

Buckner, Katharine

From: Tourville, Bob <BOB.TOURVILLE@NEW-INDYCB.COM>
Sent: Friday, March 31, 2023 2:16 PM
To: Buckner, Katharine
Cc: Pete Cleveland; Golden, Rebecca; Hardee, Christopher; McCaslin, Steven
Subject: RE: Draft PSD Applicability Calculations - Foul Condensate Stripper Project
Attachments: Emissions References.pdf; Responses to DHEC (3-30-23).docx

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Katharine

Good afternoon. Please find the attached responses to the questions below. Have a good weekend.

From: Buckner, Katharine <bucknekk@dhec.sc.gov>
Sent: Wednesday, March 22, 2023 8:52 AM
To: Tourville, Bob <BOB.TOURVILLE@NEW-INDYCB.COM>
Cc: Pete Cleveland <pete.cleveland@new-indycb.com>; Golden, Rebecca <RebeccaG@thekraftgroup.com>; Hardee, Christopher <hardeecd@dhec.sc.gov>; McCaslin, Steven <mccaslsd@dhec.sc.gov>
Subject: RE: Draft PSD Applicability Calculations - Foul Condensate Stripper Project

Hello Bob,

I have quickly reviewed the draft PSD analysis and calculations. I have some comments for you. Since there was such a short amount time to review and submit comments on the abbreviated draft analysis, you can address these comments separately from the application that is due on March 23, 2023. Some of these may already be addressed in the application so provide the specific location where the item is addressed in the application. Also, please send the electronic version of the emission calculations.

1. Please provide a narrative on the emission calculations that details the assumptions made, etc.
2. In the projected actual emissions, what is the basis for the operating time percentage of the new stripper, the backup stripper, and the time both strippers are offline?
3. Please provide complete reference citations for "Title V" and "Columbia" such as page number of the application, etc. Also, provide the complete AP-42 citations to include Chapter, Table, and any pertinent information to pinpoint the emission factor used. For information from stack tests used in the emission calculations, provide the date of the test and whether it is a Department approved test. If the stack test was performed at another facility, please provide the complete stack test report so the results can be reviewed for use as an emission factor. Where the H2SSIM/WATER9 programs were used, please provide the inputs and outputs for all.
4. Will the new stripper have its own steam generating system or will steam be supplied by the boilers? If steam will be provided by the boilers, please provide the steam balance for estimating the portion going to the new stripper and backup stripper.
5. How will the methanol be added to the Recovery Furnaces? Will a storage tank be needed for the methanol generated? Were emissions accounted for it in the PSD analysis? Is the condensed methanol further purified?
6. Please provide a detailed diagram of the foul condensate stripper system to at least show the liquid flows and the gaseous flows.
7. Was the 10% annual capacity factor for fossil fuels taken into account in the projected actual emissions for the Recovery Furnaces?
8. What happens to the scrubbing liquid from the LVHS caustic scrubber? Is this this the existing scrubber or will a new one be installed?

9. During the baseline period, where you operating in compliance? If not, how were any limits accounted for in the baseline calculations?
10. Provide the vendor guarantee/certification for the emission factors supplied by the vendor.
11. For Footnote E, why was data from the entire baseline period not used in the PSD analysis.

Please provide responses by Friday, March 31, 2023.

Thank you,

Katharine K. Buckner

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From: Tourville, Bob <BOB.TOURVILLE@NEW-INDYCB.COM>

Sent: Friday, March 17, 2023 11:37 AM

To: Buckner, Katharine <bucknekk@dhec.sc.gov>; Hardee, Christopher <hardeecd@dhec.sc.gov>; McCaslin, Steven <mccaslsd@dhec.sc.gov>

Cc: Pete Cleveland <pete.cleveland@new-indycb.com>; Golden, Rebecca <RebeccaG@thekraftgroup.com>

Subject: Draft PSD Applicability Calculations - Foul Condensate Stripper Project

***** Caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. *****

Katharine

Please find attached the draft calculations for the New Indy foul condensate stripper project. I have also placed a copy in a Fedex package. A full application will be submitted by March 23, 2023. Let me know if you have questions.

NOTICE: This message and any attachments are solely for the intended recipient and may contain confidential or privileged information. If you are not the intended recipient, you are hereby notified that any review, dissemination, distribution or duplication of this message and any attachments is prohibited. If you have received this communication in error, please notify us by reply email and immediately and permanently delete this message and any attachments. Email transmission may not be secure and could contain errors. We accept no liability for any damage caused by any virus transmitted by this email. Please do not send to us by email any information containing personally identifiable information without appropriate encryption. Thank you.

Responses in Blue

1. Please provide a narrative on the emission calculations that details the assumptions made, etc. A narrative was submitted with the permit application submitted March 23, 2023. Emissions calculations are discussed in Section 3.2.2.3.
2. In the projected actual emissions, what is the basis for the operating time percentage of the new stripper, the backup stripper, and the time both strippers are offline?
The PSD calculations were very conservative and assumed “worst case scenarios” based on best engineering judgement. In practice, we expect the new low pressure stripper to be in operation greater than 90%. The worst case scenario of 90% new stripper operation is also consistent with §63.446(g).
3. Please provide complete reference citations for “Title V” and “Columbia” such as page number of the application, etc. Also, provide the complete AP-42 citations to include Chapter, Table, and any pertinent information to pinpoint the emission factor used. For information from stack tests used in the emission calculations, provide the date of the test and whether it is a Department approved test. If the stack test was performed at another facility, please provide the complete stack test report so the results can be reviewed for use as an emission factor. Where the H2SSIM/WATER9 programs were used, please provide the inputs and outputs for all.
Stack tests performed at another facility were not used. H2SSIM and WATER9 inputs and outputs are located starting on page B-26 of Appendix B of the permit application submitted March 23, 2023. Please see attached tables for more detailed citations for other emissions factors.
4. Will the new stripper have its own steam generating system or will steam be supplied by the boilers? If steam will be provided by the boilers, please provide the steam balance for estimating the portion going to the new stripper and backup stripper.
Steam will be provided by the boilers. Emissions from generating steam required for the new stripper and backup stripper are based on preliminary design information from the vendors. The final steam balance for the project has not been developed.
5. How will the methanol be added to the Recovery Furnaces? Will a storage tank be needed for the methanol generated? Were emissions accounted for it in the PSD analysis? Is the condensed methanol further purified?
The methanol will be added to the recovery furnace black liquor feed per BLRBAC standards. Emissions from SRL methanol combustion in the recovery furnace are addressed in Section 3.2.2.3. A process tank for the methanol is proposed in the application on page 1-1 and throughout the application. The methanol tank will vent to the NCG system, which was accounted for in the analysis in Section 3.2.2.3 as the total NCG collection system. The condensed methanol will not be further purified.
6. Was the 10% annual capacity factor for fossil fuels taken into account in the projected actual emissions for the Recovery Furnaces?
The annual capacity factor was evaluated, and there is no impact to the 10% annual capacity factor. The LVHC ignitor (1 MMBtu/hr) is approximately 0.1% of the total heat input capacity of the recovery furnace. Emissions from the LVHC ignitor are included in the emissions calculation tables in Appendix B.
7. What happens to the scrubbing liquid from the LVHS caustic scrubber? Is this the existing scrubber or will a new one be installed?
When the LVHC NCG’s are being burned in the recovery boiler the existing LVHC scrubber will not be utilized, as explained on page 3-18 of the submitted permit application. The gases will be taken to the recovery boiler before the LVHC scrubber. When the backup combustion source is

Responses in Blue

used (combination boiler no. 1 or 2), the gases will go through the existing LVHC scrubber. The scrubbing liquid will be returned to the liquor cycle, consistent with current operation.

8. During the baseline period, were you operating in compliance? If not, how were any limits accounted for in the baseline calculations?

Yes. Note our baseline emissions for SO₂ are based on the October 2021 performance test.

9. Provide the vendor guarantee/certification for the emission factors supplied by the vendor.
The treatment efficiencies presented in Section 3.2.2.3 and Appendix B are based on preliminary design information. Documentation can be supplied once the vendor is selected.
10. For Footnote E, why was data from the entire baseline period not used in the PSD analysis.
Steam data for the existing steam stripper (Backup Stripper) was based on January 1 – December 16, 2022, which was readily available at the time the permit application was developed.

SO2 EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	SO2 Emissions Factor			Sulfur Capture ^C	SO2 Emissions		
			UOM	lb/UOM	Reference		%	lb/hr	tpy
			BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)						
Backup Stripper SOG ^A	NA	SOG to CB1/CB2	ADTP/day	1.06	October 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	63.1	252.5	
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	1.97	October 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	117.0	512.4	
Backup Stripper Steam ^A	Natural Gas ^{B,E}	NA	mmBtu/hr	6.00E-04	AP-42 Table 1.4-2.	NA	0.02	0.1	
Backup Stripper Steam ^A	No. 6 Oil ^{B,E}	NA	mmBtu/hr	2.20E+00	AP-42 Table 1.3-1. 2.1% Sulfur Content.	NA	61.9	5.2	
SO2 BASELINE ACTUAL EMISSIONS (BAE)							770.2		
PROJECTED ACTUAL EMISSIONS									
New Stripper Online	SRL Online	SRL Methanol to RF2/3 ^G	ADTP/day	0.56	Vendor / Preliminary Design Information	99%	0.6	2.4	
New Stripper Online	SRL Online	SRL LVHC to RF3 ^G	ADTP/day	0.84	Vendor / Preliminary Design Information	99%	0.9	2.7	
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2 ^G	ADTP/day	0.84	Vendor / Preliminary Design Information	50%	47.2	44.2	
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	1.40	Vendor / Preliminary Design Information	0%	157.4	31.0	
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	1.40	Vendor / Preliminary Design Information	0%	157.4	55.1	
No Stripper Online	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	NA	NA	NA	NA	NA	NA	
LVHC Collection System	NA	LVHC to RF3	ADTP/day	5.25	October 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. Pre-control emissions based on LVHC scrubber efficiency (50%) and estimated bark ash sulfur capture (20%) from 2012 stack test.	99%	5.9	19.4	
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	5.25	October 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. Pre-control emissions based on LVHC scrubber efficiency (50%) and estimated bark ash sulfur capture (20%) from 2012 stack test.	50%	295.2	323.3	
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	NA	mmBtu/hr	6.00E-04	AP-42 Table 1.4-2.	NA	0.00	0.0	
New Stripper Steam - Natural Gas	Natural Gas ^{D,F}	NA	mmBtu/hr	6.00E-04	AP-42 Table 1.4-2.	NA	0.06	0.2	
New Stripper Steam - No. 6 Oil	No. 6 Oil ^{D,F}	NA	mmBtu/hr	2.20E+00	AP-42 Table 1.3-1. 2.1% Sulfur Content.	NA	202.9	147.2	
Backup Stripper Steam - Natural Gas	Natural Gas ^{D,F}	NA	mmBtu/hr	6.00E-04	AP-42 Table 1.4-2.	NA	0.02	0.004	
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^{D,F}	NA	mmBtu/hr	2.20E+00	AP-42 Table 1.3-1. 2.1% Sulfur Content.	NA	53.1	3.4	
SO2 PROJECTED ACTUAL EMISSIONS (PAE)							628.84		
NET EMISSIONS CHANGE (PAE - BAE)									
NET EMISSIONS CHANGE (PAE - BAE)							-141.35		

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate steam stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - Sulfur capture in recovery furnace >99, sulfur capture in LVHC scrubber 50%, sulfur conversion in combination boilers 99%.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor.

G - 40% of TRS/H2S condensed into methanol and 60% of TRS/H2S vented into LVHC System.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

H2SO4 EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	H2SO4 Emissions Factor		Sulfur Capture	H2SO4 Emissions	
			lb/ADTP	Reference	%	lb/hr	tpy
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)							
LVHC Collection System	NA	LVHC to CB1/CB2	4.93E-03	NCASI Technical Bulletin 858, Table 10	NA	0.3	1.3
H2SO4 BASELINE ACTUAL EMISSIONS (BAE)							1.3
PROJECTED ACTUAL EMISSIONS							
LVHC Collection System	NA	LVHC to RF3	4.93E-03	NCASI Technical Bulletin 858, Table 10	NA	0.55	1.82
LVHC Collection System	NA	LVHC to CB1/CB2	4.93E-03	NCASI Technical Bulletin 858, Table 10	NA	0.55	0.61
H2SO4 PROJECTED ACTUAL EMISSIONS (PAE)							2.43
NET EMISSIONS CHANGE (PAE - BAE)							
NET EMISSIONS CHANGE (PAE - BAE)							1.15

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - Sulfur capture in recovery furnace >99, sulfur capture in LVHC scrubber 50%, sulfur conversion in combination boilers 99%.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor.

G - 40% of TRS/H2S condensed into methanol and 60% of TRS/H2S vented into LVHC System.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

NOX EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	NOX Emissions Factor			Ammonia Increase ^C	NOX Emissions	
			UOM	lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)								
Backup Stripper SOG ^A	NA	SOG to CB1/CB2	ADTP/day	0.415	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	24.7	98.7
Backup Stripper Steam ^A	Natural Gas ^{B,E}	NA	mmBtu/hr	2.80E-01	AP-42 Table 1.4-2.	NA	8.3	32.4
Backup Stripper Steam ^A	No. 6 Oil ^{B,E}	NA	mmBtu/hr	3.13E-01	AP-42 Table 1.3-1.	NA	8.8	0.7
NOX BASELINE ACTUAL EMISSIONS								131.8
PROJECTED ACTUAL EMISSIONS								
New Stripper Online	SRL Online	SRL Methanol to RF2/3 ^G	TBLS/day	1.500	NCASI Technical Bulletin 884, Table 4.12.	1.0%	1.8	6.7
New Stripper Online	SRL Online	SRL LVHC to RF3 ^G	TBLS/day	1.500	NCASI Technical Bulletin 884, Table 4.12.	1.0%	0.2	0.6
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2 ^G	ADTP/day	0.415	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	4.7	4.4
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	0.415	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	46.7	9.2
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	0.415	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	46.7	16.4
No Stripper Online	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	NA	NA	NA	NA	NA	NA
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	NA	mmBtu/hr	2.80E-01	AP-42 Table 1.4-2.	NA	0.3	0.1
New Stripper Steam - Natural Gas	Natural Gas ^{D,F}	NA	mmBtu/hr	2.80E-01	AP-42 Table 1.4-2.	NA	27.1	87.2
New Stripper Steam - No. 6 Oil	No. 6 Oil ^{D,F}	NA	mmBtu/hr	3.13E-01	AP-42 Table 1.3-1.	NA	28.9	20.9
Backup Stripper Steam - Natural Gas	Natural Gas ^{D,F}	NA	mmBtu/hr	2.80E-01	AP-42 Table 1.4-2.	NA	7.1	2.0
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^{D,F}	NA	mmBtu/hr	3.13E-01	AP-42 Table 1.3-1.	NA	7.5	0.5
NOX PROJECTED ACTUAL EMISSIONS								147.9
NET EMISSIONS CHANGE (PAE - BAE)								
PAE - BAE								16.1

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate steam stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - Ammonia input to recovery furnace increases >1% (methanol input limited to 1% of black liquor input by BLRBAC).

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - >90% of methanol condensed and burned in recovery furnace, < 10% of methanol vented into LVHC System.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

CO EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	CO Emissions Factor			CO Control	CO Emissions	
			UOM	lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)								
Backup Stripper SOG ^A	NA	SOG to CB1/CB2	ADTP/day	0.0728	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	4.3	17.3
Backup Stripper Steam ^A	Natural Gas ^B	NA	mmBtu/hr	8.40E-02	AP-42 Table 1.4-2.	NA	2.5	9.7
Backup Stripper Steam ^A	No. 6 Oil ^B	NA	mmBtu/hr	3.33E-02	AP-42 Table 1.3-1.	NA	0.9	0.1
CO BASELINE ACTUAL EMISSIONS								27.1
PROJECTED ACTUAL EMISSIONS								
New Stripper Online	SRL Online	SRL Methanol to RF2/3	NA	NA	NA	NA	NA	NA
New Stripper Online	SRL Online	SRL LVHC to RF3	ADTP/day	0.0728	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	8.2	23.0
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2	ADTP/day	0.0728	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	8.2	7.7
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	0.0728	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	8.2	1.6
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	0.0728	July 2019 Project Columbia Application. Page B-2 for Kraft Mill NCG System	NA	8.2	2.9
No Stripper Online	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	NA	NA	NA	NA	NA	NA
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	NA	mmBtu/hr	8.40E-02	AP-42 Table 1.4-2.	NA	0.1	0.0
New Stripper Steam - Natural Gas	Natural Gas ^D	NA	mmBtu/hr	8.40E-02	AP-42 Table 1.4-2.	NA	8.1	26.2
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	NA	mmBtu/hr	3.33E-02	AP-42 Table 1.3-1.	NA	3.1	2.2
Backup Stripper Steam - Natural Gas	Natural Gas ^D	NA	mmBtu/hr	8.40E-02	AP-42 Table 1.4-2.	NA	2.1	0.6
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	NA	mmBtu/hr	3.33E-02	AP-42 Table 1.3-1.	NA	0.8	0.1
CO PROJECTED ACTUAL EMISSIONS								64.2
NET EMISSIONS CHANGE (PAE - BAE)								
PAE - BAE								37.1

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

VOC EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	VOC			Removal ^C	VOC Emissions		
			Emissions Factor				%	lb/hr	tpy
			UOM	lb/UOM	Reference				
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)									
Backup Stripper SOG ^A	NA	LVHC to CB1/CB2	ADTP/day	4.37	Average daily methanol stripped based on daily Subpart S compliance.	98.0%	5.19	20.78	
Aerated Stabilization Basin (ASB)	Foul Condensate to Hard Pipe	NA	ADTP/day	8.73E-01	WATER9 Inputs and Outputs Provided.	NA	51.88	227.21	
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	3.10E-03	July 2019 Project Columbia Application. Page C-3 for Total LVHC Emissions.	NA	0.18	0.81	
Backup Stripper Steam ^A	Natural Gas ^B	NA	mmBtu/hr	5.39E-03	AP-42 Table 1.4-2.	NA	0.2	0.6	
Backup Stripper Steam ^A	No. 6 Oil ^B	NA	mmBtu/hr	1.87E-03	AP-42 Table 1.3-3. NMTOC for no. 6 oil.	NA	0.1	0.0	
VOC BASELINE ACTUAL EMISSIONS								249.43	
PROJECTED ACTUAL EMISSIONS									
New Stripper Online	SRL Online	SRL Methanol to RF2/3 ^E	ADTP/day	14.40	Vendor / Preliminary Design Information	99.9%	1.62	6.07	
New Stripper Online	SRL Online	SRL LVHC to RF3 ^G	ADTP/day	1.60	Vendor / Preliminary Design Information	98%	3.60	10.11	
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2 ^G	ADTP/day	1.60	Vendor / Preliminary Design Information	98%	3.60	3.37	
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	16.00	Vendor / Preliminary Design Information	98%	36.00	7.10	
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	16.00	Vendor / Preliminary Design Information	98%	36.00	12.61	
ASB - New Stripper Online	No Foul Condensate to Hard Pipe	NA	ADTP/day	0.29	WATER9 Inputs and Outputs Provided.	NA	32.40	127.72	
ASB - Backup Stripper Online	TRS Stripped From Foul Condensate	NA	ADTP/day	1.42	WATER9 Inputs and Outputs Provided.	NA	159.98	56.06	
ASB - No Stripper Online	Foul Condensate to Hard Pipe	NA	ADTP/day	2.20	WATER9 Inputs and Outputs Provided.	NA	247.05	21.64	
LVHC Collection System	NA	LVHC to RF3	ADTP/day	3.10E-03	July 2019 Project Columbia Application. Page C-3 for Total LVHC Emissions.	NA	0.35	1.15	
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	3.10E-03	July 2019 Project Columbia Application. Page C-3 for Total LVHC Emissions.	NA	0.35	0.38	
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	NA	mmBtu/hr	5.39E-03	AP-42 Table 1.4-2.	NA	0.0	0.0	
New Stripper Steam - Natural Gas	Natural Gas ^D	NA	mmBtu/hr	5.39E-03	AP-42 Table 1.4-2.	NA	0.5	1.7	
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	NA	mmBtu/hr	1.87E-03	AP-42 Table 1.3-3. NMTOC for no. 6 oil.	NA	0.2	0.1	
Backup Stripper Steam - Natural Gas	Natural Gas ^D	NA	mmBtu/hr	5.39E-03	AP-42 Table 1.4-2.	NA	0.1	0.0	
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	NA	mmBtu/hr	1.87E-03	AP-42 Table 1.3-3. NMTOC for no. 6 oil.	NA	0.0	0.0	
VOC PROJECTED ACTUAL EMISSIONS								248.05	
NET EMISSIONS CHANGE (PAE - BAE)									
PAE - BAE								-1.38	

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - VOC destruction >98% in vapor phase, 99.9% in liquid phase.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - >90% of methanol condensed and burned in recovery furnace, < 10% of methanol vented into LVHC System.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

TRS EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	TRS Emissions Factor			Sulfur Capture ^C	TRS Emissions	
			UOM	lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)								
Backup Stripper SOG ^A	NA	LVHC to CB1/CB2	ADTP/day	2.88E-03	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	0.17	0.68
Aerated Stabilization Basin (ASB)	NA	NA	ADTP/day	4.08E-02	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	2.42	10.61
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	8.01E-03	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	0.48	2.09
TRS BASELINE ACTUAL EMISSIONS								13.38
PROJECTED ACTUAL EMISSIONS								
New Stripper Online	SRL Online	SRL Methanol to RF2/3 ^{G,H}	ADTP/day	0.33	Vendor / Preliminary Design Information	99.9%	0.04	0.14
New Stripper Online	SRL Online	SRL LVHC to RF3 ^{G,H}	ADTP/day	0.49	Vendor / Preliminary Design Information	99.9%	0.05	0.15
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2 ^G	ADTP/day	0.49	Vendor / Preliminary Design Information	99%	0.55	0.51
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	0.81	Vendor / Preliminary Design Information	99%	0.91	0.18
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	0.81	Vendor / Preliminary Design Information	99%	0.91	0.32
ASB - New Stripper Online	No Foul Condensate to Hard Pipe	NA	ADTP/day	2.42E-02	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	2.72	10.74
ASB - Backup Stripper Online	TRS Stripped From Foul Condensate	NA	ADTP/day	2.72E-02	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	3.06	1.07
ASB - No Stripper Online	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	ADTP/day	7.28E-02	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	8.19	0.72
LVHC Collection System	NA	LVHC to RF3	ADTP/day	1.75E+00	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. Pre-control emissions based on LVHC scrubber efficiency (50%) and estimated 99% combustion efficiency in combination boilers.	99.9%	0.20	0.65
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	8.76E-03	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. DHEC Approved Test.	NA	0.99	1.08
TRS PROJECTED ACTUAL EMISSIONS								15.56
NET EMISSIONS CHANGE (PAE - BAE)								
PAE - BAE								2.18

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - Sulfur capture in recovery furnace >99.9% (see note H), sulfur capture in LVHC scrubber 50%, sulfur conversion in combination boilers 99%.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - 40% of TRS/H2S condensed into methanol and 60% of TRS/H2S vented into LVHC System.

H - Recovery Furnace captures 99% of sulfur and converts 99% of remaining uncaptured sulfur.

H2S EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	Controls	H2S Emissions Factor			Sulfur Capture ^c	H2S Emissions	
			UOM	lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)								
Backup Stripper SOG ^A	NA	LVHC to CB1/CB2	ADTP/day	4.13E-04	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	0.02	0.10
Aerated Stabilization Basin (ASB)	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	ADTP/day	1.36E-02	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	0.81	3.54
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	5.03E-04	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 average. DHEC Approved Test.	NA	0.03	0.13
H2S BASELINE ACTUAL EMISSIONS							3.77	
PROJECTED ACTUAL EMISSIONS								
New Stripper Online	SRL Online	SRL Methanol to RF2/3 ^{G,H}	ADTP/day	0.24	Vendor / Preliminary Design Information	99.9%	0.03	0.10
New Stripper Online	SRL Online	SRL LVHC to RF3 ^{G,H}	ADTP/day	0.37	Vendor / Preliminary Design Information	99.9%	0.04	0.12
New Stripper Online	SRL Online	SRL LVHC to CB1/CB2 ^G	ADTP/day	0.37	Vendor / Preliminary Design Information	99%	0.41	0.39
New Stripper Online	SRL Offline	SOG to CB1/CB2	ADTP/day	0.61	Vendor / Preliminary Design Information	99%	0.69	0.14
Backup Stripper Online	NA	SOG to CB1/CB2	ADTP/day	0.61	Vendor / Preliminary Design Information	99%	0.69	0.24
ASB - New Stripper Online	No Foul Condensate to Hard Pipe	NA	ADTP/day	9.27E-03	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	1.04	4.11
ASB - Backup Stripper Online	H2S Stripped From Foul Condensate	NA	ADTP/day	9.81E-03	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	1.10	0.39
ASB - No Stripper Online	Foul Condensate to Hard Pipe	Hydrogen Peroxide Addition	ADTP/day	9.54E-03	H2SSIM/WATER9 Inputs and Outputs Provided.	NA	1.07	0.09
LVHC Collection System	NA	LVHC to RF3	ADTP/day	1.17E-01	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. Pre-control emissions based on LVHC scrubber efficiency (50%) and estimated 99% combustion efficiency in combination boilers.	99.9%	0.01	0.04
LVHC Collection System	NA	LVHC to CB1/CB2	ADTP/day	5.87E-04	June 2021 Stack Test, Combination Boilers No. 1 and No. 2 maximum. DHEC Approved Test.	NA	0.07	0.07
H2S PROJECTED ACTUAL EMISSIONS							5.69	
NET EMISSIONS CHANGE (PAE - BAE)								
PAE - BAE							1.92	

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - Sulfur capture in recovery furnace >99.9% (see note H), sulfur capture in LVHC scrubber 50%, sulfur conversion in combination boilers 99%.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - 40% of TRS/H2S condensed into methanol and 60% of TRS/H2S vented into LVHC System.

H - Recovery Furnace captures 99% of sulfur and converts 99% of remaining uncaptured sulfur.

PM EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	UOM	PM Emissions Factor		PM Control	PM Emissions	
			lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)							
Backup Stripper Steam ^A	Natural Gas ^B	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.9
Backup Stripper Steam ^A	No. 6 Oil ^B	mmBtu/hr	1.61E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	4.5	0.4
PM BASELINE ACTUAL EMISSIONS							1.3
PROJECTED ACTUAL EMISSIONS							
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	7.60E-03	3.74E-03
New Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.7	2.4
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.61E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	14.8	10.8
Backup Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.1
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.61E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	3.9	0.3
PM PROJECTED ACTUAL EMISSIONS							13.4
NET EMISSIONS CHANGE (PAE - BAE)							
PAE - BAE							12.2

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

PM10 EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	PM10 Emissions Factor			PM10 Control %	PM10 Emissions		
		UOM	lb/UOM	Reference		lb/hr	tpy	
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)								
Backup Stripper Steam ^A	Natural Gas ^B	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.9	
Backup Stripper Steam ^A	No. 6 Oil ^B	mmBtu/hr	1.17E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	3.3	0.3	
PM10 BASELINE ACTUAL EMISSIONS							1.2	
PROJECTED ACTUAL EMISSIONS								
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	7.60E-03	3.74E-03	
New Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.7	2.4	
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.17E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	10.8	7.8	
Backup Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.1	
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.17E-01	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	2.8	0.2	
PM10 PROJECTED ACTUAL EMISSIONS							10.4	
NET EMISSIONS CHANGE (PAE - BAE)								
PAE - BAE							9.3	

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

PM2.5 EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	PM2.5 Emissions Factor			PM2.5 Control	PM2.5 Emissions	
		UOM	lb/UOM	Reference		%	lb/hr
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)							
Backup Stripper Steam ^A	Natural Gas ^B	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.9
Backup Stripper Steam ^A	No. 6 Oil ^B	mmBtu/hr	8.80E-02	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	2.5	0.2
PM2.5 BASELINE ACTUAL EMISSIONS							1.1
PROJECTED ACTUAL EMISSIONS							
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	7.60E-03	3.74E-03
New Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.7	2.4
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	8.80E-02	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	8.1	5.9
Backup Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	7.60E-03	AP-42 Table 1.4-2. Filterable and Condensable.	NA	0.2	0.1
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	8.80E-02	AP-42 Tables 1.3-1 (filterable) and 1.3-2 (condensable).	NA	2.1	0.1
PM2.5 PROJECTED ACTUAL EMISSIONS							8.4
NET EMISSIONS CHANGE (PAE - BAE)							
PAE - BAE							7.4

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

LEAD EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	UOM	lb/UOM	Lead Emissions Factor	Lead Control	Lead Emissions	
				Reference	%	lb/hr	tpy
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)							
Backup Stripper Steam ^A	Natural Gas ^B	mmBtu/hr	5.00E-07	AP-42 Table 1.4-2.	NA	1.48E-05	5.78E-05
Backup Stripper Steam ^A	No. 6 Oil ^B	mmBtu/hr	2.80E-05	U.S. EPA document "Estimating Air Toxic Emissions from Coal and Oil Combustion Sources" [EPA-450/2-89-001] for Uncontrolled Residual Oil-fired Utility Boilers (Table 4-1)	NA	7.87E-04	6.63E-05
LEAD BASELINE ACTUAL EMISSIONS							1.24E-04
PROJECTED ACTUAL EMISSIONS							
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	mmBtu/hr	5.00E-07	AP-42 Table 1.4-2.	NA	5.00E-07	2.46E-07
New Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	5.00E-07	AP-42 Table 1.4-2.	NA	4.84E-05	1.56E-04
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	2.80E-05	U.S. EPA document "Estimating Air Toxic Emissions from Coal and Oil Combustion Sources" [EPA-450/2-89-001] for Uncontrolled Residual Oil-fired Utility Boilers (Table 4-1)	NA	2.58E-03	1.87E-03
Backup Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	5.00E-07	AP-42 Table 1.4-2.	NA	1.27E-05	3.62E-06
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	2.80E-05	U.S. EPA document "Estimating Air Toxic Emissions from Coal and Oil Combustion Sources" [EPA-450/2-89-001] for Uncontrolled Residual Oil-fired Utility Boilers (Table 4-1)	NA	6.75E-04	4.35E-05
LEAD PROJECTED ACTUAL EMISSIONS							2.08E-03
NET EMISSIONS CHANGE (PAE - BAE)							
PAE - BAE							1.95E-03

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.

CO2 EMISSIONS REFERENCES

Stripper Operating Scenario	Operating Configuration	UOM	CO2 Emissions Factor		CO2 Control %	CO2 Emissions	
			lb/UOM	Reference		lb/hr	tpy
BASELINE ACTUAL EMISSIONS (March 2021 - February 2023)							
Backup Stripper Steam ^A	Natural Gas ^B	mmBtu/hr	1.17E+02	40 CFR Part 98, Table C-1	NA	3,448.9	13,512
Backup Stripper Steam ^A	No. 6 Oil ^B	mmBtu/hr	1.66E+02	40 CFR Part 98, Table C-1	NA	4,655.3	392
CO2 BASELINE ACTUAL EMISSIONS							13,904
PROJECTED ACTUAL EMISSIONS							
Recovery Furnace #3 LVHC Ignitor	Natural Gas ^I	mmBtu/hr	1.17E+02	40 CFR Part 98, Table C-1	NA	116.9	58
New Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	1.17E+02	40 CFR Part 98, Table C-1	NA	11,313.5	36,392
New Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.66E+02	40 CFR Part 98, Table C-1	NA	15,270.9	11,076
Backup Stripper Steam - Natural Gas	Natural Gas ^D	mmBtu/hr	1.17E+02	40 CFR Part 98, Table C-1	NA	2,958.3	846
Backup Stripper Steam - No. 6 Oil	No. 6 Oil ^D	mmBtu/hr	1.66E+02	40 CFR Part 98, Table C-1	NA	3,993.0	257
CO2 PROJECTED ACTUAL EMISSIONS							48,629
NET EMISSIONS CHANGE (PAE - BAE)							
PAE - BAE							34,725

A - Current (future backup) condensate steam stripper resumed operation on May 3, 2021.

B - Additional process steam to operate condensate stream stripper from fossil fuel combustion. Average fossil fuel distribution in Combination Boilers No. 1 and No. 2 during baseline.

C - reserved.

D - Historically high fuel oil percentage of fossil fuel heat input (2014).

E - Actual steam usage January 1 - December 16, 2022.

F - Projected steam usage at 850 gpm from vendor design.

G - reserved.

H - reserved.

I - Natural gas ignitor required when recovery furnace is less than 50% load on black liquor.