have sulfur content to satisfy the exemption criteria of 40CFR60.42b(k)(2). Regarding the wood (primary fuel) to be used as fuel for the boiler, the application does not identify the source(s) and species of wood to be used as fuel. If the source(s) of the wood fuel is going to be discarded from a manufacturing process, this/these source(s) of wood need to be identified and evaluated whether the material is a waste/fuel in accordance with 40 CFR 241.

4. Please separate the startup emissions for control devices that the performance is impacted/cannot be operated during startup conditions (e.g. SCR, oxidation catalyst, wet FGD) on startup event basis. If a control device performance is impacted during an shutdown, thus shutdown emissions on a short term basis needs to be identified as well. Any by-passing of a proposed control device needs to be identified for startup and shutdown events. Please define the ending of a startup event. The emission calculations are based on NG firing for 10 hours per startup and a total of 55 hours per year for start operations. This accounts for 5 startup events per year with 5 hours unaccounted for. Please explain these 5 unaccounted for hours per year for startup and are the emissions based on firing 100% wood for these hours on an uncontrolled basis.

5. Please justify reducing the organic HAPs emission factors published in AP-42 by 88% for the use of CO catalyst when the VOC removal efficiency of 60% for the CO catalyst was applied to account for the control VOC emissions for the boiler.

7. Regarding haul road emissions: Please provide the minimum and maximum weight of the vehicles for each of the percentiles used to determine the average weight of the vehicle, and justification of the silt loading. Did the average weight of the vehicles and distance traveled account for equipment used to manage the open stockpile? Given that all haul roads are proposed to be paved, is the open stockpile going to be located on a paved surface?

8. Please provide additional details on how the HCl emissions from the wastewater treatment unit were determined and how these HCl emissions will be determined when the wastewater treatment unit is in operation.

Please address the above deficiencies in writing by no later than May 12, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-414-1244
601 57th Street, SE
Charleston, WV 25304

Incomplete Notice Response v0.01.pdf
190SK

Incomplete Notice Re...

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

FIDELIS

May 6, 2025

Laura M. Crowder, Director
WV Department of Environmental Protection (WVDEP)
Division of Air Quality (DAQ)
601 57th Street SE
Charleston, WV 25304

Re: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Ms. Crowder,

Please find our responses to each of your questions/comments in the incomplete application notice sent to MGS CNP 1, LLC (MGS) on April 25th 2025. MGS has provided a detailed response in italics to address all the questions surrounding the application for the BECCS plant.

The following items will be attached to address comments:

- Updated emission calculations
- Fuel analysis
- Updated Equipment Table (Attachment I)

If you have additional questions, please do not hesitate to contact us.

Sincerely,

William D (Skip) Calhoun, P.E.
Vice President, HSE

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

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natural gas) for the CO2 dehydration unit and compression and whether these energy requirements for these activities will be part of the auxiliary load of the facility or require additional combustion units.

MGS Response

Electricity and steam for CO2 dehydration and compression are included in the total energy consumption of the facility. The total normal operating electrical demand for the facility is approximately 40,000 hp, of which, 23,275 hp is required for the carbon capture unit, CO2 compression and conditioning systems (i.e., dehydration and deoxygenation). The biomass boiler produces approximately 672 klb/hr of high-pressure steam (1,710 psig at 1,000°F), of which, approximately half of the high-pressure steam bypasses the steam turbine and is flashed to generate 314 klb/hr of low-pressure steam (100 psig at 335°F) of which 267 klb/hr is used by the carbon capture unit. The balance of the high-pressure steam is used to generate electricity in the steam turbine.

The DAQ has an unclear understanding of what will be the source of the electricity to start the proposed emissions units. Please keep in mind, the emergency engine for the emergency generator can only be operated for 50 hours per year of non-emergency use. This discussion needs to describe the electrical system that the steam turbine/generator will be connected to and the source of the electricity needed for normal startup/shutdown operations. Please explain in further detail exactly how the fluidized bed boiler will be preheated for startup with the use of steam from an auxiliary boiler or other steam generator.

MGS Response

A 3,000 hp natural gas generator will be used to provide electricity to start-up the auxiliary and utility systems (e.g., raw water treatment, boiler feedwater, instrument air, etc.) required prior to starting up the biomass boiler. The biomass boiler will combust natural gas to pre-heat the fluidized bed. Boiler feedwater will be introduced to the biomass boiler to generate high-pressure steam. Once the heat input on the boiler has been established, biomass is introduced to the boiler, natural gas to the boiler as fuel is decreased, and the high-pressure steam production rate increases. The high-pressure steam is sent to the steam generator to produce electricity to support the operation of the facility, and the natural gas generator is slowly phased out. The application includes durations for operating the natural gas generator (100 hours) and for start-up of the biomass boiler (55 hours).

Please note, the emergency engine is only used for the firewater pumps. The application includes a duration of 100 hours for emissions from the firewater pumps; however, these pumps are only anticipated to be operated for testing and maintenance. If this needs to be reduced to 50 hours, we are accepting the recommendation and emission calculation have been updated..

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

DAQ Question No. 2:

2. Missing completed individual control device sheets for the SCR, OxyCat, Wet FGD, and DBI for the boiler. Please identify key parameters that will be monitored to ensure compliance with the proposed emissions with respect to the pollutant(s) being controlled by the associated control device. Also, provide additional information regarding your proposed wet FGD system to determine if the residual moisture exiting the scrubber will pose a possible interference issue with a continuous opacity monitoring system as required in 45CSR2 and 45CSR2A. Given that the application is proposed to be a synthetic minor source under the Title V Program, please provide a monitoring plan for the CO Catalyst, Wet FGD and DBI control device to ensure compliance with proposed emission limits.

MGS Response

a. *Currently MGS CNP 1 does not have specification sheets from its vendors for each of these control devices, as the design of the plant is ongoing, and equipment vendors have not been finalized yet. All emission calculations are based on minimum guarantees provided by the vendors.*
b. *At this Time MGS CNP 1 does not have a complete monitoring plan as the plant design is not complete. Once design is finalized a modification will be filed to update these requirements.*

DAQ Question No. 3:

3. Please provide supporting information to support the claim that the proposed fuel will have sulfur content to satisfy the exemption criteria of 40CFR60.42b(k)(2). Regarding the wood (primary fuel) to be used as fuel for the boiler, the application does not identify the source(s) and species of wood to be used as fuel. If the source(s) of the wood fuel is going to be discarded from a manufacturing process, this/these source(s) of wood need to be identified and evaluated whether the material is a waste/fuel in accordance with 40 CFR 241.

MGS REsponse

a. *At this time MGS CNP 1 has determined that the Biomass analysis is proprietary information and will be following all procedures to maintain confidentiality for this analysis and for any future biomass samples. A redacted analysis will be provided that will include only the necessary information to verify the emissions. The Natural gas sample will be attached to this response.*

DAQ Question No. 4:

4. separate the startup emissions for control devices that the performance is impacted/cannot be operated during startup conditions (e.g. SCR, oxidation catalyst, wet FGD) on startup event basis. If a control device performance is impacted during an shutdown, thus shutdown emissions on a short-term basis needs to be identified as well. Any bypassing of a proposed control device needs to be identified for startup and

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

shutdown events. Please define the ending of a startup event. The emission calculations are based on NG firing for 10 hours per startup and a total of 55 hours per year for start operations. This accounts for 5 startup events per year with 5 hours unaccounted for. Please explain these 5 unaccounted for hours per year for startup and are the emissions based on firing 100% wood for these hours on an uncontrolled basis.

MGS Response

a. *The SCR and CO Catalyst are bypassed for 11 hours during start-up of the biomass boiler (5 x 11 = 55 hrs). During this duration, the biomass boiler combusts natural gas for 10 hours to pre-heat the fluidized bed. The application includes allowances for start-up emissions based on guarantees provided by the biomass boiler vendor.*
b. *Please note, no reduction in emissions were assumed for the Direct Contact Cooler / Polishing Scrubber (DCCPS) – this is the same device as the wet FGD.*
c. *Emission have been separated into normal operation and startup operations and are attached to this email.*

DAQ Question No. 5:

5. Please justify reducing the organic HAPs emission factors published in AP-42 by 88% for the use of CO catalyst when the VOC removal efficiency of 60% for the CO catalyst was applied to account for the control VOC emissions for the boiler.

MGS Response

a. *The organic HAPs were adjusted by multiplying the ratio of the biomass boiler vendor's guaranteed VOC emission factor to the AP-42 VOC emission factor. These adjusted emission factors are also used to calculate the biomass boiler's organic HAPs.*

DAQ Question No. 6:

6. Regarding haul road emissions: Please provide the minimum and maximum weight of the vehicles for each of the percentiles used to determine the average weight of the vehicle, and justification of the silt loading. Did the average weight of the vehicles and distance traveled account for equipment used to manage the open stockpile? Given that all haul roads are proposed to be paved, is the open stockpile going to be located on a paved surface?

MGS Response

a. *In the updated calculations, min and max weight for each vehicle type have been provided.*
b. *Due to BECCS facility not fitting into one of the defined categories in table 13.2.1-3. BECCS facility used Table 13.2.1-2. The Ubiquitous Baseline 0.6 g/m² and a multiplier of 4 is applied for low volume roads (< 500 Average Daily Traffic) to obtain a wintertime baseline silt loading of 4 X 0.6 = 2.4 g/m².*

c. *The biomass stockpile will be placed on a paved surface.*

DAQ Question No. 7:

7. provide additional details on how the HCl emissions from the wastewater treatment unit were determined and how these HCl emissions will be determined when the wastewater treatment unit is in operation.

MGS Response

a. *It was conservatively assumed that approximately 10% of the HCl would be absorbed in the solution from the flue gas in the Direct Contact Cooler/ Polishing Scrubber. The solution is then sent to WWTP and it is conservatively assumed that all the HCl will be emitted to the atmosphere.*
b. *Once the operation of the plant begins, HCL emissions from the WWTP will be determined by sampling for HCl periodically at the inlet and outlet of the WWTP. Sampling data will be used to estimate HCl emissions and verify compliance.*

Additional DAQ Questions:

8. I notice that some (not all) of the control devices have the same ID number as the emission point. Also, the equipment id is also used as the emission point id. A different ID needs to be used for the emission point.

MGS Response

The attachment I have been updated to have separate Emission unit IDs and Emission Point IDs. Control Device IDs have changed as well.

9. From Attachment I, I read that the makeup sand and sodium bicarbonate storage silos are venting into the BFB boiler and therefore the exhaust is controlled by the same boiler control devices. Also, there is a by-pass stack for the CCU (122-T-1001).

MGS Response

Correct; however, the bypass stack is 121-PKG-3001 not 122-T-1001.

10. For the Sand Receiving Bin (121-S-1002), it lists as the control device that vent is piped to BFB. If that is the case, the emission point for the sand receiving bin would be either 121-PKG-3001 or 122-T-1001 and not 121-S-1002.

MGS Response

The Sand Receiving Hopper (121-S-1002) is not vented to 121-PKG-3001 (BFB Boiler Stack) or 122-T-1001 (Absorber). The Sand Receiving Hopper collects sand from the truck and directs it to the inclined Sand Conveyor. The sand from the conveyor is stored in the Makeup Sand Silo (121-S-5001) which vents to the BFB Boiler Stack, when the carbon capture unit is not in operation or the Absorber during normal operation. The Sand Receiving Hopper is open to the atmosphere.

MGS CNP 1, LLC
109 Post Oak Lane, Suite 140
Houston, TX 77024

11. For the capacity of silo and bins, please list the mass capacity for the silo or bin and not the throughput rate. The open storage pile for the wood chips needs a capacity value either on a mass or area basis.

MGS Response

All sizes are preliminary and not finalized. It should also be noted that the emissions from these sources are based on the throughput handled and not depended on size of the silo or bins.

a. *121-LS-1001 – Biomass Receiving Hopper = approx. 6,000 ft3*
b. *121-LS-1002 – Biomass Receiving Hopper = approx. 6,000 ft3*
c. *121-S-1001 – Biomass Feed Hopper = 1,500 ft3*
d. *121-S-1002 – Sand Receiving Hopper = 6,000 ft3*
e. *121-S-2001A/B – Biomass Fuel Metering Bin = 4,200 ft3 each*
f. *121-S-4001A/B – Fly Ash Storage Silo = 9,500 ft3 each (166 tons each)*
g. *121-S-5001 – Makeup Sand Silo = 1,660 ft3*
h. *121-S-9901 – Sodium Bicarbonate Storage Silo = 2,000 ft3*
i. *Chip Pile = 14 days of storage (71,265.6 klbs = 212.1 klb/hr x 24 hrs/day x 14 days)*

Natural Gas Analysis

Parameter	Units	Design Value
Higher Heating Value	BTU/scf	1,051
Lower Heating Value	BTU/scf	955
Pressure	psig	600
Temperature	°F	60
Composition (typical)		
Nitrogen	mol%	0.35
Carbon Dioxide	mol%	0.17
Methane	mol%	93.10
Ethane	mol%	5.99
Propane	mol%	0.33
n-Butane	mol%	0.03
i-Butane	mol%	0.02
n-Pentane	mol%	0.004
i-Pentane	mol%	0.007
Hexane	mol%	0.007
Total Sulfur	ppmv	10
Organic Sulfur	ppmv	10
H_2S	Grains / 100 SCF	0.25 (max)

Biomass Analysis

Parameter	Units	Value
Redacted		
Composition (base case)		
Redacted		
Sulfur	wt%, wet basis	0.01%
Redacted		

Emission ID	NOx		CO		PM		PM_{10}		$PM_{2.5}$		PM-Filterable		PM_{10} - Filterable		$PM_{2.5}$ - Filterable		VOC		SO_2		NH_3		H_2SO_4		Pb	
	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr
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[illegible]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	[illegible]	[illegible]	--	--	--	--	--	--	--	--
Totals:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Emission ID	Total HAPs		Acetaldehyde		Acrolein		Benzene		Formaldehyde		HCl		Styrene		Toluene	
	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr	lb/hr	Tons/Yr
131-H-0001	3.08	28.30	--	0.14	--	1.83	--	0.02	--	2.26	1.18	2.02	--	0.88	--	0.42
128-P-8002	0.02	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.01	--	--	--	--	--	<0.01
128-FWB-0001	1.08	0.08	--	<0.01	--	<0.01	--	<0.01	--	0.08	--	--	--	<0.01	--	<0.01
137-FWB-0001	0.11	0.27	--	--	--	--	--	--	--	--	0.11	0.27	--	--	--	--
Totals:	8.88	28.88	<0.01	0.14	<0.01	1.88	<0.01	0.08	<0.01	2.80	1.80	8.22	<0.01	0.88	<0.01	0.48

List of Tables in Attachment N - Emission Calculations

Table 9-C Building Preliminary Coal Boiler
Initial SIP Call

Source Name:	Coal Ship Road Preliminary Coal Boiler	ID#:	[illegible]
Permit ID#: [illegible]		Date:	6/2/2011

PTE	EPU	Air Contaminant	lb/hr *	tpy
[illegible]	[illegible]	NOx	36.00	65.52
		CO	5.00	10.48
		VOC Pollutant	0.00	0.00
		PM2.5 - Filterable	0.00	0.00
		PM10 - Filterable	0.00	0.00
		SO2	13.00	27.27
		PM10	0.00	0.00
		PM25	0.00	0.00
		Total HAPs	0.00	0.00
		HCl	11.00	23.79
		Lead	0.00	0.00
		Cadmium	0.00	0.00
		Hg	0.00	0.00
		HF	1.00	0.00
		NH3	0.00	0.00

* hourly emissions are to be emission rates under normal operating conditions.

Process Description:
Emissions from the boiler result from combustion of steam coal products. Emissions from the boiler are controlled by the following equipment:
•Pulse Jet Fabric Filter to control PM/PM10/PM2.5
•Selective Catalytic Reduction unit to the with aqueous ammonia to control NOx
•CO Oxidation Catalyst to control CO
•Injection of Caustic to Control SO2 (Dry Flue Gas Desulfurization)
•Dry Sorbent Injection system (Lime Sodium Bicarbonate/Trona/CSI) into the flue gas to control HCl and HAPs

Source of Factors:
Factors are based on Vendor's Guarantees. The emission calculations are based on emission factors provided by the boiler supplier.

The carbon exposure unit will expose 95% of the CO in the boiler flue gas. It is assumed that the carbon exposure unit will not reduce the NOx, SO and VOC emissions from boiler combustion.

Due result of the absorption process and reactions in the CSU, a small amount of solvents amines, nitrosamines, nitramines, acetaldehyde, formaldehyde and ammonia are produced and released into the atmosphere along with the CO2 depleted gas stream. These emissions are added to those from boiler combustion as an overall emissions of these compounds.
Emissions of these compounds are estimated based on the best information currently available.

When the flue gas temperature after the CSU is close to the ambient air temperature, it is assumed that no condensable particulate matter will be formed in the flue gas after the CSU.

Pounds per Hour Emissions:
Hourly Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Boiler Max Heat Input (MMBtu/hr)

Tons per Year Emissions:
Hourly Emissions (lb/hr) x [Max Emissions (lb/hr) x Annual Operating Hours (hrs/yr)] / 2,000 (lb/ton)

Emission Calculations:

Ideal Gas Law Constant, R:	0.730282	atm-ft3/(lbmol-°R)
Volume of 1 lbmol gas @ 1 atm and 32oF:	359.031	ft3/lbmol
Volume of 1 lbmol gas @ 1 atm and 60 °F:	359.031	ft3/lbmol
1 hour:	60.000	min
Gas Temperature:	153.000	°F
Gas Pressure:	14.000	inHg
Gas Pressure:	1.000	atm, absolute (1 atm = 406.78 in H2O)
Total Wet Flow:	1,258,700	lb/hr
CO2:	332,700	lb/hr
H2O:	13,400	lb/hr
O2:	52,200	lb/hr
Lower Upper Volumetric Flow before CSU:	26826.00	acfm
Dry Flue Gas Volumetric Flow before CSU:	331,621.00	acfm, dry
Wet Flue Gas Volumetric Flow before CSU:	345,021.00	acfm, wet
Wet Flue Gas Volumetric Flow before CSU:	332,998.00	acfm, wet
CO2 Removal Efficiency:	95%	
Wet Flue Gas Flow after CSU:	331,621.00	lb/hr
H2O of the Wet Flue Gas after CSU:	27.00	lb/lbmol
Wet Flue Gas Volumetric Flow after CSU:	332,378.00	lbmol/hr

Notes:

Boiler Maximum Heat Input:	600 MMBtu/hr, HHV
Annual Operating Hours:	4760 hours/year
Startup Hours per Year:	60 hours/yr
Startup Hours + CSU Out of Service:	420 hours/yr
CSU Hours During Service:	700 hours/yr
Maximum Heat Input from NG during Startup:	360 MMBtu/hr
Average Heat Input from NG during Startup:	222.5 MMBtu/hr
Duration of NG Combustion during each Startup:	30 hours
Average Heat Input from NG + Biomass during Startup:	510.5 MMBtu/hr
No. of Startups:	8
Duration per Startup:	72 hours/startup (before SCR / CO bed and other components reach their set)

Table 9-5 Building Technical Specification
[illegible]

Total Boiler Operations Emissions with Startups + Normal Ops

Pollutants	Startup		Normal Operations		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
NOx	49.61	3.72	26.23	47.21	75.84	50.93
CO	11.58	0.87	87.30	157.14	98.88	158.00
PM (filt + CPM)	5.51	0.41	7.88	14.18	13.39	14.59
Total PM	6.61	0.50	15.75	28.35	22.36	28.85
Total PM10	6.61	0.50	15.75	28.35	22.36	28.85
PM2.5	6.61	0.50	15.75	28.35	22.36	28.85
SO2	25.51	2.04	17.58	31.64	43.09	33.68
VOC	11.54	1.15	1.04	1.84	12.58	2.99
H2SO4	7.41	0.74	1.40	2.53	8.81	3.26
Pb	-	-	0.00	0.00	0.00	0.00
Hg	0.00	0.00	0.00	0.01	0.00	0.01
NH3	0.11	0.01	0.00	0.00	0.11	0.01
Organic HAPs*	0.14	0.01	0.01	0.01	0.15	0.02
Inorganic HAPs*	0.11	0.01	0.17	0.30	0.28	0.31
HAPs Total*	-	-	0.02	0.17	0.28	0.17

Boiler Normal Operations (with SCR)

4760 hours

Pollutants	Normal Operation Emission Factor	Normal Operation Emission Factor	Normal Operation Hourly Maximum	Normal Operation Annual	Note
	lb/MMBtu	lb/MMBtu	lb/hr	tpy	
NOx	26.23	0.020594	26.23	47.21	SCR Vendor Guarantee
CO	87.30	0.068523	87.30	157.14	SCR Vendor Guarantee
PM (filt + CPM)	-	0.006301	7.88	14.18	Vendor Guarantee, Same emission factor with Pulse Jet Filter
Total PM	-	0.012601	15.75	28.35	See Note 1
PM10 (filt)	-	0.012601	15.75	28.35	See Emissions from SCC
PM2.5 (filt+Condensable)	-	0.012600	1.89	8.51	Vendor's Guarantee
SO2	0.68	0.013807	17.58	31.64	See Sect 5 Fuel Analysis/Vendor's guarantee
VOC	1.40	0.000141	1.04	1.84	Vendor's guarantee
H2SO4	1.90	0.000751	1.40	2.53	92% removal efficiency by wet scrubber
Pb	-	0.000004	0.00	0.00	Table 1.4-2 in AP-42
Hg	0.00	0.000013	0.00	0.01	By Fuel Sulfur Content Calculation
NH3	-	0.000000	0.00	0.00	Table 1.4-2 in AP-42
Organic HAPs*	-	0.000004	0.01	0.01	Adjusted AP-42 Chapter 1.4 Table 1.4-3
Inorganic HAPs*	-	0.000081	0.17	0.30	See Note 1

Boiler Startup Emissions (unknown SCR)

48 hours

Pollutants	Startup Emission Factor	Startup Operation (Hourly Maximum)	Vendor Guaranteed Emissions Per Startup Annual	Startup Annual Total	Note
	lb/MMBtu	lb/hr	tpy	tpy	
NOx	-	49.61	3.72	3.72	Vendor's Guarantee
CO	-	11.58	0.87	0.87	Vendor's Guarantee
PM (filt + CPM)	0.0066	6.61	-	0.50	Vendor's Guarantee, Same emission factor with Pulse Jet Filter
Total PM	0.0066	6.61	-	0.50	Vendor's Guarantee for Filterable PM10 adjusted CPM10 emission factor for condensable PM (See Note 7
PM2.5 (filt+Condensable)	-	6.61	0.501	0.50	Vendor's Guarantee
SO2	0.0510	25.51	-	2.04	See Sect 5
H2SO4	0.0741	7.41	-	0.74	92% removal efficiency by wet scrubber
Pb	0.00000	0.00	-	0.00	Table 1.4-2 in AP-42
Hg	0.0011	0.00	-	0.00	AP-42 Fb removal efficiency by SD
NH3	0.0009	0.11	-	0.01	Table 1.4-2 in AP-42
Organic HAPs*	-	0.14	0.001	0.01	Based on VOC value
Inorganic HAPs*	0.0020	0.11	-	0.001	See Note 1

1. Total particulate matter (PM) = Filterable PM + condensable PM. Emission factor of 0.0066 lb/MMBtu for Filterable PM, PM10, and PM2.5 is based on vendor's guarantee. Emission factor of 0.0066 lb/MMBtu is based on aggregation of raw data collected from operating units. The flue gas from the preparation unit goes through the entire exhaust and the wash water returns. These steps will reduce the temperature of the flue gas as approximately 120 °F before it is discharged into the atmosphere. Therefore, the assumption for boilers using raw coal as PM control unit with samples and raw data materials were used as for the average emission factor of condensable PM. The data are attached as supporting material in the end of the boiler emissions calculation.

2. Emissions from the SCC should be revised once permitted based on engineering judgements and similar projects.

3. It is assumed that the amount of organic HAPs is the same as the amount of VOCs from fuel combustion. This assumption is supported by Table 1.4-3 in AP-42.

4. The emission factor for total metallic HAPs is based on Table 1.4-2 in AP-42. However, the emission factor for Manganese in AP-42 is not conservative enough. AP-42 formula includes. Therefore, MEC every in the supporting database with an Manganese emission factor of 1.3 E-06. The data used for this project is 10 times that value.

5. The vendor guaranteed VOC emission factor is 0.003 lb/MMBtu in the flue gas before the SCR/CO and gas. Due to the presence of the CO and gas, a VOC removal efficiency of 60% is applied to reduce the VOC emissions.

6. The emission factor for startup is the highest of the coal emission factors of biomass combustion and natural gas combustion. For natural gas combustion during startup, the SCC emissions are calculated as follows,

(20.1 lb/MMscf) * 1000000 btu/MMBtu * 48 hrs/startup/yr) / (1020 btu/scf) / (976.56 scf/Mscf)) * (10 ppmv lb/scf) / 1000000 * 60 lb/lbmol = 14.07 lb/yr = 0.01 tpy

7. The emissions of filterable PM, PM10, PM2.5 include the particulates from the fresh and startup of coal in the coal burn boilers and startup units.

[illegible]

[illegible]

Pollutant	[illegible] Emission Factor (lb/MMBtu)	[illegible] Heat Input Capacity (MMBtu/hr)	[illegible] Emissions (lb/hr)
Sulfuric Acid Mist	0.00	0.00	0.00
Ammonia	0.00	0.00	0.00
Chromium, Total	0.00	0.00	0.00
Chromium, VI	0.00	0.00	0.00
Cobalt Metal	0.00	0.00	0.00
Manganese	0.00	0.00	0.00
Nickel Metal	0.00	0.00	0.00
Phosphorus	0.00	0.00	0.00
Selenium	0.00	0.00	0.00
Total TSP (Lime Kiln)	0.00	0.00	0.00
Total PM10 (Lime Kiln)	0.00	0.00	0.00

[illegible]

HAP Emissions from Boiler Combustion

Reference: Table 1.3-9 of AP-42

Organic Compound	Average Emission Factor (lb/MMBtu)	CAS	HAP	HAP EF (lb/MMBtu)	Project HAP EF (lb/MMBtu)**	Emissions (tpy)*	Notes
Acetaldehyde	0.00E+00	75-07-0	Yes	0.00E+00	0.00E+00	0.00	
Acetophenone	0.00E+00	98-86-2	Yes	0.00E+00	0.00E+00	0.00	
Acrolein	0.00E+00	107-02-8	Yes	0.00E+00	0.00E+00	0.00	
Benzene	0.00E+00	71-43-2	Yes	0.00E+00	0.00E+00	0.00	Value >0.00 are HAP
Benzo(a)anthracene	0.00E+00	56-55-3	Yes	0.00E+00	0.00E+00	0.00	
Benzo(b)fluoranthene	0.00E+00	205-99-2	Yes	0.00E+00	0.00E+00	0.00	
Benzo(e)pyrene	0.00E+00	192-97-2	Yes	0.00E+00	0.00E+00	0.00	
Benzo(g,h,i)perylene	0.00E+00	191-24-2	Yes	0.00E+00	0.00E+00	0.00	
Benzo(k)fluoranthene	0.00E+00	207-08-9	Yes	0.00E+00	0.00E+00	0.00	
Benzyl chloride	0.00E+00	100-44-7	Yes	0.00E+00	0.00E+00	0.00	
Biphenyl	0.00E+00	92-52-4	Yes	0.00E+00	0.00E+00	0.00	
bis(2-Ethylhexyl) phthalate	0.00E+00	117-81-7	Yes	0.00E+00	0.00E+00	0.00	
Bromoform	0.00E+00	75-25-2	Yes	0.00E+00	0.00E+00	0.00	
Chloroform (TCM)	0.00E+00	67-66-3	Yes	0.00E+00	0.00E+00	0.00	
Chrysene	0.00E+00	218-01-9	Yes	0.00E+00	0.00E+00	0.00	
Cumene	0.00E+00	98-82-8	Yes	0.00E+00	0.00E+00	0.00	
Dibenzofuran	0.00E+00	132-64-9	Yes	0.00E+00	0.00E+00	0.00	
Dichlorobenzene	0.00E+00	25321-22-6	Yes	0.00E+00	0.00E+00	0.00	
Dichloroethane	0.00E+00	107-06-2	Yes	0.00E+00	0.00E+00	0.00	
Dichloropropane	0.00E+00	78-87-5	Yes	0.00E+00	0.00E+00	0.00	
Diethyl sulfate	0.00E+00	64-67-5	Yes	0.00E+00	0.00E+00	0.00	
Dimethyl sulfate	0.00E+00	77-78-1	Yes	0.00E+00	0.00E+00	0.00	
Dimethylbenz(a)anthracene	0.00E+00	57-97-6	Yes	0.00E+00	0.00E+00	0.00	
Dinitrophenol	0.00E+00	51-28-5	Yes	0.00E+00	0.00E+00	0.00	
Ethylbenzene	0.00E+00	100-41-4	Yes	0.00E+00	0.00E+00	0.00	
Ethylene dibromide	0.00E+00	106-93-4	Yes	0.00E+00	0.00E+00	0.00	
Fluoranthene	0.00E+00	206-44-0	Yes	0.00E+00	0.00E+00	0.00	
Fluorene	0.00E+00	86-73-7	Yes	0.00E+00	0.00E+00	0.00	
Formaldehyde	0.00E+00	50-00-0	Yes	0.00E+00	0.00E+00	0.00	
Hexane, n-	0.00E+00	110-54-3	Yes	0.00E+00	0.00E+00	0.00	
Hexane, other isomers	0.00E+00	Various	Yes	0.00E+00	0.00E+00	0.00	
Hexane, total	0.00E+00	Various	Yes	0.00E+00	0.00E+00	0.00	
Hexane, 2-methyl-	0.00E+00	591-76-4	Yes	0.00E+00	0.00E+00	0.00	
Hexane, 3-methyl-	0.00E+00	589-34-4	Yes	0.00E+00	0.00E+00	0.00	
Indeno(1,2,3-cd)pyrene	0.00E+00	193-39-5	Yes	0.00E+00	0.00E+00	0.00	
Isobutyraldehyde	0.00E+00	78-84-2	Yes	0.00E+00	0.00E+00	0.00	
Methanol	0.00E+00	67-56-1	Yes	0.00E+00	0.00E+00	0.00	
Methylbenz(a)anthracene	0.00E+00	56-49-5	Yes	0.00E+00	0.00E+00	0.00	
Methylchloranthrene	0.00E+00	3697-24-3	Yes	0.00E+00	0.00E+00	0.00	
Naphthalene	0.00E+00	91-20-3	Yes	0.00E+00	0.00E+00	0.00	

Table 9-C Building Modified Scrubber
MECO PSD_1.xls

Organic Compound	Emission Factor (lb/MMBtu)	CAS	HAP	HAP EF (lb/MMBtu)	Project HAP EF (lb/MMBtu)**	Emissions (tpy) *	Notes
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Value = ND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Value = ND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]						
[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]							
[illegible]				[illegible]			
[illegible]				[illegible]	[illegible]	[illegible]	

1. For values of "<LOD" (detection 1.0), lesser for VOC is the sum of all fumes from the sample chromatogram such as and acetone chloride.
2. For values of "<LOD" (detection 1.0), lesser for VOC is the sum of all fumes from the sample hydrogen chloride, chloroform, methylene, carbon tetrachloride, 1,1,1-trichloroethane, dichloromethane, benzene, chlorine, acetic, methanol, and acetone chloride.
3. Project HAP EFs are proportional to calculated emission changes per MECO's.
4. These annual emissions were conservatively estimated using the maximum heat input capacity of the boiler and 8760 hours per year.

References: Table C-9-1 of AP-42

Trace Elements	Emission Factor (lb/MMBtu)	HAP	HAP EF (lb/MMBtu)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Table N-2 Wood Chips Receiving Hoppers
MGS CNP 1, LLC

Source Name:	Biomass Unloading Seghouse	EPN:	121-PKS-1001		
Proposed MAERT Limits		Date:	5/5/2025		
PIN	EPN	Air Contaminant		lbs/hr	TPY
121-LS-1001 121-LS-1002	121-PKS-1001	PM		1.08	4.72
		PM10		1.08	4.72
		PM2.5		1.08	4.72

Process Description:

Wood fuel is delivered to the site by trucks. Trucks unload wood fuel into two receiving hoppers (121-LS-1001 and 121-LS-1002). Dust control is provided by a slight negative pressure in the dumping area. The extracted dust laden air will be directed through a bag house (121-PKS-1001) before discharge to atmosphere.
The bag house will reduce the particulate matter emissions to reach a PM loading of 0.01 grains/cf.

To represent worst case emissions, maximum hourly emissions for 121-LS-1001 and 121-LS-1002 are both based on the total amount of wood fuel to be delivered to the site, rather than splitting the emissions in half. This scenario is conservative, as if one of the truck unloaders fails, fuel can be delivered via the other unloader and all the wood chips would be delivered to one hopper. The annual emissions of 121-LS-1001 and 121-LS-1002 are permitted under a cap quantified based on the maximum amount of wood chips delivered each year.

Bases and Factors:
Particulate Matter (PM) emissions from truck unloading are estimated using the following design information:

Seghouse volumetric exhaust flow rate: 12566 ft3/min

The bag house will reduce the particulate matter emissions to a PM loading of 0.01 grains/cf.

Hourly emission rates are determined as follows:

Hourly Emissions (lb/hr) = exhaust flow (ft3/min) x 60 min/hr x PM loading in exhaust (0.01 grains/cf)
Annual emission rates are determined as follows:
Annual Emissions (tpy) = [hourly emissions (lb/hr) * annual operating hours (hr)] / 2,000 (lb/ton)

Table N-2 Wood Chips Receiving Hoppers
MGS CNP 1, LLC

Data:

	Fuel Delivered Per Year	Exhaust Flow	PM Loading in Exhaust	Controlled Max Hourly Emissions	Annual Operating Hours	Controlled Annual Emissions
Pollutant	tons/yr	ft3/min	gr/cf	lb/hr	hr/year	tpy
PM	929146.92	12566	0.01	1.08	8760	4.72
PM10	929146.92	12566	0.01	1.08	8760	4.72
PM2.5	929146.92	12566	0.01	1.08	8760	4.72

SECCS Plant
Air Quality Permit Application
December, 2024

5/6/2025 3:50 PM
Emissions Calculations for Air Permitting - SECCS - 4.25.25.xlsx
Table N-2 Receiving Hoppers

Emission FeaSors for Biomass Handling Process:
Emissions are BaseD on AP-42 emission faSors for Aggregate HandSng and Storage Piles (AP-42 Ch. 13.2.4, SecSon 13.2.4.3, NovemBer 2006)

Average Wind Speed is obtained from US EPA AP-42 TaSle 7.1-7 for Huntington, West Virginia (closest SaSsfactSon period)

DaSa:

Source Parameters				
Pollutant	Particle Size (µm)	Fall Drops in Transfer Process	Average Moisture (%)	$k^{(1)}$
PM/TSP	< 30	1	0.6	0.74
PM_{10}	< 10	1	0.6	0.35
$PM_{2.5}$	< 2.5	1	0.6	0.053

[1] 0.35% - 0.6% moisture site quality rating level A at the equation. The moisture content of the used chips is 20%. 0.6% is used in the calculations as per conservative results.

Hours of Operation	8,760	hours/year (24 hours/day X 7 days/week X 52 weeks/year)	
Annual Average Wind Speed at (less 10'=-	6.6	mph	annual average and highest monthly average wind speed for Huntington, WV taken from US EPA AP-42 Table 7.1-7.
Highest Monthly Average Wind Speed at (less 10'=-	8.6	mph	

Calculations:
AP-42 (section 13.2.4.3) fqyion of material

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

Where: k = particle size multiplier from AP-42 section 13.2.4.3
M = material moisture content (%)
U = mean wind speed

TSP/PM hourly emission fqyion:			TSP/PM annual emission fqyion:
= (0.74) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]			= (0.74) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]
=	0.0012	lbs/ton	= 0.0004 lbs/ton

PM10 hourly emission fqyion:			PM10 annual emission fqyion:
= (0.35) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]			= (0.35) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]
=	0.0006	lbs/ton	= 0.0002 lbs/ton

$PM_{2.5}$ hourly average emission fqyion:			$PM_{2.5}$ annual average emission fqyion:
= (0.053) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]			= (0.053) x (0.0032) x [(6.6/5)^1.3/(0.6/2)^1.4]
=	0.0000	lbs/ton	= 0.0001 lbs/ton

Table 1H-1: Biomass Handling Process
MGE CHP 1, LLC

Emission Unit	Emission Point	Description
111-CV-0001	222-CV-0001	Conveyor #1 from Biomass Receiving Hopper 1000 to Storage Pile
111-CV-0002	222-CV-0002	Conveyor #2 from Biomass Receiving Hopper 1000 to Storage Pile
CHP-1	CHP-1	Biomass Storage Pile Loading Fugitives
111-S-0005	222-CV-0003	Biomass Feed Hopper
111-CV-0003	222-CV-0004	Conveyor from Feed Hopper to 222-CV-0003 S/B
111-CV-0003 A	222-CV-0003 A	Enclosed Conveyor from 111-CV-0003 to Biomass Fuel Metering Bin 111-S-0003 A
111-CV-0003 B	222-CV-0003 B	Enclosed Conveyor from 111-CV-0003 to Biomass Fuel Metering Bin 111-S-0003 B
111-S-0003 A	222-CV-0003 A	Biomass Fuel Metering Bin A
111-S-0003 B	222-CV-0003 B	Biomass Fuel Metering Bin B

Process Description:
From the receiving hoppers, biomass is conveyed via enclosed conveyors (111-CV-0001 and 111-CV-0002) to an uncovered chip pile (CHP-1).
The biomass is loaded from the chip pile into a biomass feed hopper (222-CV-0002) using front end loaders.
The biomass is conveyed from the biomass feed hopper (222-CV-0002) to the fuel metering bins (111-S-0003 A/B) through a covered conveyor (conveyor 111-CV-0003) and two covered screw conveyors (222-CV-0003 A/B).
The above description indicates that the facility will be equipped with two identical biomass transfer processes from the receiving hopper to the BFB (except there will be just one biomass feed hopper and one conveyor from the feed hopper to the screw conveyors), for each transfer process, there will be 6 drop points from the receiving hoppers.
To represent worst-case emissions, the maximum hourly emissions for each drop point are based on the total amounts of wood fuel to be delivered to the site, rather than splitting the emissions in half. The annual emissions for each drop point or each step are permitted under a cap.

Basis and Factors:
Emission factors are based on AP-42 emission factors for Aggregate Handling and Storage Piles (AP-42 13, Section 13.2.4.3, November 2006). Please refer to Table 1H-2 for emission factor calculations.

Hourly emission rates are determined as follows:
Hourly Emissions (lb/hr) = annual emissions (tpy) / annual operating hours (hr) x 2,000 lb/ton

Annual emission rates are determined as follows:
Annual Emissions (tpy) = [(wood conveyed (tpy) * emission factor (lb emissions per ton of wood conveyed per drop point) * number of drop points) / 2,000 lb/ton]

Fugal Emissions:

Pollutants	Wood Chips Conveyed on Each Transfer Drop (tph)	Emission Factor (lb PM/ ton of wood/ drop point	Number of Drop Points	Annual Emissions TPY	Annual Operating Hours	Hourly Emission lb/hr
PM	608.127	0.0011	6	3.60	8,760	0.82
PM10	608.127	0.0005	6	1.64	8,760	0.37
PM2.5	608.127	0.0001	6	0.33	8,760	0.08

Note: Because the amount of biomass transferred per unit of a facility's hourly emissions are calculated based on the maximum hourly capacity of each of the 6 drop points in the fuel handling processes. The annual emissions are calculated based on the 6 drop points at each of these drops.

Emissions on each individual piece of equipment:

Source	Transfer Rate		Emissions: Production Rates (Tonnes/Year) Hourly			Annual			Emissions: Fuel Input Rates (lb/hr)			Emissions: Annual Production Rates (tpy)			Precaution from Wind	Efficiency
	(tons/hr)	(tons/yr)	PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5		
111-CV-0001	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001	2.6E7	0.0000	0.0010	Yes	99%
111-CV-0002	608.127		0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001				Yes	99%
CHP-1	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.170	0.080	0.008	0.370	0.170	0.020	No	0%
111-S-0005	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.170	0.080	0.008	0.370	0.170	0.020	No	0%
111-CV-0003	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001	2.6E7	0.0000	0.0010	Yes	99%
111-CV-0003 A	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001	2.6E7	0.0000	0.0010	Yes	99%
111-CV-0003 B	608.127		0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001				Yes	99%
111-S-0003 A [1]	608.127	5,000,140.00	0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001	2.6E7	0.0000	0.0010	Yes	99%
111-S-0003 B [1]	608.127		0.0011	0.0005	0.0001	0.0036	0.0016	0.0003	0.0011	0.0005	0.0001				Yes	99%
									Total lbs/hr	=	=	=	1.66	0.76	0.10	

[1] Design is still in progress. Because there will be covers on the conveyors to reduce wind speed, an emission control efficiency of 99% is used in the calculations.
[2] Each biomass receiving bins always possesses opening.

PM PM10 PM2.5 PM PM10 PM2.5

Table N-3 Storage Pile Wind Erosion
MGS CNP 1, LLC

Source Name:	Wood Chips Storage Pile Wind Erosion	EPN:	CHIP-1
Proposed MAERT Limits		Date:	5/5/2025

FIN	EPN	Air Contaminant	lbs/hr	TPY
CHIP-1	CHIP-1	PM	–	0.31
		PM10	–	0.15
		PM2.5	–	0.02

Process Description:

Wood chips are stored outside in one storage pile.

Assumptions:

Emissions from wood chips storage wind erosion are estimated using the AP-42, Section 13.2.5, Industrial Wind Erosion, November 2006 - Equation (2).

Meteorological data is obtained for Mason County, West Virginia (closest data collection point).
Measured wind gust speed plus additional 10 mph is assumed for yearly fluctuations.
Storage piles will be sprayed with water as necessary to control particulate emissions.

Data:

Calculations:
AP-42 (section 13.2.5, Industrial Wind Erosion, November 2006 - Equation (2): lb/acre of material

$$\text{Emission factor} = k \sum_{i=1}^{N} P_i \qquad (2)$$

Where: EF = emission factor (g/m²/yr)
k = particle size multiplier from AP-42 Section 13.2.5
N = number of disturbances per year
P = erosion potential corresponding to the observed (or probable) fastest mile of wind for the ith period between disturbances, g/m²
$P = 58 (u^* - u_t^*)^2 + 25 (u^* - u_t^*)$ (equation 3)
$p = 0$ for $u^* < u_t^*$
u^* = friction velocity = 0.053 X the fastest mile (m/s) (equation 4)
u_t^* = threshold friction velocity (m/s) = 1.02 m/s for overburden from AP-42 Table 13.2.5-2
The fastest mile is defined as the fastest observed mile of wind from Huntington, WV for the years 2002 - 2022.

Input:

Aerodynamic Particle Size Multipliers for Equation 3		
Pollutant	Particle Size (µm)	k
PM_{30}	< 30	1.0
PM_{10}	< 10	0.5
$PM_{2.5}$	< 2.5	0.075

Threshold friction velocity (u_t^*): 1.02 m/s
Frequency of disturbance: 12000 per year
Average frequency of wind events resulting in wind erosion: 100 per month

Erosion Potential Emission Factors

Month	Fastest Mile		u^*	$(u^* - u_t^*)$	$(u^* - u_t^*)^2$	P_{TSP}	P_{PM10}	$P_{PM2.5}$
	(mph)	(m/s)	(m/s)			(g/m²)	(g/m²)	(g/m²)
Jan	65	17.88	0.95	<0.07	0.01	0	0	0
Feb	69	18.99	1.01	0.01	0.00	0.13	0.06	0.01
Mar	68	20.16	1.07	0.05	0.01	0.71	1.32	0.35
Apr	68	20.60	1.10	0.07	0.01	0.86	0.80	0.21
May	64	16.88	0.90	<0.13	0.01	0.00	0.00	0.00
Jun	68	18.56	1.00	0.07	0.00	0.06	0.00	0.00
Jul	69	18.10	1.03	0.00	0.00	0.00	0.00	0.00
Aug	63	16.78	0.79	<0.23	0.06	0.00	0.00	0.00
Sep	65	16.48	0.83	<0.18	0.01	0.00	0.00	0.00
Oct	63	16.78	0.79	<0.23	0.06	0.00	0.00	0.00
Nov	63	16.78	0.89	<0.23	0.00	0.00	0.00	0.00
Dec	68	20.56	1.09	0.07	0.00	0.06	0.00	0.00
					Maximum Erosion Potential	0.72	1.32	0.35
					Annualized Erosion Factor (g/m²/yr)	91.80	10.87	2.65

Wind Erosion Emissions

Emission Source	Total Area	Disturbed Area		General Efficiency	PM	PM10	PM2.5
	(m²)	(%)	(m²)	(%)	(tpy)	(tpy)	(tpy)
Chip Storage	31,000	10	3100	0	0.31	0.15	0.02

Table N-5 Fly Ash Handling Process
MGS CNP 1, LLC

Emission Unit	Emission Point	Description	Hourly Rate (tons/hr)	Annual Rate (tons/yr)	Control	Note
121-CV-4001 A	121-CV-4001 A	PJFF Ash Collection Drag Chain Conveyor A (From boiler hopper to surge bin A)	4.5	39420	Covered	
121-CV-4001 B	121-CV-4001 B	PJFF Ash Collection Drag Chain Conveyor B (from boiler hopper to surge bin B)	4.5		Covered	
121-S-4002 A	121-S-4002 A	PJFF Ash Collection Surge Bin A	4.5	39420	NA	Hoppers are not open to the atmosphere. According to information provided by the boiler supplier, Babcock & Wilcox (B&W), the hopper does not produce any emissions.
121-S-4002 B	121-S-4002 B	PJFF Ash Collection Surge Bin B	4.5		NA	
121-CV-4002	121-CV-4002	PJFF Ash Transport Drag Chain Conveyor (From Surge Bins #1 and #2 to PJFF Ash Transfer Drag Chain Conveyor)	4.5	39420	Covered	
121-CV-4003	121-CV-4003	PJFF Ash Transfer Drag Chain Conveyor (to Ash Bucket Elevator)	4.5	39420	Covered	
121-CV-4004	121-CV-4004	Ash Bucket Elevator	4.5	39420	Covered	
121-CV-4005	121-CV-4005	Ash Distrubution Drag Chain Conveyor (From Ash Bucket Elevator to Fly Ash Storage Silos)	4.5	39420	Covered	
121-CV-4006 A	121-CV-4006 A	Economizer Hopper Ash Drag Chain Conveyor A (From Economizer Hopper to Economizer Hopper Ash Surge Bin A)	3.3	28908	Covered	
121-CV-4006 B	121-CV-4006 B	Economizer Hopper Ash Drag Chain Conveyor B (From Economizer Hopper to Economizer Hopper Ash Surge Bin B)	3.3		Covered	
121-S-4003 A	121-S-4003 A	Economizer Hopper Ash Surge Bin A	3.3	28908	NA	Hoppers are not open to the atmosphere. According to information provided by the

Table N-6 Fly Ash Handling Process
MGS CNP 1, LLC

Emission Unit	Emission Point	Description	Hourly Rate (tons/hr)	Annual Rate (tons/yr)	Control	Note
121-S-4002 B	121-S-4002 B	Economizer Hopper Ash Surge Bin B	3.3	[illegible]	NA	boiler supplier, B&W, the hoppers will not produce any emissions.

Table N-6 Fly Ash Handling Process
MGS CNP 1, LLC

Emission Unit	Emission Point	Description	Hourly Rate (tons/hr)	Annual Rate (tons/yr)	Control	Note
121-CV-4007 A	121-CV-4007 A	Economizer Ash Transport Conveyor A (From Economizer Ash Surge Bin A to Fly Ash Silo A)	3.3	28908	Covered	
121-CV-4007 B	121-CV-4007 B	Economizer Ash Transport Conveyor B (From Economizer Ash Surge Bin B to Fly Ash Silo B)	3.3		Covered	
121-S-4001 A	121-S-4001 A	Fly Ash Storage Silo A	7.9	68328	Pulse Jet Filter 121-F-4001 A	
121-S-4001 B	121-S-4001 B	Fly Ash Storage Silo B	7.9		Pulse Jet Filter 121-F-4001 B	
121-MX-4001 A	121-MX-4001 A	Pugmill A	7.9	68328	NA	There will be no emissions per B&W.
121-MX-4001 B	121-MX-4001 B	Pugmill B	7.9		NA	
121-TL-0001	121-TL-0001	Fly Ash Truck Loading	8.6	75335	Wet fly ash, with a moisture content of at least 10%	

BECCS Plant
Air Quality Permit Application
December, 2024

5/6/2025 2:30 PM
Emissions Calculations for Air Permitting - BECCS - 4.28.25.xlsx
Table N-6 Fly Ash Handling (1)

Fugitive emissions can be expected from conveying and transferring of fly ash due to wind and conveyor vibration.

Source	No. of Transfer	Transfer Rate		Emissions: Particulate Emissions (lb/hour) Hourly			Annual			Mixed Ions Particulates (lb/hr)			Annual Particulates (tpy)			Particulates from Wind	Efficiency [1]
		(tons/hr)	(tons/yr)	PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5		
123-CV-0005 A	1	4.8	30420	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003	1.700	0.843	0.128	Yes	99%
123-CV-0005 B	1	4.8		0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003				Yes	99%
123-CV-0002	1	4.8	30420	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003	1.700	0.843	0.128	Yes	99%
123-CV-0006	1	4.8	30420	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003	1.700	0.843	0.128	Yes	99%
123-CV-0003	1	4.8	30420	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003	1.700	0.843	0.128	Yes	99%
123-CV-0008	1	4.8	30420	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.007	0.004	0.003	1.700	0.843	0.128	Yes	99%
123-CV-0009 A	1	3.3	28800	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.004	0.002	0.000	1.310	0.602	0.004	Yes	99%
123-CV-0009 B	1	3.3		0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.004	0.002	0.000				Yes	99%
123-CV-0007 A	1	3.3	28800	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.004	0.002	0.000	1.310	0.602	0.004	Yes	99%
123-CV-0007 B	1	3.3		0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	0.004	0.002	0.000				Yes	99%
123-B-0003 A	1	7.8	68328	0.0388	0.1120	0.0171	0.1810	0.0880	0.0133	Refer to emission calculations for fly ash storage silos							
123-B-0003 B	1	7.8		0.0388	0.1120	0.0171	0.1810	0.0880	0.0133								
123-TU-0005	1	3.6	70338	-	-	-	-	-	-	Refer to emission calculations for fly ash truck loading							
				TOTAL						4.720	2.368	0.345	11.600	5.483	0.880		

[1] Design is still in progress. Because there will be sensors on the conveyors to reduce wind speed, an emission control efficiency of 20% is used in the calculations.

Emission Factors for Dry Fly Ash Handling Process:
Emissions are based on AP-42 emission factors for Aggregate Handling and Storage Piles (AP-42 V3, Section 13.2.4.3, Equation (1), November 2006)

Average Wind Speed is obtained from US EPA AP-42 Table 7.1-7 for Huntington, West Virginia (closest data collection point)

Key:

Source Parameters				
Pollutant	Particle Size (µm)	# of Drops in Transfer Process	Average Moisture % (M) [1]	$k^{(5)}$
PM_{TSP}	< 30	1	0.13	0.74
PM_{10}	< 10	1	0.13	0.35
$PM_{2.5}$	< 2.5	1	0.13	0.053

[1] 0.25% - 1.5% moisture the quality rating level D of the equation. The moisture content of the dry fly ash is conservatively assumed to be 0.13%.

Table N-3 Fly Ash Handling Process
MRH CMP 1, LLC

Hours of Operation	8,760	hours/year (24 hours/day X 7 days/week X 52 weeks/year)	
Annual average Wind Speed of Area (U) =	8.6	mph	annual average wind speeds for Huntington, WV taken from US EPA AP-42 Table 7.1-7.
Highest Monthly Average Wind Speed of Area (U) =	8.6	mph	

Calculations:

AP-42 (section 13.2.4.3) (k)em of material

$$Emission\ factor\ (lb\ ton) = k*(0.0032)*\left(\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\right)$$

Where: k = particle size multiplier from AP-42 (section 13.2.4.3)
U = mean wind speed
M = material moisture content (%)

TSP/PM hourly emission factor:		
= (0.74) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.3988	lbs/ton

TSP/PM annual average emission factor:		
= (0.74) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.3839	lbs/ton

$PM_{10\ (hourly)}$ emission factor:		
= (0.35) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.1886	lbs/ton

$PM_{10\ (Annual\ average)}$ emission factor:		
= (0.35) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.1815	lbs/ton

$PM_{2.5\ (hourly)}$ emission factor:		
= (0.053) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.0272	lbs/ton

$PM_{2.5\ (Annual\ average)}$ emission factor:		
= (0.053) x (0.0032) x [(8.6/5)^1.3/(0.13/2)^1.4]		
=	0.0260	lbs/ton

BBCCS Plant
Air Quality Permit Application
December, 2020

2/2/2023 8:50 PM
Emissions Calculations for Air Permitting - BBCCS - 0.33.33.xlsm
Table N-3 Fly Ash Handling (2)

Table N-6 Fly Ash Handling Process
MGS CNP 1, LLC

Source Name:	Fly Ash Storage Silos A & B	EPN:	121-F-4001 A / 121-F-4001 B	
Proposed MAERT Limits		Date:	5/6/2025	
FIN	EPN	Air Contaminant	lbs/hr	TPY
121-S-4001 A 121-S-4001 B	121-F-4001 A / 121-F-4001 B	PM	0.01	0.06
		PM10	0.01	0.03
		PM2.5	0.00	0.00

Process Description:

Generated fly ash will be transferred to two ash storage silos via an enclosed conveyor. When a sufficient volume has been collected, the fly ash will be mixed with utility water before removed from site for disposal by trucks.

The emissions from the fly ash silos were conservatively estimated using emission factors for Aggregate Handling and Storage Piles (AP-42 V5, Section 13.2.4.3, Equation (1), November 2006).

The two fly ash silos will be used alternately. Therefore, the annual emissions from the two silos will be permitted under a cap.

Bases and Factors:

The emission factors used to estimate the uncontrolled PM, PM10 and PM2.5 emissions were presented in Table N-6 Fly Ash Handling (2). A filter will be installed on each silo and run continuously, reducing particulate emissions by 99%.

Data:

Filter control efficiency: 99%

Pollutant	Emission Factor (lb/ton)		Feed Rate per Hour	Feed Rate per Year	Uncontrolled		Controlled	
					Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions
	Hourly	Annual	Tons/hr	Tons/yr	lb/hr	TPY	lb/hr	TPY
PM	0.1395	0.1819	7.5	65729.00	1.86	6.31	0.02	0.06
PM10	0.1129	0.0860	7.5	65729.00	0.88	2.94	0.01	0.03
PM2.5	0.0171	0.0130	7.5	65729.00	0.13	0.45	0.00	0.0045

Table N-6 Fly Ash Handling Process
MGS CNP 1, LLC

Source Name:	Fly Ash Truck Loading	EPN:	121-TL-0001	
Proposed MAERT Limits		Date:	5/6/2025	
FIN	EPN	Air Contaminant	lbs/hr	TPY
121-TL-0001	121-TL-0001	PM	0.00	0.01
		PM10	0.00	0.01
		PM2.5	0.00	0.00

Process Description:

Generated fly ash will be transferred to the ash storage silos via a conveying system. When a sufficient volume has been collected, the fly ash will be mixed with utility water before removed from site for disposal by trucks. The fly ash will have a minimum moisture content of 10% when loaded into trucks.
The particulate matter emissions will be controlled by keeping high moisture content of the fly ash.

Fly Ash Loading into Trucks

Data:

Pollutant	Emission Factor	Ash Produced per Hour	Ash Produced per Year	Hourly Emissions	Annual Emissions
	lb/Ton	Tons/hr	Tons/yr	lb/hr	TPY
PM	0.0004	8.6	75336	0.0033	0.01
PM10	0.0002	8.6	75336	0.0015	0.01
PM2.5	0.0000	8.6	75336	0.0002	0.001

Emission Factors for Dry Fly Ash Handling Process:

Emissions are based on AP-42 emission factors for Aggregate Handling and Storage Piles (AP-42 V5, Section 13.2.4.3, Equation (1), November 2006)

Average Wind Speed is obtained from US EPA AP-42 Table 7.1-7 for Huntington, West Virginia (closest data collection point)

Data:

Source Parameters				
Pollutant	Particle Size (µm)	# of Drops in Transfer Process	Average Moisture % (M) [1]	k [2]
PM/TSP	<30	1	10	0.74
PM_{10}	<10	1	10	0.35
$PM_{2.5}$	<2.5	1	10	0.053

(1) 0.25%-4.8% maintains the quality rating level A of the equation. The minimum moisture content of the wet fly ash is 10%.

Table N-6 Fly Ash Handling Process
MGS CNP 1, LLC

Hours of Operation	8,760	hours/year (24 hours/day X 7 days/week X 52 weeks/year)	
Annual Average Wind Speed of Area (U)–	5.6	mph	annual average and highest monthly average wind speeds for Huntington, WV taken from US EPA AP-42 Table 7.1-7.
Highest Monthly Average Wind Speed of Area (U)–	6.9	mph	

Calculations:
AP-42 (section 13.2.4.3) lb/ton of material

$$Emission\ factor\ (lb/ton) = k * (0.0032) * \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Where: k – particle size multiplier from AP-42 Section 13.2.4.3
M – material moisture content (%)
U – mean wind speed

TSP/PM average emission factor:		
= (0.74) x (0.0032) x ((6.9/5)^1.3/(10/2)^1.4)		
=	0.0004	lb/ton

PM_{10} average emission factor:		
= (0.35) x (0.0032) x ((6.9/5)^1.3/(10/2)^1.4)		
=	0.0002	lb/ton

$PM_{2.5}$ average emission factor:		
= (0.053) x (0.0032) x ((6.9/5)^1.3/(10/2)^1.4)		
=	0.00002	lb/ton

Table N-7 Sand Handling Process
MGS CNP 1, LLC

Bottom Ash and Sand Handling Process

Emission Unit ID	Emission Point ID	Description	Hourly Rate lb/hr	Annual Rate tpy	Control	Note
121-CV-3001 A	121-CH-3001 A	Metering Conveyor A (Bed Ash Screw A)	3333	9333	Covered	
121-CV-3001 B	121-CH-3001 B	Metering Conveyor B (Bed Ash Screw B)	3333		Covered	
121-CV-3003A	121-CH-3003A	Vibrating Screener A (Separate Bottom ash and sand)	3333	9333	Trough Hood (Partial enclosure)	
121-CV-3003B	121-CH-3003B	Vibrating Screener B (Separate Bottom ash and sand)	3333		Trough Hood (Partial enclosure)	
121-S-3001 A	121-S-3001 A	Bottom Ash Storage Bin A	3000	2700	N/A	No emissions are expected due to the size of the material.
121-S-3001 B	121-S-3001 B	Bottom Ash Storage Bin B	3000		N/A	
121-S-1003	121-S-1003	Sand Receiving Hopper	100000	1733	N/A	
121-CV-1004	121-CH-1004	Inclined Sand Hopper Conveyor	100000	1733	Covered	
121-S-3001	121-S-3001	Makeup Sand Silo	100000	1733	Vent piping to the BFS	
N/A	N/A	Chute (From Makeup Sand Silo to Sand Bucket Elevator)	600	1733	Full enclosure (Pipe)	
121-CV-3008 A	121-CH-3008 A	Transfer Conveyor A (Recycled Sand) (From Vibrating Screener A to Sand Bucket Elevator A)	330	1093	Cover assembly (partial enclosure)	
121-CV-3008 B	121-CH-3008 B	Transfer Conveyor B (Recycled Sand) (From Vibrating Screener B to Sand Bucket Elevator B)	330		Cover assembly (partial enclosure)	
121-CV-3004 A	121-CH-3004 A	Sand Bucket Elevator A (Recycled Sand + Fresh Sand)	330	2867	Covered	330 lbs/hr of reclaimed sand + 600 lbs/hr of makeup sand
121-CV-3004 B	121-CH-3004 B	Sand Bucket Elevator B (Recycled Sand + Fresh Sand)	330		Covered	330 lbs/hr of reclaimed sand + 600 lbs/hr of makeup sand
N/A	N/A	Recycle Sand Chute A (From Sand Bucket Elevator A Discharge to Boiler)	8000 lbs/24 hours		Full enclosure (Pipe)	No emissions
N/A	N/A	Recycle Sand Chute B (From Sand Bucket Elevator B Discharge to Boiler)	8000 lbs/24 hours		Full enclosure (Pipe)	No emissions

Table N-7 Sand Handling Process
MBS CNF 3, LLC

Fugitive emissions can be expected from conveying and transferring of sand due to wind and conveyor vibration.

Basis:
Particulate emissions from the sand handling process are conservatively estimated using uncontrolled emission factors in AP-42 Table 11.19-2 for aggregate transfer.

				Emissions										
				Short-term Emissions						Annual Emissions				
				lb/hr						tpy				
Source	No. of Transfer Points	Transfer Rate		Emission Factor (lb/ton)			PM	PM10	PM2.5	PM	PM10	PM2.5	PreControl from Wind	ETAcleanair [1]
		(tons/hr)	(tons/yr)	PM	PM10	PM2.5								
131-CV-8801 A	1	1.125	9855	0.0099	0.0033	0.0033	0.004	0.002	0.002	0.017	0.008	0.008	Yes	50%
131-CV-8801 B	1	1.125		0.0099	0.0033	0.0033	0.004	0.002	0.002				Yes	50%
131-CV-8801C	1	1.125	9855	0.0099	0.0033	0.0033	0.004	0.002	0.002	0.017	0.008	0.008	Yes	50%
131-CV-8801E	1	1.125		0.0099	0.0033	0.0033	0.004	0.002	0.002				Yes	50%
131-S-1003	1	90	1792	0.0099	0.0033	0.0033	0.345	0.165	0.165	0.009	0.003	0.003	No	0%
131-CV-1804	1	90	1792	0.0099	0.0033	0.0033	0.179	0.083	0.083	0.009	0.001	0.001	Yes	50%
131-CV-8808 A	1	0.125	1095	0.0099	0.0033	0.0033	0.000	0.000	0.000	0.003	0.001	0.001	Yes	50%
131-CV-8808 B	1	0.125		0.0099	0.0033	0.0033	0.000	0.000	0.000				Yes	50%
131-CV-8805 A	1	0.225	2847	0.0099	0.0033	0.0033	0.001	0.001	0.001	0.005	0.002	0.002	Yes	50%
131-CV-8805 B	1	0.225		0.0099	0.0033	0.0033	0.001	0.001	0.001				Yes	50%
						TOTAL	0.599	0.299	0.299	0.060	0.024	0.024		

[1] Design is still in progress. Because there will be screens on the conveyors to reduce wind speed, an emission control efficiency of 50% is used in the calculations.

Table N-8 Sodium Bicarbonate Handling Process
MBS CNF 3, LLC

			Hourly Rate	Annual Rate		
Emission Unit	Emission Point	Description	lb/hr	tpy	Control	Note
131-S-8801	131-FGS-8001, 131-F-1001	Sodium Bicarbonate Storage Silo	18000	4EE	Vent routed to Boiler and controlled by the Boiler PJFF	Relief operation; NaHCO3 will be pneumatically transferred to the silo.
131-S-8802 A	131-F-8802 A	Sodium Bicarbonate Vent Hopper A	100	4EE	Pulse Jet Filter 131-F-8801 A	
131-S-8802 B	131-F-8802 B	Sodium Bicarbonate Vent Hopper B	100		Pulse Jet Filter 131-F-8801 B	

Table N-5 Sodium Sicarbonate Handling Process
MGS CNP 1, LLC

Source Name:	Sodium Sicarbonate Vent Hoppers	EPN:	121-F-9902 A; 121-F-9902 B	
Proposed MACT Limits		Date:	5/6/2025	
FIN	EPN	Air Contaminant	lbs/hr	TPY
121-F-9902 A; 121-F-9902 B	121-F-9902A; 121-F-9902 B	PM	1.95E-04	8.54E-04
		PM10	7.50E-05	3.29E-04
		PM2.5	7.50E-05	3.29E-04

Process Description:

*From the NaHCO3 Silo, NaHCO3 will be gravity fed to the vent hoppers.
The emissions from the vent hoppers are calimated using emission factors from Table 11.19.2-2 in Section 11.19.2 of AP-42.

Bases and Factors:

0.039 lb/ton and 0.015 lb/ton are used to calimate the uncontrolled PM and PM10/PM2.5 emissions.
Each vent hopper will be equipped with one filter and will reduce particulate emissions by 90%.

To represent worst case emissions, the maximum hourly emissions for each vent hopper are based on the total amount of NaHCO3 to flow through the vent hoppers, rather than splitting the emissions in half. The annual emissions for both vent hoppers are permitted under a cap.

Data:

*filter control efficiency: 90%

Pollutant	Emission Factor	Feed Rate per Hour	Feed Rate per Year	Uncontrolled Hourly Emissions	Uncontrolled Annual Emissions	Controlled Hourly Emissions	Controlled Annual Emissions
	lb/ton	Tons/hr	Tons/yr	lb/hr	TPY	lb/hr	TPY
PM	0.039	0.05	455.00	0.00195	0.0085	0.0002	0.0009
PM10	0.015	0.05	455.00	0.00075	0.0033	0.0001	0.0003
PM2.5	0.015	0.05	455.00	0.00075	0.0033	0.0001	0.0003

Table IV-9 Cooling Tower
MGS CNP 1, LLC

Cooling Tower

One open recirculating, induced draft and counterflow cooling tower will be installed to support the facility's operation. The cooling tower will have 8 cells.

		Cooling Tower	Notes
	Production Unit ID:	120-CT-0101	
	EPN:	120-CT-0101	
Inputs	Recirculation Rate (gpm)	32,760	Rated capacity; Design only
	Drift (%)*	0.001	Design info
	Maximum TDS (ppm)	6000	
	Annual Average TDS (ppm)	1700	
	Annual operation hours	8760	
Controlled Emissions	Uncontrolled PM (lb/hr)	0.62	
	Uncontrolled PM (lb/hr)	0.06	
	PM (tpy)	0.27	
	Uncontrolled PM10 (lb/hr)	0.27	
	Controlled PM10 (lb/hr)	0.03	
	PM10 (tpy)	0.12	
	Uncontrolled PM2.5 (lb/hr)	0.27	
	Controlled PM2.5 (lb/hr)	0.03	
	PM2.5 (tpy)	0.12	

Cooling Tower Water Info:

concentration ratio:	3		Design info
TDS (average) make up water	340	ppmw	Design info
TDS (maximum) make up water	1,000	ppmw	
Maximum TDS	6,000	ppmw	
Annual Average TDS	1700	ppmw	

Recirculation Rate	10,100	m3/hr
Water density	0.84	kg/L
	997	kg/m3
1 lb =	453.59	grams
1 ton =	20	lbs
1 kg =	1000	grams

Equation: PM = Recirculation Rate, gpm * Drift, %/100 * 8.34 lb/gal * 60 min/hr * TDS, ppm/1000000 — Reference (*)

Particle Size Calculation (Hourly Max.)*

Cooling Tower Droplet Size			Particle Size		
Droplet (DA, reference)	Mass (Dv, reference)	Distribution (% Mass Smaller Than)	(Dp, reference)	PM 10 %Mass	PM2.5 %Mass
0-10	7.5	20.00	2.925		31.31
10 - 20	30	40.00	5.277		
20 - 30	60	60.00	8.624	73.04	
30 - 140	80	80.00	11.727		
140 - 170	145.5	90.00	16.676		
170 - 230	200	95.00	20.516		
230 - 270	250.5	98.00	23.338		
270 - 350	310	99.00	25.133		
> 350	350	100.00	26.317		

Table N-9 Cooling Tower
MBS CNP 1, LLC

Particle Size Calculation (Annual Crek.)[1]					
Drift Loss Tower Droplet Size			Particle Size		
Droplet Size (Dia. microns)	Mass (Dist. microns)	Fraction (% Mass Smaller Than)	(Dp, microns)	PM 10 % Mass	PM2.5 % Mass
< 10	7.5	20.00	0.625		
10 - 30	30	40.00	2.337		41.88
30 - 50	50	60.00	4.674		
50 - 110	80	80.00	8.334	83.88	
110 - 170	140.5	90.00	12.337		
170 - 230	200	94.00	15.338		
230 - 270	250.5	96.00	23.151		
270 - 370	320	98.00	38.808		
> 370	500	100.00	48.004		

$Q_d = Q_w * [\text{density}] * (TDS) / (1,000,000) * 4 * 8$

where:	Density of Water [g/l] =	1
	Density of TDS [g/l] =	2.33

TDS is assumed to be sodium chloride

Equations and Sample Calculations

Max PM yearly emissions (ton) = [cooling tower emission rate (gpm)] * [drift(%)] * 60 * 8.34 * Max. TDS, in circulating water (ppm)] * 8760 / 2000

= [value] / [value] * [value] / [value] * [value] / [value] * [value] / [value] = [value] tpy

PM annual emissions

PM* = [design PM emissions (lb/hr)] * [maximum hours of operation / operation (1 hr/8760 hr)]

= [value] / hr * [value] hr/yr * [value] = [value] tpy

Max PM10 yearly emissions (ton) = Max PM yearly emissions (ton) * fraction of emission PM10 (%)

= [value] tpy * [value] = [value] tpy

PM10 Annual emissions (tpy) = [design PM10 yearly emissions (ton)] *[maximum hours of operation (hr/yr)] * [1 ton/2000 lb]

= [value] tpy * [value] hr/yr * [value] = [value] tpy

Max PM2.5 yearly emissions (ton) = Max PM yearly emissions (ton) * fraction of emission PM2.5 (%)

= [value] tpy * [value] = [value] tpy

PM2.5 Annual emissions (tpy) = [design PM2.5 yearly emissions (ton)] *[maximum hours of operation (hr/yr)] * [1 ton/2000 lb]

= [value] tpy * [value] hr/yr * [value] = [value] tpy

References:

1. AP42 chapter 13.4 cooling towers.
2. 0.001% drift is assumed design.
3. Maximum hydraulically assumed operating hours for emissions from cooling towers. Max Hydrogen and Sulfide Fraction assumed conservative assumptions, etc.

Table N-10a Fugitive Road - Annual
MBS CNP 1, LLC

Annual Emission Rate

Unit ID*N	Vehicles I*er Day	Hours of Vehicle Traffic (hrs/day)	Road Length (miles)	Vehicle Mile Travelled Hourly (VM I/hr)
PM-PlantRd	107	24	0.83	2.81

Constituents	Emission Factor		Average Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
Criteria Pollutants	Factor	Units		
PM	0.7626	lb/VMT	2.14	9.38
PM 2.5	0.0374	lb/VMT	0.11	0.46
PM 10	0.1525	lb/VMT	0.43	1.88

Assumptions:

All roads paved

Maximum annual emission rate assumes 107 vehicle/24 hr day.

Mix of vehicles	Average Vehicle Weight	Min Vehicle Weight	Max Vehicle Weight	Unit
4.90%	25.5	24	27	ton
5.55%	30	20	40	ton
94.12%	31.5	15	42	ton
Average weight	32.7	-	-	ton

Maximum inside plant speed (posted speed limit) 20 mph.

Number of days with rainfall greater than 0.01 inch is 140 days.

Table N-10a Fugitive Road - Annual
M35 CNP 1, LLC

Constants:

k for PM	0.011 lb/VMT, Particle size multiplier for particle size range.
k for PM2.5	0.00054 lb/VMT, Particle size multiplier for particle size range.
k for PM10	0.0022 lb/VMT, Particle size multiplier for particle size range.
sL	2.4 g/m^2, Road surface silt loading
W	32.7 ton, Average weight of the vehicles traveling the road.
P	157 days, Number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period based on Figure 13.2.1-2 in AP-42.
N	365 days, Number of days in the averaging period.
	8760 hrs, Annual operation

Equations and Example Calculations:

(1) PM Emission Factor (lb/VMT) = EF = (k * (sL)$^{0.91}$ * (W)$^{1.02}$)(1-P/4N)
= 0.011 lb/VMT * (2.4 g/m^2)$^{0.91}$ *(32.7 ton)$^{1.02}$ * (1-140)/(4*365))
0.7626 lb/VMT

(2) PM Average Hourly Emission (lb/hr) = (VMT Hourly) * (EF for PM)
(2.79 VMT/hr) * (0.7725 lb/VMT)
2.14 lb/hr

(3) PM Annual Emission (ton/yr) = (PM Hourly Emission * Annual Operation) / 2000 lb/ton
(2.17 lb/hr * 8760 yrs) / 2000 lb/ton
9.38 ton/yr

References:

(1) AP-42, 13.2.1 Paved Roads
(2) Particle size multiplier, k, from Table 13.2.1-1
(3) Road surface silt loading constant, sL, estimated based on low traffic travel in Table 13.2.1-2 with application of identified controls:
•Paving of all in-plant haul roads
•Post and limit the maximum travelling speed to 20 mph

Table N-10b Fugitive Road - Hourly
M35 CNP 1, LLC

Max Hourly Rate

Unit ID/PN	Vehicles Per Day	Hours of Vehicle Traffic (hrs/day)	Road Length (miles)	Vehicle Mile Travelled Hourly (VMT/hr)
PM-PlantRd	203	10	0.63	12.79

Constituents	Emission Factor		Max Hourly Emissions
Criteria Pollutants	Factor	Units	(lb/hr)
PM	0.8395	lb/VMT	10.74
PM 2.5	0.0412	lb/VMT	0.527
PM 10	0.1679	lb/VMT	2.15

Assumptions:

All roads paved
Maximum hourly emission rate assumes 198 vehicle/10 hr day.

Mix of vehicles	Average Vehicle Weight	Min Vehicle Weight	Max Vehicle Weight	Units
2.53%	25.5	24	27	ton
3.03%	30	20	40	ton
96.97%	31.5	18	45	ton
Average weight	32.1	-	-	ton

Maximum inside plant speed (posted speed limit) 20 mph.
Number of hours with rainfall greater than 0.01 inch is 0 days.

Table N-10b Fugitive Road - Hourly
M35 CNP 1, LLC

Constants:

k for PM	0.011 lb/VMT, Particle size multiplier for particle size range.
k for PM2.5	0.00054 lb/VMT, Particle size multiplier for particle size range.
k for PM10	0.0022 lb/VMT, Particle size multiplier for particle size range.
sL	2.4 g/m^2, Road surface silt loading
W	32.1 ton, Average weight of the vehicles traveling the road.
P	0 days, Number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period.
N	1 days, Number of days in the averaging period.

Equations and Example Calculations:

(1) PM Emission Factor (lb/VMT) = EF = k * (sL)$^{0.91}$ * (W)$^{1.02}$
= 0.011 lb/VMT * (2.4 g/m^2)$^{0.91}$ *(32.1 ton)$^{1.02}$ * (1-0/4*1)
0.8395 lb/VMT

(2) PM Hourly Emission (lb/hr) = (VMT Hourly) * (EF for PM)
(12.79 VMT/hr) * (0.8395 lb/VMT)
10.74 lb/hr

References:

(1) AP-42, 13.2.1 Paved Roads
(2) Particle size multiplier, k, from Table 13.2.1-1
(3) Road surface silt loading constant, sL, estimated based on low traffic travel in Table 13.2.1-2 with application of identified controls:
•Paving of all in-plant haul roads
•Post and limit the maximum travelling speed to 20 mph

Table N-11 Fixed Roof Tanks Emissions
WBS CHP 1, LLC

Fixed roof tank emissions:

Breathing and working losses from fixed roof tanks were estimated using equations and methodology from AP-42 Chapter 7.

Emissions are based on the anticipated annual throughput for each tank along with the material composition to be stored.

Equipment ID	Description	Tank Type	Throughput		Maximum Filling Rate	Working Volume		Shell Height/Length	Max. Liquid Height	Diameter	Heated/Insulated		Control
			(bbl/yr)		(bbl/hr)	(bbl)	(gal)	(ft)	(ft)	(ft)	(Y/N)	°F	
122-TK-99005	Ammonia Storage Tank	Vertical	11,148.00		133.72	198	8,323	17.3	14	20	N	N/A	No atmosphere
122-TK-99021	Lean Amine Tank	Vertical	7,070.08		1,167.00	7,163	300,738	40	33	40	Y	210	No atmosphere
TOTAL	2												

Table N-11 Fixed Roof Tanks Emissions - Amine Tanks
WBS CHP 1, LLC

Company Name				WBS CHP 1, LLC	
Site Name				BECCS Plant	
Emission Unit ID				122-TK-99022	122-TK-99021
Description				Amine Makeup Tank	Lean Amine Tank

INPUT DATA

Tank Data

Tank Type (Vertical or Horizontal)				Vertical Fixed Roof	Vertical Fixed Roof
Diameter, D	D	ft		20.00	40
Height, H (or length for Horizontal tanks)	H_S	ft		12.00	40
Roof Type				Cone	Cone
Cone Roof Slope (cone roof only), S_r	S_r	Dimensionless, Default 0.0625		0.0625	0.0625
Shell Paint Color				WHite	WHite
Shell Paint Condition				Good	Good
Roof Paint Color				WHite	WHite
Roof Paint Condition				Good	Good
Breather Vent Pressure Setting, P_P	P_P	psig (Default is 0.03)		0.03	0.03
Breather Vent Vacuum Setting, P_V	P_V	psig (Default is -0.03)		-0.03	-0.03
Pressure of Vapor Space at Normal Conditions, P	P	psig (Default is 0)		0	0
Maximum Liquid Height, H_{LX}	H_{LX}	ft		12.00	33.00
Minimum Liquid Height, H_{LN}	H_{LN}	ft		1	1
Average Liquid Height, H_L	H_L	ft	$H_{LX}/2$	6.50	16.50
Maximum Hourly Throughput, Q_{MAX}	Q_{MAX}	bbl/Hr		167.83	1167.00
Annual Throughput, Q_{ANN}	Q_{ANN}	bbl/yr		308.00	7070.08
Control Type				NA	NA
Control Efficiency				NA	NA
Tank Insulated?				Yes	Yes
	T_{AX}, T_A, T_{AN}, T_{LA}	°R		308.67	308.67
Tank Maximum Liquid Volume, V_{LX}	V_{LX}	Bbl		9403.71	383008.90

Meteorological Data

Daily Min. Ambient Temp., T_{AN}	T_{AN}	°F		48.0	48.0
Daily Max. Ambient Temp., T_{AX}	T_{AX}	°F		68.5	68.5
Daily Total Solar Insulation, I	I	$Btu/(ft^2-day)$		1200	1200
Atmospheric Pressure, P_A	P_A	psia (Default is 14.7)		14.28	14.28

Material Data

Working Loss Product Factor, K_n	K_n	Dimensionless (0.75 for crude oils, 1.0 for all other organic		1	1
Total Losses, L_T [Eq. 1-1]	L_T	lb/yr	$L_T = L_S + L_W$	0.001	0.010
Total Losses, Lr [Eq. 1-1]	Lr	lb/yr	Lr = Ls + Lw	1.83	20.14
Standing Storage Losses, L_S [Eq. 1-2]	L_S	lb/yr	$L_S = 365V_{VS}K_EK_S$	0.00	0.00
Tank Vapor Space Volume, V_V [Eq. 1-3]	V_V	ft^3	$V_V = [\pi/4)D^2]H_{VO}$	713.04	85082.38
Vapor Space Outage, H_{VO} [Eq. 1-10]	H_{VO}	ft	$H_{VO} = H_S - H_L + H_{RO}$ (cortical tanks)	9.10	39.63
Cone Roof Outage, H_{RO} [Eq. 1-17]	H_{RO}	ft	$H_{RO} = H_R/3$ (cone roof)	0.10	0.43
Cone Tank Roof Height, H_R [Eq. 1-18]	H_R	ft	$H_R = S_RR_S$ (cone roof)	0.31	1.33
Vapor Space Expansion Factor, K_E [Eq. 1-4]	K_E	Dimensionless	$K_E = \Delta T_V/T_{VA} + ((\Delta P_A - \Delta P_B)/(P_A - P_{VA}))$	0.00	0.00
Vapor Space Expansion Factor, K_S [Eq. 1-13]	K_S	Dimensionless	$K_S = 0.0013ST_V$	0.00	0.00
Average Daily Vapor Temperature Range, ΔT_V [Eq. 1-5]	ΔT_V	°R	$\Delta T_V = (0.83/(3.3^*Ha/D)+0.2)(\Delta T_A + (0.003\alpha_s)+0.028\alpha Ha/D(\alpha_s/)/(3.3)Ha/D)+1.8)$	0.00	0.00
Average Daily Vapor Temperature Range, ΔT_V [Eq. 1-7]	ΔT_V	°R	$\Delta T_V = 0.72T_A + 0.028\alpha I$	0.00	0.00
Paint Solar Absorptance, α [Table 7.1-6]		Dimensionless		0.17	0.17
Average Daily Ambient Temperature Range, ΔT_A [Eq. 1-11]	ΔT_A	°R	$\Delta T_A = T_{AX} - T_{AN}$	19.10	19.10
Average Daily Liquid Surface Temperature, T_{LA} [Eq. 1-27]	T_{LA}	°R	$T_{LA} = (0.8+0.2/(1.0)Ha/D)+0.2((T_{AA} + (0.8 + 0.2/(1.0)Ha/D)+0.2)(T_B + (0.003\alpha_s) + 0.028 (Ha/D(\alpha_s))/(1.0)Ha/D)+0.2))$	209.27	209.27
		°F		30.05	30.05
		°C		30.05	30.05
		K		288.13	288.13
Average Daily Liquid Surface Temperature, T_{LA} [Eq. 1-28]	T_{LA}	°R	$T_{LA} = 0.7T_{AA} + 0.6T_B + 0.008\alpha I$	209.27	209.27
		°F		30.05	30.05
		°C		30.05	30.05
		K		288.13	288.13
Liquid Bulk Temperature, T_B [Eq. 1-31]	T_B	°R	$T_B = T_{AA} + 0.003\alpha I$	209.27	209.27
		°F		30.05	30.05
Average Daily Ambient Temperature, T_{AA} [Eq. 1-30]	T_{AA}	°R	$T_{AA} = (T_{AX} + T_{AN})/2$	213.03	213.03
Average Daily Minimum Liquid Surface Temperature, T_{LN} [Fig 7.1-17]	T_{LN}	°R	$T_{LN} = T_{LA} - 0.25\Delta T_V$	209.27	209.27
		°F		30.05	30.05
		°C		30.05	30.05
		K		288.13	288.13
		°R	$T_{LX} = T_{LA} + 0.25\Delta T_V$	209.27	209.27

Average Daily Maximum Liquid Surface Temperature, T_{LX} [Fig. 7.1-17]	T_{LX}	°R		30.05	30.05
		°C		30.05	30.05
		K		288.13	288.13
Daily Vapor Pressure Range, ΔP_V [Eq. 1-9]	ΔP_V	psia	$\Delta P_V = P_{VX} - P_{VN}$	0.000	0.000
Is the fixed roof tank a Deltak or riveted construction?				No	No

Table N-11 Fixed Roof Tanks Emissions - Amine Tanks

WBD CHP 1, LLC

Breather Vent Pressure Setting Range, ΔP_R (Eq. 1-20)	ΔP_R	psig	$\Delta P_R = P_{BP} - P_{BV}$	0.06	0.06
Vented Vapor Saturation Factor, K_S (Eq. 1-21)	K_S	Dimensionless	$K_S = 1/(1+0.053P_{VA}H_{VO})$	0.98	0.98
Vapor Pressure at the Average Daily Liquid Surface Temp, P_{VA} (Eq. 1-22)	P_{VA}	psia		0.1431	0.1431
Steel Vapor Density, W_V, (Eq. 1-23)	W_V	lb/ft^3	$W_V = (MP_{VA})/(RT_V)$	6.71E-04	6.71E-04
Vapor Molecular Weight, M_V, (Eq. 1-22)	M_V	lb/lb-mol		18.06	18.06
Average Vapor Temperature, T_V (Eq. 1-22)	T_V	°R	$T_V = (1.3\alpha_B/(\alpha_B+0.3)T_{AA} + 0.3T_B+0.003\alpha_B I)/(1.3\alpha_B/(\alpha_B+0.3)+0.3)$	318.19	318.00
Average Vapor Temperature, T_V (Eq. 1-22)	T_V	°R	$T_V = 0.7T_{AA} + 0.3T_B + 0.005\alpha I$	309.37	309.37
Working Loss, L_W (Eq. 1-28)	L_W	lb/yr	$L_W = V_Q K_N K_P W_V K_B$	1.83	20.84
Number of Turnovers per Year, N (Eq. 1-32)	N	Dimensionless	$N = 5.614Q/V_{LX}$	8.81	1.16
Working Loss Turnover (saturation) Factor, K_N	K_N	Dimensionless		1.00	1.00
Working Loss Product Factor, K_P	K_P	Dimensionless		1	1
Tank Minimum Liquid Volume, V_{LN} (Eq. 1-31)	V_{LN}	ft^3	$V_{LN} = (\pi/12)D^2(H_{LX}-H_{LN})$	808.96	87088.11
Vent Setting Correction Factor Test (Eq. 1-10)			$P_{BP}P_{BV} + P_{AV}(P_V + P_{AV}) > 1.0$	1.003	1.003
Vent Setting Correction Factor, K_B (Eq. 1-10)	K_B	Dimensionless		0.998	0.998
Vent Setting Correction Factor, K_B	K_B	Dimensionless	$K_B = (P_V + P_{AV})/(P_{BP} + P_{AV})$ if $P_{BP} + P_{AV} \geq P_V + P_{AV}$	0.998	0.998

MAXIMUM HOURLY EMISSIONS (TCEQ GUIDANCE DOCUMENT "ESTIMATING SHORT TERM EMISSION RATES FROM FIXED ROOF TANKS", 03/03)

Maximum 2Part-Term Emission Rate, L_{STE} (Eq. 1)	L_{STE}	lb/hr	$L_{STE} = (M_V \times P_{VA} \times FK_E)/(R \times T)$	0.43	8.16
Vapor Molecular Weight of the Component, M_V		lb/lb-mol		18.06	18.06
Maximum Filling Rate, FK_E		gal/hr		7008.76	136000.00
Ideal Gas Constant, R	R	[psia × gal]/[lb-mol × °R]		82.57	82.57
Worst Case Liquid Surface Temperature, T	T_{AA} + 10	°R	equal or EQ as max. ambient	309.37	309.37
Vapor Pressure of the Tank Contents at T_{AA}	P_{VA}	psia		0.13	0.13

Speciated Emissions (122-TK-9801)

					122-TK-9801	
	Vapor Phase @ T_{AA}	Vapor Phase @ T_{AA}	Vapor Phase @ T_{AA}	Vapor Phase @ T_{max}	Uncontrolled Emissions	
Components	wt%	wt%	wt%	wt%	[lb/hr]	[tpy]
MDEA	0.37	0.37	0.37	0.37	1.02E-03	1.78E-03
MDEA	0.03	0.03	0.03	0.03	2.02E-04	8.84E-07
Water	99.60	99.60	99.60	99.60	0.0203	0.0007

Speciated Emissions (122-TK-3301)

					122-TK-3301	
	Vapor Phase @ T_{AA}	Vapor Phase @ T_{AA}	Vapor Phase @ T_{AA}	Vapor Phase @ T_{max}	Uncontrolled Emissions	
Components	wt%	wt%	wt%	wt%	[lb/hr]	[tpy]
MEA	0.37	0.37	0.37	0.37	2.83E-03	2.72E-03

Table N-11 Fixed Roof Tanks Emissions - Amine Tanks

WBD CHP 1, LLC

MDEA	0.03	0.03	0.03	0.03	1.27E-03	3.41E-06
Water	99.60	99.60	99.60	99.60	0.1269	0.0005

BBCCS Plant 2/2/2023 8:03 PM
Air Quality Permit Application Emissions Calculations for Air Permitting - BBCCS - 0.18.22.xlsx
December, 2022 Table N-11 FR Tanks (2)

Table V-C1 Fixed Roof Tanks Emissions - Vapor Pressure Jones
MDS CHP 1, LLC

Vapor Pressure Calculations for Tanks 110-TK-6601 and 110-TK-6602

				a	b	c	P_{VA}	P_{VB}	P_{VC}	P_{VM}	Vapor Phase @ T_{LN}	Vapor Phase @ T_{LX}	Vapor Phase @ T_{LN}	Vapor Phase @ T_{VAX}	Vapor Phase @ T_{LN}	Vapor Phase @ T_{LX}	Vapor Phase @ T_{LN}	Vapor Phase @ T_{VAX}
Components	MW	Wt%	mol%	dimensionless	[°C]	[°C]	psia	psia	psia	psia	mol%	mol%	mol%	mol%	vol%	vol%	vol%	vol%
MEA [1]	61.08	15.00	13.46	8.36883	3034.67	-134.040	0.0031061	0.0031061	0.0031061	0.0031061	0.0795	0.0795	0.0795	0.0795	0.3455	0.3455	0.3455	0.3455
MDEA [2]	119.163	35.00	8.01				0.0001955	0.0001955	0.0001955	0.0001955	0.005	0.005	0.005	0.005	0.02	0.02	0.02	0.02
Water [3]	18.02	50.00	78.53	8.0518	3816.340	-46.616	0.17	0.17	0.17	0.17	99.915	99.915	99.915	99.915	99.63	99.63	99.63	99.63
							0.18	0.18	0.18	0.18								

Mole % of Liquid Product	
MW	19.60

	Vapor Pressures				Mol % of Vapor			
TOTAL	0.18	0.18	0.18	0.18	19.58	19.58	19.58	19.58

[1] Pressure equation for MEA is P_{VA} in bar and T in °K, P = 10^((A+B/(D+T)). (https://yaws.chemeng.ntou.edu.tw/wp-content/uploads/2021/08/Yaws-Handbook-of-Vapor-Pressure-2nd-Edition-2014.pdf)
P_{VA} in bar is converted to psia by multiplying 14.503773. Temperature range [338.6 to 533.2] K.
[2] MDEA has a vapor pressure less than 0.01 mm Hg at 20 °C. The entire tank is below 20 °C. 0.01 mmHg was used in the calculation to obtain conservative results.
[3] Pressure equation for water is P_{VB} in bar and T in °K, P = 10^((A+B/(D+T)). (https://yaws.chemeng.ntou.edu.tw/wp-content/uploads/2021/08/Yaws-Handbook-of-Vapor-Pressure-2nd-Edition-2014.pdf)
P_{VB} in bar is converted to psia by multiplying 14.503773. Temperature range [288.6 - 373] K.

Table V-C2 Fire Water Pump
MDS CHP 1, LLC

Three will be one diesel fired fire water pumps, with rating of 500 hp.
Sulfur content of fuel used in engines will be 15 ppm sulfur or less.
Annual nonemergency operating hours will be limited to 100 hr/yr.
Engines will be new (model year 2024 or later).

PM:	130 # 0402	PPM:	130 # 0402
Fuel Type:	Diesel		
Rating:	500		
Unit of Rating:	hp		
Fuel Consumption per Engine:	26.5	gal/hr	
Diesel Density:	7.100	lb/gal	
Fuel Consumption per Engine:	187.9	lb/hr	
Diesel Fuel Heat Content (HHV):	19,300	Btu/lb	
Fuel Input (HHV) per Engine:	3.63	MMBtu/hr	
Engine Horsepower Output:	500	hp	
Brake Specific:	7.26	lb/hp-hr	
Annual Operation:	100	hr/yr	
Engine Load:	100%		
Number of Engines:	1	per engine	
Brake Specific Fuel Consumption:	7.260	lb/hp-hr	

Notes:
[1] 19,300 Btu/lb is the average heating value of diesel and 7,001 lb/gal is the density of diesel as provided by vendor.
[2] Brake specific fuel consumption per hour = (Heat Input (HHV)) / (Engine Horsepower Output (hp)).

Water Pumps Diesel Engine Pollutant Rates:

Pollutant	Emission Factor [1,2,3]		Emissions Rates (Per Engine)		
			Max. Hourly	Annual Average [4]	Annual
			lb/hr	lb/hr	tpy
NOx [1]	4.0	g/bhp-hr	4.44	4.44	0.22
CO [1]	3.5	g/bhp-hr	3.89	3.89	0.19
PM10 [1,2]	0.1	g/bhp-hr	0.11	0.11	0.01
PM2.5 [1,2]	0.1	g/bhp-hr	0.11	0.11	0.01
VOC [1]	0.2	g/bhp-hr	0.22	0.22	0.01
SO2 [1]	1.00E-05	lb/bhp-hr	0.01	0.00	0.000

Notes:
1. NOx, CO, PM, and VOC emission factors are from 40 CFR 60.4202(a) for engines with rated power greater than or equal to 600 hp (450 kW) but less than or equal to 750 hp (560 kW). NSPS Subpart IIII specifies to use emission factors from Table 4 to 40 CFR Subpart IIII.
2. Emission factors for SO2 based on 15 ppmw ULSD.
3. All PM is assumed to be less than 1.0 µm in diameter. Therefore, the PM emission factor is used to estimate emissions of PM10 and PM2.5.
4. Annual average hourly emission rates are (annual emissions in tpy)*(2000 lb/ton)*(year/8760 hours.

Table N-13 Fire Water Pump
VIBE CHP 3, LLC

Example Calculation:

Hourly NO_x = 4.0 g/hr-hp | 447.43 hp | 1 lb / 453.59 g = 3.95 lb/hr

Annual NO_x = 3.95 lb/hr | 50 hrs/yr | 1 ton / 2000 lbs = 0.10 ton/yr

NAP Pollutants Non-Pollutants

NAP Pollutants Pollutants

Max Input = 4.50 MMBtu/hr each engine
Annual Hours @ Max Rating = 50.0 hrs/yr
Hourly Emissions = [Max Heat Input • MMBtu/hr] x [1 SCR*1.000 Btu] x [EF – lb/MMBTU]
Annual Emissions = [Max Heat Input • MMBtu/hr] x [1 SCR*1.000 Btu] x [EF – lb/MMBTU] x [Annual Operating Hours/yr] / [2,000 lb/Ton]

Pollutant	EF [1] (lb/MMBtu)	Source	gas/vapor [2]	Max. Hourly Emissions (lb/hr)	Annual Emissions [3] (tpy)	Maximum Potential Annual Emissions [4] (tpy)
BENZENE	9.33E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.74E-05
TOLUENE	4.09E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	7.64E-06
XYLENE	2.85E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	5.32E-06
PROPANE	2.96E-03	AP-42 Table 3.4-3 (10/96)	NA	0.00E+00	0.00E+00	5.53E-05
FORMALDEHYDE	7.89E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.47E-06
ACETALDEHYDE	7.67E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.43E-05
ACROLEIN	9.25E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.73E-06
METHANOL	2.50E-03	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	4.67E-05
NAPHTHALENE	1.30E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.43E-06
ACENAPHTHENE	1.25E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.34E-08
ACENAPHTHYLENE	9.23E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.72E-07
ANTHRACENE	1.23E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.30E-08
BENZO(A)ANTHRACENE	6.22E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.16E-07
BENZO(B)FLUORANTHENE	1.11E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.07E-08
BENZO(G,H,I)PERYLENE	4.14E-07	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	7.73E-09
BENZO(K)FLUORANTHENE	2.18E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	4.07E-08
CHRYSENE	6.93E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.29E-07
DIBENZ(A,H)ANTHRACENE	3.46E-07	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	6.46E-09
FLUORANTHENE	1.11E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.07E-08
FLUORENE	5.67E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.06E-07
INDENO(1,2,3-CD)PYRENE	1.66E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	3.10E-08
PHENANTHRENE	1.04E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.94E-07
PYRENE	1.36E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.54E-08
2-METHYLNAPHTHALENE	1.32E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.46E-07
BENZENE	9.33E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.74E-05
3-METHYLCHOLANTHRENE	4.91E-08	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	9.16E-10
7,12-DIMETHYLBENZ(A)ANTHRACENE	2.52E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	4.69E-07
ACETALDEHYDE	7.67E-04	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.43E-05
ACROLEIN	9.25E-05	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.73E-06
BENZO(A)PYRENE	4.14E-07	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	7.73E-09
BENZO(B)FLUORANTHENE	1.11E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	2.07E-08
BENZO(K)FLUORANTHENE	2.18E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	4.07E-08
CHRYSENE	6.93E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	1.29E-07
DIBENZ(A,H)ANTHRACENE	3.46E-07	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	6.46E-09
INDENO(1,2,3-CD)PYRENE	1.66E-06	AP-42 Table 3.4-3 (10/96)	Yes	0.00E+00	0.00E+00	3.10E-08
PROPYLENE	9.31E-03	AP-42 Table 3.4-3 (10/96)	NA	0.00E+00	0.00E+00	1.74E-04

[1] Emission factors obtained from US EPA, AP-42 Section 3.2 Gasoline and Diesel Engines (10/96), Table 3.2-2.
[2] Listed US EPA Hazardous Air Pollutants.
[3] Max. Hourly Emissions = Emission Factor [lb/MMBtu] *Max Heat Input Capacity per Engine (MMBtu/hr)
[4] Maximum Annual Emission Rate [lb/yr] = Hourly Emissions [lb/hr] * Annual Operating Hours [hr/yr]
[5] Maximum Annual Emission Rate [lb/yr] = Hourly Emissions [lb/hr] * Annual Operating Hours [hr/yr]
[6] Maximum Potential Annual Emission Rate [tpy] = Hourly Emissions [lb/hr] * Annual Hours [hr/yr] / [1 ton/2000 lb].

Table N-GE NG StarUp Generator
VIBE CHP 3, LLC

There will be one NG fired startup generator, with power rating @ 2237 kW
Sulfur content of fuel used in engine will be 15 ppmv sulfur or less.
Annual operating hours will be limited to 100 hr/yr.
Engines will be new (model year 2024 or later).

PIN: 125 PKS 5051 PPN: 125 PKS 5051
Engine Type: Waukesha, lean burn engine

Fuel Type:	Natural Gas	
Year:	2024	
Total Engines:	1	
Fuel Consumption:	15333	Btu/hr
NG HHV:	1091.22	Btu/Scf
Heat Input (HHV):	15.7	MMBtu/hr
Engine Horsepower Output:	3000	hp
Engine Output:	2237	kW
Annual Operation:	50	hr/yr
Engine Load:	100%	
Brake Specific Fuel Consumption: [1]	6930.00	Btu/kW-hr

1 hp = 2544 Btu/hr
1 kW = 1.341 hp

Standard Temperature: 60 °F 15.56 °C
Standard Pressure: 1 atm
Standard Volume: 379.48 ft3/lbmol

Notes:
[1] Vendor supplied data = 6930 Btu/kW-hr

Generator Gas Engine Pollutant Rates

Pollutant	Pollutant Factor [1] [2] [3]	Pollutant Rates		
		Max. Hourly (lb/hr)	Annual Average [4] (tpy)	Annual (tpy)
NOx [5]	4.0	g/hp-hr	0.04	0.04	0.17
CO [5]	2.0	g/hp-hr	19.03	0.05	0.33
PM [6]	0.000071	lb/MMBtu	0.00	0.0011	0.00
PM10 [6]	0.000071	lb/MMBtu	0.00	0.0011	0.00
PM2.5 [6]	0.000071	lb/MMBtu	0.00	0.0011	0.00
VOC max [5]	0.7	g/hp-hr	4.63	0.02	0.12
VOC [7]			2.87	0.02	0.10
SO2 [8]	4.08E-04	lb/hr	0.00	0.00	0.001

Notes:
1. NOX, CO, and VOC_{non} emission factors are Table 1 to 40 CFR 60 Subpart JJJJ for engines with rated power greater than or equal to 500 hp and manufactured after 7/1/2010.
40 CFR 60.4233(e) specifies to use emission factors from Table 1 to 40 CFR 60 Subpart JJJJ.
2. PM/PM10/PM2.5 emission factors come from Table 3.2-2 in AP-42.
3. Emission factors for SO2 based on 15 ppmv sulfur in NG.
4. All PM is assumed to be less than 1.0 µm in diameter. Therefore the PM emission factor is used to estimate emissions of PM10 and PM2.5.
5. Annual average hourly emission rates are (annual emissions in lb/yr)*2000 lb/ton*1 year/8760 hours.
6. As indicated in 40 CFR 60 Subpart JJJJ, Table 1, Note a(), VOC_{non} does not include formaldehyde. Total VOC = VOC_{non} + Formaldehyde. Formaldehyde is quantified using emission factor in Section 3.2 of AP-42.

Example Calculation:

Hourly NO_x = (4.08 g / kpbhr) * (8000.00 hp) * (1 lb / 453.00 g) = (8.61 lb / hr)

Annual NO_x = (8.61 lb / hr) * (50 hrs / yr) * (1 ton / 2000 lbs) = (0.17 ton / yr)

HAP Pollutants from NG Engine

HAP Pollutant Pollutants

Max Input = 10.77 MMBtu/hr each engine
Annual Hours @ Max Rating = 50.0 hrs/yr
Hourly Emissions = [Max Heat Input • MMBtu/hr] x [EF • lb/MMBtu]
Annual Emissions = [Max Heat Input • MMBtu/hr] x [EF • lb/MMBtu] x [Annual Operating Hours] / [2,000 lb/Ton]

1 Blanks / Low Rows Pogbox (27 HAPs)

Pollutant	HAPs [1]	Emission Factor [2] lb/MMBtu(fuel input)	Emission Factor Rating	HAPs Emission Factor lb/MMBtu(fuel input)	Max Hourly Emissions [3] (lb/hr)	Annual Emissions (lb/yr) [4]	Annual Emissions (ton) [5]
1,1,2,2-TeCraaEtaneEtaneA	Yes	0.00004	E	0.00004	7.01E-04	3.50E+00	1.75E-03
1,1,2-TraEtaneEtaneA	Yes	0.0000015	E	0.0000015	2.63E-05	1.31E+00	1.27E-03
1,1-DaEtaneEtane	Ne	0.0000338	E	0	0.00E+00	0.00E+00	0.00E+00
1,2,3-TrimeEtyBenzene	Ne	2.32E-05	C	0	0.00E+00	0.00E+00	0.00E+00
1,2,4-TrimeEtyBenzene	Ne	1.48E-05	C	0	0.00E+00	0.00E+00	0.00E+00
1,3-DaEtaneEtane	Ne	0.0000338	E	0	0.00E+00	0.00E+00	0.00E+00
1,3-DaEtaneepaene	Ne	0.0000338	E	0	0.00E+00	0.00E+00	0.00E+00
1,3,5-TrimeEtyBenzene	Ne	1.63E-05	C	0	0.00E+00	0.00E+00	0.00E+00
1,3-BuTaDiene	Yes	2.67E-04	C	2.67E-04	4.62E-03	2.31E+01	1.15E-02
1,3-DiEtaneepaene	Yes	0.0000264	E	0.0000264	4.57E-04	2.31E+00	1.15E-03
2-MeEtyleTaene	Yes	2.52E-05	C	2.52E-05	4.36E-04	2.18E+00	1.09E-03
2,2,4-TrimeEtyleTane	Yes	2.50E-04	C	2.50E-04	4.34E-03	2.17E+01	1.09E-02
Aeaph[Ene	Yes	1.25E-06	C	1.25E-06	2.17E-05	1.08E-01	5.42E-05
Aeaph[Eylene	Yes	8.23E-06	C	8.23E-06	1.42E-04	7.12E+00	3.72E-03
AeEaldeEyde	Yes	5.52E-03	A	5.52E-03	9.55E-02	4.78E+03	2.39E+00
Aeolein	Yes	5.14E-03	A	5.14E-03	8.89E-02	4.45E+03	2.23E+00
Benzene	Yes	1.42E-04	A	1.42E-04	2.45E-03	1.23E+02	6.13E-02
Benz[A]Fluoene	Yes	1.83E-07	C	1.83E-07	3.16E-06	1.58E-01	7.92E-05
Benz[a]pyene	Yes	1.13E-07	C	1.13E-07	1.95E-06	9.77E-02	4.88E-05
Benz[g,h,i]pey[ene	Yes	1.11E-07	C	1.11E-07	1.92E-06	9.59E-02	4.80E-05

Pollutant	HAPs [1]	Emission Factor [2] lb/MMBtu(fuel input)	Emission Factor Rating	HAPs Emission Factor lb/MMBtu(fuel input)	Max Hourly Emissions [3] (lb/hr)	Annual Emissions (lb/yr) [4]	Annual Emissions (ton) [5]
BipheyiX	Yes	2.12E-04	C	2.12E-04	3.67E-03	1.83E+01	9.17E-03
BuEane	Ne	0.41E-04	C	0	0.00E+00	0.00E+00	0.00E+00
Buty[ceBuEyalEeEyEe	Ne	1.04E-04	C	0	0.00E+00	0.00E+00	0.00E+00
CarBon TeTraCloriDeE	Yes	0.0000367	E	0.0000367	7.03E-04	3.52E+00	1.76E-03
ChloraBenzeneE	Yes	0.0000304	E	0.0000304	5.21E-01	2.60E+03	1.30E-03
ChloreEane	Ne	4.87E-05	C	0	0.00E+00	0.00E+00	0.00E+00
ChloreEtheneE	Yes	0.0000182	E	0.0000182	2.63E-04	1.31E+00	1.31E-03
Chryeneee	Yes	6.22E-07	C	6.22E-07	1.07E-05	5.33E+01	2.67E-04
CyaneeHane	Ne	2.37E-04	C	0	0.00E+00	0.00E+00	0.00E+00
EEane	Ne	1.66E-01	C	0	0.00E+00	0.00E+00	0.00E+00
EEyleBenzeneE	Yes	2.37E-03	E	2.37E-03	7.32E-04	3.66E+02	1.83E-03
EEyleneDiBromiDeE	Yes	0.0000443	E	0.0000443	8.76E-04	4.38E+02	2.19E-03
FluoraEtheneE	Yes	4.44E-05	C	4.44E-05	2.40E-03	1.20E+02	6.02E-02
FluoreneE	Yes	2.67E-06	C	2.67E-06	4.62E-04	2.31E+01	1.15E-02
FormaldeEyde[1]	Yes	2.23E-02	A	2.23E-02	4.04E-01	2.02E+01	1.01E-02
HeEaneE	Yes	2.50E-03	E	2.50E-03	4.34E-02	2.17E+01	1.09E-02
HeEyleneE	Ne	1.63E-05	C	0	0.00E+00	0.00E+00	0.00E+00
HeEylene DiBromiDeE	Yes	0.0000465	E	0.0000465	8.07E-04	4.03E+02	2.02E-03
HeEylene DiChloriDeE	Yes	1.48E-05	C	1.48E-05	2.57E-04	1.28E+02	6.42E-02
HexaneE	Yes	1.11E-04	C	1.11E-04	1.92E-03	9.61E+01	4.80E-02
IndeE[1,2,3-cd]PyreneE	Yes	1.67E-07	C	1.67E-07	2.90E-06	1.45E-01	7.24E-05
IsopropyleBenzene	Ne	1.63E-05	C	0	0.00E+00	0.00E+00	0.00E+00
MeEyleneChloriDeE	Yes	2.03E-05	C	2.03E-05	3.52E-04	1.76E+02	8.80E-02
n-HexaneE	Yes	1.11E-04	C	1.11E-04	1.92E-03	9.61E+01	4.80E-02
n-NoneaneE	Ne	1.12E-04	C	0	0.00E+00	0.00E+00	0.00E+00
n-OcEane	Ne	3.81E-04	C	0	0.00E+00	0.00E+00	0.00E+00
n-PenEane	Ne	2.63E-03	C	0	0.00E+00	0.00E+00	0.00E+00
NapEEaleneE	Yes	7.44E-05	C	7.44E-05	1.47E-03	7.33E+01	3.66E-02
PhenE	Yes	2.63E-05	C	2.63E-05	4.32E-04	2.16E+01	1.08E-02
PhenaEthreneE	Yes	1.84E-05	C	1.84E-05	3.03E-04	1.52E+01	7.58E-03
PhenolE	Yes	2.40E-05	C	2.40E-05	3.94E-04	1.97E+01	9.85E-03
PropaneE	Ne	1.42E-02	C	0	0.00E+00	0.00E+00	0.00E+00
PyreneE	Yes	1.36E-06	C	1.36E-06	2.63E-05	1.31E+00	6.72E-04
StyreneE	Yes	0.0000236	E	0.0000236	4.67E-04	2.33E+01	1.17E-02
TeTraaChloreEtheneE	Yes	2.48E-06	C	2.48E-06	4.08E-05	2.04E+00	1.02E-03
TolueneE	Yes	4.08E-04	E	4.08E-04	8.07E-03	4.03E+02	2.02E-04
Vinyl ChloriDeE	Yes	1.49E-05	C	1.49E-05	2.93E-04	1.47E+02	7.33E-02
XyleneE	Yes	1.84E-04	E	1.84E-04	3.64E-03	1.82E+01	9.09E-03
				Total HAPs	0.0003617	4.43	7.1.22

[1] Emission factors obtained from US EPA AP-42 Section 3.4 Large Stationary Diesel and All Stationary Dual-fuel Engines (10/96). Tables 3.4-3 and 3.4-4.
[2] Listed US EPA Hazardous Air Pollutants.
[3] Max. Hourly Emissions = Emission Factor (lb/MMBtu) *Max Heat Input Capacity per Engine (MMBtu/hr)
[4] Maximum Annual Emission Rate (lb/yr) = Hourly Emissions (lb/hr) * Annual Operating Hours (hr/yr)
[5] Maximum Potential Annual Emission Rate (tpy) = Hourly Emissions (lb/hr) * Annual Hours (hr/yr) / (1 ton/2000 lb).

Company: MGS CNP 1, LLC
Emission Point ID: BECCS-FUG
BECCS Plant Equipment Leaks
HOURS OF OPERATION: 8,760

Emission Summary

Pollutant	Hourly Emission Rate lb/hr	Annual Emission Rate tpy
VOC	0.83	33.05
NH_3	0.00	0.04

Emission Calculation

Component	Product (Service)	Component Count[1]	TOC Emission Factor[2] kg/component/hr	Stream Composition, wt%		Hourly Emissions, lb/hr	
				VOC	NH_3	VOC	NH_3
Valves	Rich Amine (Heavy Liquid)	38	0.00023	91%	0.0001%	0.21	2.84E-05
Pump Seals		2	0.00860			0.03	2.76E-05
Compressor Seals		0	-			-	-
Pressure Relief Valves (Gas Service)		2	0.104			0.30	1.15E-03
Flanges		300	0.00183			0.80	3.02E-07
Open-ended Lines[3]		12	0			0.00	0.00E+00
Valves	Lean Amine (Heavy Liquid)	400	0.00023	97%	-	0.10	-
Pump Seals		10	0.00860			0.28	-
Compressor Seals		0	-			-	-
Pressure Relief Valves (Gas Service)		87	0.104			2.80	-
Flanges		1800	0.00183			3.27	-
Open-ended Lines[3]		100	0			0.00	-
Valves	Natural Gas (Gas)	6	0.00287	12%	-	0.21	-
Pump Seals		0	-			-	-
Compressor Seals		0	0.228			0.00	-
Pressure Relief Valves		0	0.104			0.00	-
Flanges		22	0.00183			0.01	-
Open-ended Lines[3]		1	0			0.00	-

Component	Product (Service)	Component Count[1]	TOC Emission Factor[2] kg/component/hr	Stream Composition, wt%		Hourly Emissions, lb/hr	
				VOC	NH_3	VOC	NH_3
Valves	Diesel (Heavy Liquid)	28	0.00023	100%	-	0.01	-
Pump Seals		1	0.00860			0.03	-
Compressor Seals		0	-			-	-
Pressure Relief Valves (Gas Service)		1	0.104			0.24	-
Flanges		109	0.00183			0.05	-
Open-ended Lines[3]		6	0			0.00	-
Valves	Aqueous Ammonia (Light Liquid)	21	0.00456	-	32%	-	1.82E-01
Pump Seals		1	0.2189			-	1.39E-02
Compressor Seals		0	-			-	-
Pressure Relief Valves (Gas Service)		4	0.104			-	3.39E-01
Flanges		210	0.00183			-	2.17E-01
Open-ended Lines[3]		14	0			-	0.00E+00
Total Hourly Emissions, lb/hr						0.83	0.90

[1] *Component Count is estimated based on similar projects.*

[2] *TOC emission factor is obtained from protocol for equipment leak emission estimates, EPA-453/R-95-017, November 1995, Table 2-1. SOCMI Average Emission Factors*

[3] *Open-ended Lines will be equipped with a cap, blind flange, plug, or a second valve; Stream here a 100% control credit is taken.*

[4] *Sampling connections will be closed-purge connections; Stream here a 100% control credit is taken.*

Table N-15 Degraded Amine Truck Loadout
MGS CNP 1, LLC

Truck Loadout of Degraded Amine
Overview:
Degraded amine removed from the reclaiming system will be loaded offsite by trucks. Maximum permit calculations are based on 2000 barrels per year. For hourly maximum, the loading rate is 105 GPM (150 barrels per hour). MEA is used to represent the amine.

Emissions Methodology:
AP-42, Section 5.2 : Transport and Marketing of Petroleum Liquids

Formula for calculating loading losses:

$$L_L = 12.46 \frac{S * P * M}{T} \qquad \text{AP-42, Section 5.2 §106, Equation 1}$$

where:
L_L = Loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded
S = A saturation factor (based on type and service of loaded vessel)
P = True vapor pressure of liquid loaded, pounds per square inch absolute
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole)
T = temperature of bulk liquid loaded, °R 524.97 °R

Physical and Chemical Properties:

Emission Unit ID	True Vapor Pressure [1] (psia)	MW of Vapors [1] (lb / lb-mole)	Loading Loss (lb / 10^3 gal)	Notes
VOC - Amine -LOAD	0.0027	61.08	0.003	Submerged Loading: dedicated normal service, Uncontrolled

Throughput and Emissions:

Emission Unit ID	Max Hourly Throughput Mgal/hr	Annual Throughput Mgal/yr	Max Hourly Vapor Released (lb / hr)	Maximum Annual Vapor Released (lb/yr)	Notes
VOC - Amine -LOAD	6.3	84	0.015	0.20	Submerged Loading: dedicated normal service, Uncontrolled

Degraded Amine loading vapors - Uncontrolled

Emissions	Average lb / hr	Maximum lb / hr	Maximum tons /yr
VOC - Amine -LOAD	0.000033	0.015	0.00010

Table N-15 Degraded Amine Truck Loadout
MGS CNP 1, LLC

Calculation of MEA vapor pressure

				a	b	c
Components	MW	Wt.%	mol%	dimensionless	[°K]	[°K]
MEA [2]	61.08	100.00	100.00	4.29253	1408.87	-116.093

P_{vp}	0.0026944	psia

[2] Pressure equation for MEA is P_{vp} in bar and T in °K. P = 10^(A-B/(C+T)). (https://webbook.nist.gov/cgi/cbook.cgi?ID=C141435&Mask=4&Type=ANTOINE&Plot=on).
P_{vp} in bar is converted to psia by multiplying 14.50377. Temperature range [288.6 to 444.3] K.

BECCS Plant
Air Quality Permit Application
December, 2024

5/6/2025 2:30 PM
Emissions Calculations for Air Permitting - BECCS - 4.28.25.xlsx
Table N-15 Amine Loadout

Table H-4.A Wastewater Treatment Rate
MES ONP 1, LLC

Source Name:	Wastewater Treatment Rate	EIN:	11-1420-0001
Proposed Limits		Date:	1.10.2020

PM	PM10	Air Contaminant [2]	Ton/Yr [1]	lb/hr
11-1420-0000	11-1420-0000	VOC	0.01	0.00
		H2S	0.01	0.10
		HCl [3]	0.13	0.07

[1] Hourly emission rate is the emission rate under normal operating conditions.
[2] Hazardous Air Pollutants
[3] CO and HAPs were excluded from this calculation

Process Description:
The wastewater treatment plant will receive water from the sludge storage equalization/settling emulsion system. The emulsion liquid will have direct contact with the flue gas exhaust from the boiler. The emulsion solution will absorb ammonia, sulfuric acid and hydrochloric acid that could be present in the flue gas. The emulsion solution will be sent to the Wastewater Treatment Plant for further processing before it is discharged to the outfall. It is conservatively assumed that 100% of the ammonia, sulfuric acid and hydrochloric acid in the flue gas would be emitted from the Wastewater Treatment plant. The wastewater treatment plant will also receive water from the demineralized water system, reverse osmosis unit, fuel panel water, sealing water water and boiler blowdown water. These streams are expected to contribute emissions from the wastewater treatment plant.

MESC Rate
Air Quality Permit Application
February, 2020

3/24/2020 10:05:14 AM
Emissions Calculations for Air Permitting - MESC - 20JN002.b.xlsx
Table H-4.A Wastewater

Emission Unit ID	Emission Point ID	Proposed Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
BFB Boiler						
11-BFB-0001	11-FRED-0001 or 11-TV-0001	11-FRED-0001 - ES or 11-TV-0001 - ES	Fixed Grate Fluid Bed Boiler	2004	241 MMBtu/hr	20000-1C - Dulce Jet Debris Filter 20000-1C - SCR 20000-1C - CO Oxidation Catalyst 20000-1C - Wet Flue Gas Desulfurizer 20000-1C - Dry Sorbent Injection
11-BFB-0002			Sidelong Sand Silo	2004	40 Tons/hr	
11-BFB-0003			Sodium Bicarbonate Storage Silo	2004	100 lbs/hr	
Biomass Handling Process						
11-SA-1001	11-FRED-1001	11-FRED-1001 - ES	Biomass Receiving Dlegger 1001	2004	0.12 tons/hr	Baghouse 11-FRED-1001
11-SA-1002			Biomass Receiving Dlegger 1002	2004	0.12 tons/hr	
11-CTV-1001	11-CTV-1001	11-CTV-1001 - ES	Conveyor 11 from Biomass Receiving Dlegger 1001 to Energy Silo	2004	104.27 tons/hr	Covered
11-CTV-1002	11-CTV-1001	11-CTV-1002 - ES	Conveyor 12 from Biomass Receiving Dlegger 1002 to Energy Silo	2004	104.27 tons/hr	Covered
ESSP-1	ESSP-1	ESSP-1 - ES	Biomass Energy Silo Loading Fugitives	2004	104.27 tons/hr	N/A
11-SA-1001	11-SA-1001	11-SA-1001 - ES	Biomass Feed Dlegger	2004	104.27 tons/hr	N/A
11-CTV-1003	11-CTV-1001	11-CTV-1003 - ES	Conveyor from Feed Dlegger to 11-CTV-1001 A/B	2004	104.27 tons/hr	Covered
11-CTV-1003 A	11-CTV-1001 A	11-CTV-1003 A - ES	Semi-Conveyor from Biomass Feed Dlegger A to Biomass Fuel Metering Bin 11-SA-1001 A	2004	104.27 tons/hr	Covered
11-CTV-1003 B	11-CTV-1001 B	11-CTV-1003 B - ES	Semi-Conveyor from Biomass Feed Dlegger B to Biomass Fuel Metering Bin 11-SA-1001 B	2004	104.27 tons/hr	Covered
11-SA-1001 A	11-SA-1001 A	11-SA-1001 A - ES	Biomass Fuel Metering Bin A	2004	104.27 tons/hr	N/A
11-SA-1001 B	11-SA-1001 B	11-SA-1001 B - ES	Biomass Fuel Metering Bin B	2004	104.27 tons/hr	N/A
ESSP-1	ESSP-1	ESSP-1 - ES	Wood Chips Energy Silo	2004	-	N/A

Fly Ash / Economizer Ash Handling Process						
12-CTV-0001 A	12-CTV-0001 A	12-CTV-0001 A – ID	EST Ash Collection Drag Chain Conveyor A (from boiler hopper to surge bin A)	DDM	4.6 tons/hr	Covered
12-CTV-0001 B	12-CTV-0001 B	12-CTV-0001 B – ID	EST Ash Collection Drag Chain Conveyor B (from boiler to surge bin B)	DDM	4.6 tons/hr	Covered
12-CTV-0002	12-CTV-0002	12-CTV-0002 – ID	EST Ash Transport Drag Chain Conveyor (from Surge Bins # 1 and #2 to EST Ash Transfer Drag Chain Conveyor)	DDM	4.6 tons/hr	Covered
12-CTV-0003	12-CTV-0003	12-CTV-0003 – ID	EST Ash Transfer Drag Chain Conveyor to Ash Bucket Elevator)	DDM	4.6 tons/hr	Covered
12-CTV-0004	12-CTV-0004	12-CTV-0004 – ID	Ash Bucket Elevator	DDM	4.6 tons/hr	Covered
12-CTV-0005	12-CTV-0005	12-CTV-0005 – ID	Ash Distribution Drag Chain Conveyor (from Ash Bucket Elevator to Fly Ash Storage Silos)	DDM	4.6 tons/hr	Covered
12-CTV-0006 A	12-CTV-0006 A	12-CTV-0006 A – ID	Economizer Hopper Ash Drag Chain Conveyor A (From Economizer Hopper to Economizer Hopper Ash Surge Bin A)	DDM	2.3 tons/hr	Covered
12-CTV-0006 B	12-CTV-0006 B	12-CTV-0006 B – ID	Economizer Hopper Ash Drag Chain Conveyor B (From Economizer Hopper to Economizer Hopper Ash Surge Bin B)	DDM	2.3 tons/hr	Covered
12-CTV-0007 A	12-CTV-0007 A	12-CTV-0007 A – ID	Economizer Ash Transport Conveyor A (from Economizer Ash Surge Bin A to Fly Ash Silo A)	DDM	2.3 tons/hr	Covered
12-CTV-0007 B	12-CTV-0007 B	12-CTV-0007 B – ID	Economizer Ash Transport Conveyor B (from Economizer Ash Surge Bin B to Fly Ash Silo B)	DDM	2.3 tons/hr	Covered
12-FS-0001 A	12-FS-0001 A	12-FS-0001 A – ID	Fly Ash Storage Silo A	DDM	7.5 tons/hr	DIP 12-FS-0001 A
12-FS-0001 B	12-FS-0001 B	12-FS-0001 B – ID	Fly Ash Storage Silo B	DDM	7.5 tons/hr	DIP 12-FS-0001 B
12-TL-0001	12-TL-0001	12-TL-0001 – ID	Fly Ash Truck Loading	DDM	9.6 tons/hr	N/A

Bottom Ash and Sand Handling Process						
12-CTV-0001 A	12-CTV-0001 A	12-CTV-0001 A – ID	Ribveyor Conveyor A (Sand Ash Return A)	DDM	2160 lbs/hr	Covered
12-CTV-0001 B	12-CTV-0001 B	12-CTV-0001 B – ID	Ribveyor Conveyor B (Sand Ash Return B)	DDM	2160 lbs/hr	Covered
12-CTV-0002A	12-CTV-0002A	12-CTV-0002A – ID	Vibrating Screener A (to separate bottom ash and sand)	DDM	2160 lbs/hr	Partial Enclosure
12-CTV-0002B	12-CTV-0002B	12-CTV-0002B – ID	Vibrating Screener B (to separate bottom ash and sand)	DDM	2160 lbs/hr	Trough hood (Partial enclosure)
12-B-1002	12-PBSD-1002 or 12-PV-1001	12-PBSD-1002 or 12-PV-1001 – ID	Sand Receiving Hopper	DDM	32 tons/hr	N/A Covered. Vent piping to the BFD.
12-CTV-1004	12-CTV-1004	12-CTV-1004 – ID	Inclined Sand Hopper Conveyor	DDM	32 tons/hr	
12-B-0001	12-PBSD-0001; 12-PV-1001	12-PBSD-0001 – ID	Bulking Sand Silo	DDM	32 tons/hr 1765 tons/yr	
12-CTV-0002 A	12-CTV-0002 A	12-CTV-0002 A – ID	Transfer Conveyor A (Recycled Sand) (from Vibrating Screener A to Sand Bucket Elevator A)	DDM	4032 lbs/24 hours	Partial Enclosure)
12-CTV-0002 B	12-CTV-0002 B	12-CTV-0002 B – ID	Transfer Conveyor B (Recycled Sand) (from Vibrating Screener B to Sand Bucket Elevator B)	DDM	4032 lbs/24 hours	Partial Enclosure)
12-CTV-0004 A	12-CTV-0004 A	12-CTV-0004 A – ID	Sand Bucket Elevator A (Recycled Sand Bank Sand)	DDM	672	Covered.
12-CTV-0004 B	12-CTV-0004 B	12-CTV-0004 B – ID	Sand Bucket Elevator B (Recycled Sand Bank Sand)	DDM	672	Covered.

Hull/ROM Handling Process						
121-WSD-0001	121-WSD-0001; 122-TV-001	121-WSD-0001 > 122-122-TV-001 > ID	Sodium Bicarbonate Energy Silo	BIM	1402 cubic yard Raw (transformer, 84 hour)	Time record to BIT
121-WSD-0002 A	121-WSD-0002 A	121-WSD-0002 A > ID	Sodium Bicarbonate Unit Hopper A	BIM	124 Incho	BIT 121-WSD-0002 A
121-WSD-0002 B	121-WSD-0002 B	121-WSD-0002 B > ID	Sodium Bicarbonate Unit Hopper B	BIM	124 Incho	BIT 121-WSD-0002 B
Odour Point Sources						
123-ST-0001	123-ST-0001	123-ST-0001 > ID	Cooling Tower	BIM	81 792 ppm	N/A
Hull Handfill	Hull Handfill	Hull Handfill > ID	Truck Load Tipping Particulate Emissions	BIM	Max 222 vehicles per day; Av average 107 vehicles per day	N/A
123-TW-0001	123-TW-0001	123-TW-0001 > ID	Aeobic Inlaking Tank	BIM	88 51 yd (max)	N/A
123-TW-0001	123-TW-0001	123-TW-0001 > ID	Lane aeotion Tank	BIM	274 384 yd (max)	N/A
123-WWD	123-WWD	123-WWD > ID	Fire Water Pump	BIM	4031 ID	N/A
123-WSD-0001	123-WSD-0001	123-WSD-0001 > ID	WE Energy Generator	BIM	33001 ID	N/A
WSD-conveyor-LiLoD	WSD-conveyor-LiLoD	WSD-conveyor-LiLoD > ID	Truck Loading of Hydrated Aeotive	BIM	8.2 Mg/Hr	N/A
127-WSD-0001	127-WSD-0001	127-WSD-0001 > ID	Wastewater Treatment Plant	BIM	2.17 Mg/day 1.8171-03 Mg/d/yr	N/A
Tanks						
123-TW-0002	123-TW-0002	123-TW-0002 > ID	Diesel Tank	BIM	16 61 yd (max)	N/A
123-WSD-0001	123-WSD-0001	123-WSD-0001 > ID	Hydrated Aeotive Tank	BIM	1 488 yd (max)	N/A

CBI Claim Info 4/30/2025

Thursday, May 1, 2025 8:04 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

Rule 31 CBI

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Wed, Apr 30, 2025 at 12:34 PM
To: Michael Dearing <Michael.Dearing@erm.com>

Here is a link to our Rule 31 regarding CBI Claims with our office.

https://dep.wv.gov/daq/rulessummary/Documents/2024%20Final%20Rules/45-31.pdf

The items applicant's either overlook or fail to satisfy are 4.1.b. and 4.1.c.

Please look over the pdf at this link regarding filing a claim, which includes a sample form.

https://dep.wv.gov/daq/Documents/Longview%20Power/Claim%20of%20Confidentiality%203%2023%202020.pdf

Should you have any questions, please let me know.

Thanks,
Ed

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-414-1244
601 57th Street, SE
Charleston, WV 25304

Inc Email 4/22/2025

Tuesday, April 22, 2025 3:21 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Incomplete App Email

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Tue, Apr 22, 2025 at 3:20 PM
To: William Calhoun <jack.calhoun@fidelisinfra.com>, Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>

RE: Application Status: Incomplete
MGS CNP 1, LLC/BECCS Plant
Permit Application No. R13-3708
Plant ID No. 053-00134

Mr. Calhoun:

Your application for a construction permit for a steam to electric generation facility was received by this Division on February 24, 2025, and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete. It has been determined that the application as submitted is incomplete based on the following items:

1. Missing an discussion on the purpose (e.g. sell of electricity) of the excess electricity generated by the proposed boiler/steam turbine generator. If your proposed generation is to be used for a data center or other use that requires a redundant (backup) supply of electrical, please identify this alternative/backup source of electricity for the primary end user. This discussion needs to clearly answer whether the electricity is being sold, the planned amount of electricity to be sold, is there a purchase power agreement in place, please note the source of required electricity for normal startup operations will be purchased/supplied from local electricity wholesaler/another generating unit, and the nameplate rating of the generator. Please note if the facility is going to be connected to the electrical grid system (e.g. PJM), please explain the relationship (e.g., solely purchaser/consumer, wholesaler/generator).

Please note the amount of excess steam will be utilized to provide heat energy for the amine regenerator (temperature and pressure is also needed). Please provide details of the energy consumption of the facility, type of energy consumed (e.g. electricity, steam, natural gas) for the CO2 dehydration unit and compression and whether these energy requirements for these activities will be part of the auxiliary load of the facility or require additional combustion units.

The DAQ has an unclear understanding of what will be the source of the electricity to start the proposed emissions units. Please keep in mind, the emergency engine for the emergency generator can only be operated for 50 hours per year of non-emergency use. This discussion needs to describe the electrical system that the steam turbine/generator will be connected to and the source of the electricity needed for normal startup/shutdown operations. Please explain in further detail exactly how the fluidized bed boiler will be preheated for startup with the use of steam from an auxiliary boiler or other steam generator.

2. Missing completed individual control device sheets for the SCR, OxyCat, Wet FGD, and DSI for the boiler. Please identify key parameters that will be monitored to ensure compliance with the proposed emissions with respect to the pollutant(s) being controlled by the associated control device. Also, provide additional information regarding your proposed wet FGD system to determine if the residual moisture exiting the scrubber will pose a possible interference issue with a

continuous opacity monitoring system as required in 45CSR2 and 45CSR2A. Given that the application is proposed to be a synthetic minor source under the Title V Program, please provide a monitoring plan for the CO Catalyst, Wet FGD and DSI control device to ensure compliance with proposed emission limits.

3. Please provide supporting information to support the claim that the proposed fuel will have sulfur content to satisfy the exemption criteria of 40CFR60.42b(k)(2). Regarding the wood (primary fuel) to be used as fuel for the boiler, the application does not identify the source(s) and species of wood to be used as fuel. If the source(s) of the wood fuel is going to be discarded from a manufacturing process, this/these source(s) of wood need to be identified and evaluated whether the material is a waste/fuel in accordance with 40 CFR 241.

4. Please separate the startup emissions for control devices that the performance is impacted/cannot be operated during startup conditions (e.g. SCR, oxidation catalyst, wet FGD) on startup event basis. If a control device performance is impacted during an shutdown, thus shutdown emissions on a short term basis needs to be identified as well. Any by-passing of a proposed control device needs to be identified for startup and shutdown events. Please define the ending of a startup event. The emission calculations are based on NG firing for 10 hours per startup and a total of 55 hours per year for start operations. This accounts for 5 startup events per year with 5 hours unaccounted for. Please explain these 5 unaccounted for hours per year for startup and are the emissions based on firing 100% wood for these hours on an uncontrolled basis.

5. Please justify reducing the organic HAPs emission factors published in AP-42 by 88% for the use of CO catalyst when the VOC removal efficiency of 60% for the CO catalyst was applied to account for the control VOC emissions for the boiler.

7. Regarding haul road emissions: Please provide the minimum and maximum weight of the vehicles for each of the percentiles used to determine the average weight of the vehicle, and justification of the silt loading. Did the average weight of the vehicles and distance traveled account for equipment used to manage the open stockpile? Given that all haul roads are proposed to be paved, is the open stockpile going to be located on a paved surface?

8. Please provide additional details on how the HCl emissions from the wastewater treatment unit were determined and how these HCl emissions will be determined when the wastewater treatment unit is in operation.

Please address the above deficiencies in writing by no later than May 12, 2025. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Ed Andrews at (304) 926-0499 ext. 41244 or reply to this email.

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-414-1244
601 57th Street, SE
Charleston, WV 25304

Affidavit 3/2/2025

Thursday, April 3, 2025 10:49 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: WV DAQ Permit Application Status for MGS CNP 1, LLC; BECCS Plant

1 message

Michael Dearing <michael.dearing@erm.com> Wed, Apr 2, 2025 at 4:35 PM
To: "Mink, Stephanie R" <stephanie.r.mink@wv.gov>, "jack.calhoun@fidelisinfra.com" <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>, "Andrews, Edward S" <edward.s.andrews@wv.gov>, Gregory L Null <gregory.l.null@wv.gov>, Casey M Samples <casey.m.samples@wv.gov>, Kathy M Sullivan <kathy.m.sullivan@wv.gov>

Hello,

Attached is the affidavit for this application.

Thanks

ERM
Sustainability is our business

Michael Dearing

Managing Consultant, Scientist

Charleston WV **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Mink, Stephanie R <stephanie.r.mink@wv.gov>
Sent: Tuesday, February 25, 2025 9:04 AM
To: jack.calhoun@fidelisinfra.com; Michael Dearing <michael.dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>; Andrews, Edward S <edward.s.andrews@wv.gov>; Gregory L Null <gregory.l.null@wv.gov>; Casey M Samples <casey.m.samples@wv.gov>; Kathy M Sullivan <kathy.m.sullivan@wv.gov>
Subject: WV DAQ Permit Application Status for MGS CNP 1, LLC; BECCS Plant

Application Status

MGS CNP 1, LLC; BECCS Plant
Facility ID No. 053-00134
Application No. R13-3708

Mr. Calhoun:

Your application for a Construction Permit for the BECCS Plant was received by this Division via email on February 24, 2025 and was assigned to Ed Andrews. The following items were not included in the initial application submittal:

Copy of Class I legal advertisement affidavit.

Application fee of $4,500.00.

- Credit card payments may be made by contacting the Accounts Receivable section at 304-926-0499 x 41195. DEP accepts Visa and MasterCard only. Please have the Facility ID and Application Number available when calling.

- Checks may be sent by mail. You must include the Facility ID Number and Application Number on the check as an identifier. A check may be mailed to:

  WVDEP - DAQ - Permitting
  ATTN: NSR Permitting Secretary
  601 57th Street, SE
  Charleston, WV 25304

These items are necessary for the assigned permit writer to continue the 30-day completeness review.

Within 30 days, you should receive notification from Ed Andrews stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Ed Andrews, at 304-926-0499 x41244.

--

Stephanie Mink

Environmental Resources Associate

West Virginia Department of Environmental Protection

Division of Air Quality, Title V & NSR Permitting

601 57th Street SE

Charleston, WV 25304

Phone: 304-926-0499 x41281

25033EE0 - Affidavit - ERM Mason Co - River Cities Tribune.pdf
94K

25033EE0 -
Affidavit -...

PUBLISHER'S CERTIFICATE

I, Tamra Lawson,
Classified Manager of THE RIVER CITIES TRIBUNE, a newspaper of general circulation published in the city of Gallipolis, Gallia Co. OH, Pomeroy, Meigs Co. OH, and Point Pleasant, Mason Co. WV, County and state aforesaid, do hereby certify that the annexed:

25033EE0 Environmental Resources Management

Ad# 1465369

was published in THE RIVER CITIES TRIBUNE 1 time(s) commencing on 03/18/2025 and ending on 03/18/2025 at the request of

WV PRESS ASSOCIATION LEGAL NOTIC.

Given under my hand this 03/18/2025.

The publisher's fee for said publication is: $30.23.

Tamra Lawson
Classified Manager of
THE RIVER CITIES TRIBUNE

Subscribed to and sworn to before me this
03/18/2025

Notary Public in and for Gallia, Meigs and Mason Counties

My commission expires on
The 15 day of January 20 30

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that MGS CNP 1, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit for a Biomass Energy and Carbon Capture Sequestration Plant located off of WV Route 62, near Point Pleasant, in Mason County, West Virginia. The facility will be utilized primarily in the production of carbon dioxide removal (CDR) credits with future power/steam generation. The latitude and longitude coordinates are: 38.92450, -82.10822.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: Nitrogen Oxides, 90.85 tons per year (TPY); Carbon Monoxide, 48.48 TPY; Volatile Organic Compounds, 55.27 TPY; Sulfur Dioxide, 55.27 TPY; Particulate Matter-10, 83.35 TPY; Total Hazardous Air Pollutants, 24.00 TPY.

Startup of operation is planned to begin on or about the 15th day of November, 2026. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Written comments will also be received via email at DEPAirQualityPermitting@WV.gov.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 41281, during normal business hours. Dated this the 6th day of February 2025.

By: MGS CNP 1, LLC
Jack Calhoun
Vice President
109 Post Oak Lane, Suite 140
Houston, TX 77024

Ad#1465369

Additional Info 4/3/2025

Thursday, April 3, 2025 10:51 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Application Status for 13-3708

1 message

Michael Dearing <Michael.Dearing@erm.com> Thu, Apr 3, 2025 at 9:51 AM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>, William Calhoun <jack.calhoun@fidelisinfra.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>, Jonathan Rosenbaum <laura.m.crowder@wv.gov>

Ed,

I sent the affidavit in yesterday. Also, I have attached the list of question you sent 3/31/25 with responses from the team at Fidels. Some of the question we were unsure how to answer and may require a meeting to discuss.

Thanks

ERM
Sustainability is our business

Michael Dearing

Managing Consultant, Scientist

Charleston WV **erm.com**

O +1-(612)-347-7144

C +1-(304)-654-2227

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Friday, March 21, 2025 11:14 AM
To: William Calhoun <jack.calhoun@fidelisinfra.com>; Michael Dearing <Michael.Dearing@erm.com>
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>; Jonathan Rosenbaum <laura.m.crowder@wv.gov>
Subject: Application Status for 13-3708

You don't often get email from edward.s.andrews@wv.gov. Learn why this is important

EXTERNAL MESSAGE

Mr. Calhoun;

Our office has not received a copy of the affidavit of publication and therefore your application cannot be deam complete at this time.

We do have some concerns/questions with the application as follows, which need to be addressed/answered, which we can do during my site visit on Monday, March 25, 2025.

Attach is a word file of these concerns/issues/questions.

At this time, I feel that the monitoring for the proposed boiler is going to depend on whether the boiler is subject to the Acid Rain Program. Thus, the agency needs to know the capacity of the generator and whether the electricity generated by your proposed generator is going to be sold.

I would like to mention to you that 45CSR30.2.2. defines an affected source as a source that includes one or more affected units under 45CSR33 and Title IV of the Clean Air Act (Acid Deposition Control). Section 3.2. does not exclude "affected sources" that are non-major sources under 45CSR30 from the permitting requirements of Title V.

" *3.2. Exemptions and deferrals.*

3.2.a. Except as provided in section 4, all sources listed in subsection 3.1 that are not major sources, affected sources, or solid waste incineration units required to obtain a permit pursuant to §129(e) of the Clean Air Act may be deferred by the Secretary on a specific source category basis from the obligation to obtain a Title V operating permit under this rule. Any such deferral by the Secretary shall be consistent with the timetable established by the U.S. EPA for non-major sources to which this rule applies except as provided under subdivision 4.1.a."

As part of my review, I will review EPA's past Acid Rain Applicability Determinations whether your proposed boiler is an "affected source" under the Acid Rain Program (Title IV of the CAA) before making any applicability determination regarding your permit application. https://www.epa.gov/acidrain/acid-rain-program-applicability-determinations

Should you have any questions, please let me know.

Thanks,

Ed

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-414-1244

601 57th Street, SE

Charleston, WV 25304

DAQ list of Issues for 13-3708 - Reviewed.docx
27K

DAQ list of Issues for 13-3708 - Reviewed

DAQ list of Issues/Concern/Questions regarding Permit Application 13-3708 for MGS CNP1/BECCS Plant.

1. Parts of the application are blacked out and there is no claim of "confidential business information" in the February 24, 2025, submittal. (e.g., MSDS for natural gas (sweet), SOS Business Certificate)
    - This was not meant to be confidential information, but rather a generic SDS for natural gas in the area.
2. Under Section 4.8.4. of the application, the application notes that the electricity is being sold. The electricity generated by the proposed boiler being sold needs to be clearly answered. Please clarify this. Also, keep in mind this answer impacts the proposed boiler with the interstate trade rules (e.g., acid rain).
    - Electricity will not be supplied to the grid. Rather steam generated from the combustion of the biomass can be sent to the STG to produce the hotel load for the facility. Excess steam can bypass the STG and be condensed. In future activities, this steam can be added to STG to create additional electricity as required for future projects.
3. The application under the EUDS for the boiler notes that NOx and CO2 CEMS will be utilized for monitoring NOx emissions. Given that your proposed unit will include a CO2 adsorber to remove carbon dioxide the location of the NOx CO2 CEMS needs to be upstream of the CO2 adsorber to properly monitor NOx emissions.
    - In the configuration, the approach is through the DCC, Absorber and then wash column. The DCC will control the emissions, and the amine in the absorber will react with the oxides present in the flue gas to create degraded products. The monitoring arrangement is setup to capture the stream after the absorber as NOx and other pollutants including NH3 are expected to be lower exit the absorber due to reaction and only control.
4. After Table N-1 BFB (pdf page 183) is a table of summary of stack data, the significance of the data or how the data was used with respect to this application to be explained.
    - Table N-1 is detailed description of the values used in the MAERT table along with the emission data source (i.e., vendor data/guarantee).
5. Did H2SO4 emission rates for the boiler consider the use of the DSI control device?
    - Yes, DSI controls are considered.
6. Would the H2SO4 emissions be knocked out in the CO2 adsorber?
    - No, the DCC will knock out the H2SO4 but to be conservative, the H2SO4 is shown as a pass through.
7. Did the HCl emission rates for the boiler consider the use of the wet scrubber? If not, explain why.
    - No, the DCC will knock out the HCL but to be conservative, the HCL is shown as a pass through.
8. The application lacks specific monitoring of the control devices for the respective pollutants except for NOx emissions. The DAQ would prefer to separate the control device sheet for each of the different types of control device. The exception could be made for dual catalysts (SCR and oxidation catalyst integrated into a single bed configuration) style control device. Information needed in the application from these sheets is needed to

develop clear set points for the permit when these controls are in operation (e.g., end of startup and when shutdown begins).
    - This topic needs further discussion with DEP to get clarity
9. Also, NOx mass emission needs to be accounted for under the Acid Rain and to ensure that the facility does not trigger the Title V major source status.
    - Nox is list in lbs./day and tons/yr in emission calculations. We are unsure of the location of this comment.
10. Does the PM rate of 67.83 tpy for the boiler in the summary table on PDF page 172 include condensable PM?
    - Yes, this does include condensable PM.
11. There is clearly a great deal of effort put into this application. However, most of my concerns in the application are focused on monitoring emissions/control devices with regards to NOx, CO, SO2, and HCl.
    - Is there a related question for this item?
12. The application does not contain supporting information that the SO2 potential of the fuel (e.g. sulfur content of the fuel) for the boiler will be below 0.32 lb/MMBtu to satisfy the exemption under 40CFR60.42b(k)(2).
    - MGS CNP has a representative wood analysis sample where SO2 would be less than 0.1 lb./MMBtu emitted.

App Status 2/25/2025

Wednesday, April 2, 2025 7:58 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

WV DAQ Permit Application Status for MGS CNP 1, LLC; BECCS Plant

1 message

Mink, Stephanie R <stephanie.r.mink@wv.gov> Tue, Feb 25, 2025 at 9:03 AM
To: jack.calhoun@fidelisinfra.com, michael.dearing@erm.com
Cc: Joseph R Kessler <joseph.r.kessler@wv.gov>, "Andrews, Edward S" <edward.s.andrews@wv.gov>, Gregory L Null <gregory.l.null@wv.gov>, Casey M Samples <casey.m.samples@wv.gov>, Kathy M Sullivan <kathy.m.sullivan@wv.gov>

Application Status
MGS CNP 1, LLC; BECCS Plant
Facility ID No. 053-00134
Application No. R13-3708

Mr. Calhoun:

Your application for a Construction Permit for the BECCS Plant was received by this Division via email on February 24, 2025 and was assigned to Ed Andrews. The following items were not included in the initial application submittal:

Copy of Class I legal advertisement affidavit.

Application fee of $4,500.00.

- Credit card payments may be made by contacting the Accounts Receivable section at 304-926-0499 x 41195. DEP accepts Visa and MasterCard only. Please have the Facility ID and Application Number available when calling.
- Checks may be sent by mail. You must include the Facility ID Number and Application Number on the check as an identifier. A check may be mailed to:

WVDEP - DAQ - Permitting
ATTN: NSR Permitting Secretary
601 57th Street, SE
Charleston, WV 25304

These items are necessary for the assigned permit writer to continue the 30-day completeness review.

Within 30 days, you should receive notification from Ed Andrews stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Ed Andrews, at 304-926-0499 x41244.

--

Stephanie Mink

Environmental Resources Associate

West Virginia Department of Environmental Protection

Division of Air Quality, Title V & NSR Permitting

601 57th Street SE

Charleston, WV 25304

Phone: 304-926-0499 x41281