

Asheville-Buncombe Air Quality Agency APPLICATION REVIEW SUMMARY

SECTION A: FACILITY INFORMATION			
Company Name:	New Belgium Brewing Company, Inc.		
Site Name:	New Belgium Brewery		
Mailing Address:	500 Linden Street, Fort Collins, CO 80524		
Site Address:	91 Craven Street, Asheville, NC 28806		
General Description of Business:	Beer Brewery		
Facility Classification:	Synthetic Minor	Site Status:	Existing

SECTION B: APPLICATION INFORMATION			
Date of Application:	July 19, 2024	Application Tracking No.:	NA
Date Complete Application Received:	August 19, 2024	Board Meeting Date:	September 10, 2024
Confidentiality Requested?	No	Board Agenda Type:	Modification
Application Results:	New Belgium Brewing Company, Inc. is requesting to modify their Air Quality permit to allow the boilers to combust biogas.		
Permit No. / Date Issued by Application:	11-904-22A / September 10, 2024		
Permit No. / Date Voided by Application:	11-904-22 / March 8, 2022		

SECTION C: REGULATORY INFORMATION	
AB Air Quality Regulations:	4.0503, 4.0515, 4.0516, 4.0521, 4.0524, 4.0605, 4.111, 4.1806, 17.0315, 17.0700

SECTION D: FACILITY-WIDE EMISSIONS INFORMATION			
Pollutants Reviewed as a Result of this Application or AB Air Quality Action:	Actual Emissions (tons/yr) 2023	Previous Potential Emissions (tons/yr)	Potential Emissions after Change (tons/yr)
PM	12.31*	15.85*	14.02*
PM ₁₀	2.33*	4.66*	2.75*
PM _{2.5}	0.74*	2.80*	0.97*
SO ₂	0.77	2.58	3.51
NO _x	2.01	6.40	16.57
CO	5.03	23.49	11.81
VOC	3.07	11.94	10.46
Greenhouse Gases, CO _{2e}	3,889.77	17,118.11	18,519.22
All Hazardous Air Pollutants (HAPs)	0.0464	0.240	0.348
List all HAPs >10TPY of potential emissions	None.		
Emission numbers denoted with an () reflect "controlled" emissions (i.e. emissions reduced by a pollution control device).			

IN COMPLIANCE WITH EMISSION STANDARDS / RECOMMEND APPROVAL			
Prepared By:	James C. Raiford / 	Date Completed:	8/23/2024
Reviewed By:	Betsy Brown / 	Date Reviewed:	8/27/2024
Director Name:	Ashley J. Featherstone / 	Date Approved:	8/29/2024

SECTION A DETAILS

FACILITY INFORMATION [Detailed discussion of any items in Section A]

New Belgium Brewing Company, Inc operates a beer brewing facility in Buncombe County. The facility performs all functions related to the production, packaging and shipping of beer. The SIC code for Malt Beverages is 2082 and the NAICS code for Breweries is 31212. The facility is eventually expected to operate 12 hours per day, 7 days per week and 52 weeks per year, and will be able to produce 550,000 barrels (bbl) of beer per year. A barrel of beer contains 31 gallons of beer. Emissions of concern are particulate matter (PM) from the grain (malt) storage and handling system. The facility's potential uncontrolled PM10 emissions exceed the Title V permitting threshold of 100 tons/year. The facility has requested a limitation so that they do not exceed this threshold and will be classified as a Synthetic Minor facility.

NBB added a process water treatment plant (PWTP) which is exempt from permitting. Since their permit was issued the PWTP flare was added as an emission source. The flare combusts biogas generated from the PWTP anaerobic digestion treatment process. This is an enclosed flare with 98% destruction efficiency for carbon monoxide, nitrogen oxide and hydrogen sulfide. Hydrogen sulfide is subject to North Carolina Air Toxics. The emission rate was below the 1.7 pounds per day toxic permit emission rate.

The Agency included the can line on the permit as a permitted source so that the facility could add it without modifying the permit. There are no applicable regulations. Due to market demand, the can filling line was installed beginning in the fall of 2019 and became operational during the summer of 2020.

For this permit modification, the facility is proposing to replace the burners in their current boilers to install a new biogas conditioning skid (mainly to remove moisture), a containerized gas storage unit, and new Limpfield burners to allow for the combustion of both biogas and natural gas in their boilers. Since the boilers will now combust a fuel other than natural gas, they are no longer exempt from permitting. The permit already contained the necessary permit conditions for the boiler. The flare will continue to burn excess biogas, but a majority of the biogas will be mixed with natural gas and be combusted in the boilers. Permit conditions 6 and 9 were modified to include the definition of natural gas, as the facility intends for the natural gas/biogas mixture to meet those definitions. The reporting requirements were also modified with this permit to include reporting biogas consumption in the boilers.

Specific Condition 4 was added to the permit which states the maximum allowable particulate emission rate for the two boilers. This is not a new requirement but should have already been listed in the permit.

Additionally, the facility was reviewed for toxics since biogas contains hydrogen sulfide. The maximum potential emission rate is 0.54 pounds per day which is below the 1.7 pounds per day toxic permit emission rate. The actual emission rate will be even lower since the flare will be operated only when biogas production exceeds the capacity of the boilers.

Facility Operations:

Malt is delivered by truck to the facility and loaded from a belly dump trailer into silos by screw conveyors and a bucket elevator. The malt is taken by mechanical conveyor from the silos to the brewhouse mill. Spot filters are used to control particulate emissions during the malt transfer process. A central vacuum system is used for general cleaning of the malt area when necessary.

The malt, along with hot water, is fed to the mash tun, the first step in the brewing process, where sugars in malt are converted from complex carbohydrates into small-chain sugars. The type of malt depends on the particular beer. The resulting product of this process is referred to as mash and contains the crushed malt (grist) and water. From the mash tun, the mash is pumped to a straining tank called a lauter tun. The lauter tun separates the grist from the sweet wort. Hot water is sprayed onto the mash bed as it is filtered, leaching sugars from the mash. The product of the lauter tun is called wort. The sweet wort is drained from the vessel and transferred to the next vessel. The remaining grain is pumped off as a by-

product, transferred to a spent grain silo and ultimately shipped offsite. The weak wort tank is used to collect lower strength wort, blending it with higher strength wort. This tank allows for a higher yield of product. The emissions from these processes are volatile organic compounds (VOC).

The pre-run vessel (PRV) is simply a holding vessel before the brew kettle. This vessel allows the brewing process to continue, as each step in the brewing process runs for a varied amount of time. The brew kettle boils the sweet wort. During the boil, hops, spices and brewing salts are added to produce bitter wort. The boiling process sterilizes the wort, causes a number of organic chemical reactions to take place that enhance the bitter wort and drives off several types of VOC. After completion of the boil, the bitter wort is transferred to the whirlpool. The whirlpool is designed to separate the insoluble matter from the bitter wort. The bitter wort resulting from this operation is transferred to fermentation vessels to begin primary fermentation. The left over trub is considered a waste material and is subsequently transferred to a trub vessel. The trub vessel is designed to receive trub from the whirlpool and deliver it to the spent-grain silo. The emissions from these processes are VOC.

Primary fermentation (conversion of disaccharides to alcohol and carbon dioxide or CO₂ by yeast) occurs within the fermentation vessels. The result of this process is called green beer. During primary fermentation, a substantial volume of CO₂ gas is released. The CO₂ bubbles through the green beer and strips ethanol from the beer, which is subsequently vented. The emissions from this process are VOC in the form of ethanol. Aging vessels continue the fermentation process and allow several complex biochemical reactions to take place involving yeast. During this time, flavors are developed, and off-flavors are minimized. Only a relatively small volume of CO₂ is produced in this step. After aging, the green beer is filtered and is then transferred to bright beer tanks. The emissions from this process are VOC in the form of ethanol.

The bottling line fills both 12-ounce and 22-ounce glass bottles. There are no dedicated vents for the bottle filler, and all emissions are fugitive and released indoors. The keg line fills three different types of kegs, 1/6, 1/4 and 1/2 bbl capacity kegs. A canning line may be added in the future. The emissions from this process are VOC in the form of ethanol, released during the filling process.

The keg line utilizes ink for labeling. This same ink will be utilized by the canning line, if one is ever installed in the future. The emissions from this process are released indoors as fugitive emissions, and consist of VOC, including methyl ethyl ketone (MEK), which is a toxic air pollutant (TAP).

The bottle line utilizes a laser to etch information onto the paper label. The glue used to attach the paper label to the glass bottle contains a small amount of ammonium hydroxide. However, this is not a source of ammonia (TAP) emissions.

The bottle crusher is utilized to crush both full and empty glass bottles. When full bottles of beer are crushed, the resulting emissions are VOC in the form of ethanol. The amount of glass crushed varies depending on how the bottling process is functioning.

The two 12 MMBtu/hr, natural gas-fired boilers are used to heat up water for brewing and other processes.

The following processes and sources are exempt from permitting and are mentioned here for understanding of the facility. However, the emergency generator and natural gas boilers will be listed on the permit so that the applicable requirements may be included in the permit.

Anhydrous ammonia is used to cool glycol, which in turn is used to cool fermenting, aging and bright beer. This ammonia is contained in multiple areas, including compressors, condensers, separators and process piping. This cooling process is operated under a closed system, so no ammonia is released to the atmosphere.

Multiple bulk chemicals are used during the brewing process to clean and sanitize brewing equipment. These chemicals include acid (nitric and phosphoric acid blend), caustic (NaOH), peroxyacetic acid (PA) and lactic acid. These chemical tanks may vent small amounts of their contents as vapors.

A diesel backup generator is only used for emergency purposes and is run on a limited basis throughout the month to ensure operational efficiency. The generator is subject to 40 CFR Part 60, Subpart IIII –

Standards of Performance for Stationary Compression Ignition (CI) Internal Combustion Engines (ICEs). There is a 400–500-gallon aboveground diesel storage tank to supply fuel for the backup generator.

The keg filler will be installed 1-2 years after initial construction. A canning line was installed in 2019 and 2020. Also at a later date, the facility may add an open wort cooler. The open wort cooler (referred to as a coolship) is used sparingly and only for specific brands. Wort from the brew kettle and whirlpool is transferred to this open vessel to cool. Once cooled, the wort is fermented with naturally occurring yeast in the air. The emissions from this process are VOC.

SECTION B DETAILS

APPLICATION INFORMATION

[List all emission sources (permitted and exempt) reviewed as a result of this application, their associated control devices and pollutants. Provide a detailed discussion of any other items in Section B at bottom under "Application Notes"]

Emission Source ID	Emission Source Description 1. Type, manufacturer, capacity 2. Control device with ID (if any)	Pollutant(s) Emitted	Miscellaneous Notes
ES-001	One (1) malt intake and storage system with a rated capacity of 27.6 tons per hour and emissions controlled by three (3) spot filters CD-001 to CD-003, each with 47.4 square feet of filter area.	PM, PM-10, PM-2.5	This includes malt intake from trucks to nine silos (3 @ 100 metric tons and 6 @ 50 metric tons) and the malt transfer system.
ES-002	One (1) malt transfer system with a rated capacity of 9.9 tons per hour and emissions controlled by seven (7) spot filters CD-004 to CD-010, each with 47.4 square feet of filter area.	PM, PM-10, PM-2.5	Handles malt from the silos to the brewhouse mill by mechanical conveyors.
ES-002.1	One (1) central vacuum system with emissions controlled by one (1) spot filter with 236.4 square feet of filter area	PM, PM-10, PM-2.5	Operates during the transfer of malt to the brewhouse.
ES-003	One (1) mash tun	VOC	This activity is permitted, but there are no applicable requirements.
ES-004	One (1) lauter tun	VOC	This activity is permitted, but there are no applicable requirements.
ES-005	One (1) weak wort tank	VOC	This activity is permitted, but there are no applicable requirements.
ES-006	One (1) pre-run vessel (PRV)	VOC	This activity is permitted, but there are no applicable requirements.
ES-007	One (1) brew kettle	PM, PM-10, PM-2.5, VOC	This activity is permitted, but there are no applicable requirements.
ES-008	One (1) hot wort settling tank	VOC	This activity is permitted, but there are no applicable requirements.
ES-009	One (1) trub vessel	VOC	This activity is permitted, but there are no applicable requirements.
ES-010	Multiple fermentation vessels	VOC, GHG, TAPs	This activity is permitted, but there are no applicable requirements.
ES-011	Multiple aging vessels	VOC, GHG	This activity is permitted, but there are no applicable requirements.
ES-012	One (1) bottle filler	VOC, GHG	This activity is permitted, but there are no applicable requirements.
ES-013	One (1) keg filler	VOC, GHG	This activity is permitted, but there are no applicable requirements.
ES-014	One (1) can filler	VOC, GHG	This activity is permitted, but there are no applicable requirements.
ES-015	One (1) keg labeling	VOC, TAPs	This activity is permitted, but there are no applicable requirements.
ES-016	One (1) can labeling	VOC, TAPs	This activity is permitted, but there are no applicable requirements.

ES-017	One (1) flare	PM, PM-10, PM-2.5, CO, NOx, VOCs, TAPs, GHGs	The flare will combust biogas generated from the PWTP anaerobic digestion treatment process to reduce emissions and odors.
G-01	One (1) 250-kilowatt diesel emergency-use generator	PM, PM-10, PM-2.5, CO, NOx, SO2, VOCs, HAPs/TAPs, GHGs	Kohler Model 250REOZJE, 324 horsepower, diesel generator. This activity is exempt from permitting per AB Air Quality Code 17.012(2)(B)(v). However, it will be included as a permitted source so that the relevant requirements of NSPS Subpart IIII can be included in the permit.
B-01, B-02	Two (2) natural gas and biogas-fired boilers each approximately 14.7 MMBtu/hr	PM, PM-10, PM-2.5, CO, NOx, SO2, VOCs, HAPs/TAPs, GHGs	Hurst Model No. S250-G-350-150W natural gas boilers. Since the boilers no longer combust only natural gas, this activity is no longer exempt from permitting per AB Air Quality Code 17.0102(2)(B)(ii).
NA	(1) 400–500-gallon aboveground diesel storage tank	VOC	This tank is exempt from permitting per the AB Air Quality Code 17.0102 (c)(1)(D)(i).
NA	Ammonia storage	NA	This activity is exempt from permitting per AB Air Quality Code 17.0102 (c)(1)(D)(iii).
NA	Multiple chemical storage tanks, including inorganic compounds, nitric acid, phosphoric acid blend, and caustic sodium hydroxide	NA	This activity is exempt from permitting per AB Air Quality Code 17.0102 (c)(2)(D)(iii)
NA	Multiple chemical storage totes, including organic compounds, peroxyacetic acid and lactic acid	NA	This activity is exempt from permitting per AB Air Quality Code 17.0102 (c)(2)(F)
NA	Process Water Treatment Plant	NA	This activity is exempt from permitting per AB Air Quality Code 17.0102 (c)(1)(F).

APPLICATION NOTES

SECTION C DETAILS

REGULATORY INFORMATION

(Identify the AB Air Quality Regulations reviewed because of this application. At a minimum, the regulations already listed should be reviewed and reason given for applicability or non-applicability. If a regulation has a standard, list the standard and indicate how the source is in compliance.)

AB Air Quality Regulation Number / Title	Emission Source ID No(s). Subject	Notes On Regulation (Compliance demonstration, applicability, etc.)
17.0500 – Title V Procedures and 17.0315 – Synthetic Minor Facilities	NA	The facility is not subject to Title V permitting procedures because it elected to take avoidance limitations that define its potential to emit as less than 100 tons per year for PM-10. The facility's potential to emit HAPs is less than the 10-ton per year applicability threshold for individual HAPs and the 25-ton per year applicability threshold for combined HAPs.
17.0700 – Toxic Air Pollutant Procedures	NA	The initial construction and operation of this facility did not trigger a toxics review because no TAPs are emitted by the sources required to be permitted (i.e., ES-001 and ES-002). With a previous modification to add the flare for the PWTP, toxics was triggered since the source does emit a TAP, H ₂ S, and is required to be permitted. For this modification, the burning of biogas in the boilers required an updated toxics review. Potential emissions of H ₂ S were calculated to be 0.54 lbs/day which is below the TPER of 1.7 lbs/day.
4.0503 – Particulates from Fuel Burning Indirect Heat Exchangers	B-01, B-02	Based on the heat input of each boiler, this regulation limits PM emissions from B-01 and B-02 to 0.54 lb/million Btu (MMBtu). This was derived using the equation $E=1.09*14.7^{-0.2594}$. The emission factor for these boilers is only 0.0048 lb/MMBtu when burning natural gas and 0.0073 lb/MMBtu when burning biogas. Thus, the facility is in compliance.
4.0516 - Sulfur Dioxide Emissions from Combustion Sources	ES-017, B-01, B-02, G-1	This regulation limits SO ₂ emissions from these sources to 2.3 lb/MMBtu. The SO ₂ emission factors for the boilers are 0.0005 lb/MMBtu for natural gas combustion and 0.0008 lb/MMBtu for biogas combustion. The AP-42 SO ₂ emission factor for (0.5% S) diesel fuel combustion for emergency generators is 0.51 lb/MMBtu. There are no AP-42 SO ₂ emission factors for industrial flares, but the SO ₂ emission factor was calculated from the H ₂ S concentrations in the flare to be 0.197 lb/MMBtu according to an equation developed by South Dakota. Compliance with this regulation is expected.

4.0521 – Control of Visible Emissions	Entire Facility	This regulation limits visible emissions from these sources to no greater than 20% opacity due to their post-1971 manufacture date. Compliance with this regulation will be determined through facility self-monitoring and Agency inspections.
4.0524 – New Source Performance Standards (40 CFR 60, Subpart Dc)	B-01, B-02	The facility is subject to 40 CFR Part 60, Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. The facility shall record the cubic feet of natural gas and biogas that each boiler combusts on a monthly basis. The facility intends to burn a mixture of natural gas and biogas that meets the definition of natural gas according to 40 CFR Part 60.41c and the definition is listed in the permit.
4.0524 – New Source Performance Standards (40 CFR 63, Subpart IIII)	G-01	This emergency-use generator is subject to the requirements of 40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition (CI) Internal Combustion Engines, which requires the manufacturer to certify that the generator meets the emission limits listed in the subpart. The generator must be equipped with a non-resettable hour meter and nonemergency use (e.g., testing) is limited to 100 hours per year. Ultra-low sulfur diesel (ULSD) fuel must be used.
4.0530 – Prevention of Significant Deterioration	NA	The facility does not have potential emissions above the threshold of 250 tons per year for any criteria pollutant.
4.1111 – MACT (40 CFR 63 Subpart ZZZZ)	G-01	The emergency generator is subject to 40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. To comply with this MACT, new CI engines must meet the requirements of the New Source Performance Standards, 40 CFR Part 60 Subpart IIIII. These engines have no further requirements under the RICE NESHAP.
4.1111 – MACT (40 CFR 63, Subpart JJJJJJ)	NA	Neither of the facility's boilers is subject to 40 CFR Part 63, Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers. Boilers that only burn natural gas are not subject to the rule. The facility intends to burn a mixture of natural gas and biogas that meets the definition of natural gas according to 40 CFR Part 63.11237 and the definition is listed in the permit.

4.0515 – Particulates from Miscellaneous Industrial Processes**	ES-001, ES-002, ES-002.1, ES-017	This regulation limits PM emissions from the malt intake and storage system (ES-001) to 37.8 pounds per hour from each spot filter stack, and from the malt intake transfer system (ES-002) to 19.1 pounds per hour from each spot filter stack. Per emission calculations, each ES-001 spot filter will emit 4.41 pounds of PM per hour, and each ES-002 spot filter will emit 1.59 pounds of PM per hour, the ES-002.1 filter will emit 0.165 pounds of PM per hour. The flare will emit 0.012 pounds of PM per hour. Thus, the facility is in compliance.
4.0605 – General Recordkeeping and Reporting Requirements	Entire facility	The facility is required to keep records and submit an annual report with the number of barrels of beer brewed and the amount of malt used. The facility is also required to notify AB Air Quality within 30 days after the startup of new equipment.
4.0605 - General Recordkeeping and Reporting Requirements	ES-0017	The facility shall submit an annual report to this Agency with hours of operation and amount of biogas combusted during the previous calendar year.
4.1806 – Control and Prohibition of Odorous Emissions	Entire Facility	This regulation requires that the facility prevent odorous emissions from causing or contributing to objectionable odors beyond their property line. Compliance with this regulation will be determined through facility self-monitoring and Agency inspections.

REGULATORY NOTES

Determination of the allowable PM limits of 4.0515 is included in the emission calculations made by the AB Air Quality.

During a previous permit review, Agency staff noted that a permit exemption in AB Air Quality Code 17.0102(c)(2)(E)(i) (potential emissions less than 5 tons per year) was used for ES-003 through ES-016. This exemption cannot be used for sources at this facility due to wording at the end of the exemption which states that the exemption may be used "...provided that the total potential emissions of particulate, sulfur dioxide, nitrogen oxides, volatile organic compounds, and carbon monoxide from the facility are each less than 40 tons per year and the total potential emissions of all hazardous air pollutants are below their lesser quantity cutoff emission rates or provided that the facility has an air quality permit." The potential particulate emissions before controls for the malt handling system are over 40 tons per year. This means that the brewing, bottling and other operations as well as the flare, are permitted emissions sources.

SECTION D DETAILS				
EMISSION INFORMATION				
Calculation Method Codes (List all that apply)	1 = Stack test result 2 = Material (mass) balance 3 = EPA approved information (AP-42, CTG, etc.) 4 = Other (specify in table below)			
Calculation Rejection Codes (List all that apply)	1 = Calculation error 2 = Wrong emission factor(s) used 3 = Control efficiency(ies) not accepted 4 = Other (specify in table below)			
Emission Source (ID No.)	Calculation Method Code	Accept Or Reject?	Calculation Rejection Code	AB Air Quality Calculations Attached?
ES-001, ES-002, ES-002.1	3, 4	Reject	4	Yes
ES-003-017 and Various Insignificant Activities	2, 3, 4	Accept	NA	Yes

EMISSION NOTES

The PM emission calculations for ES-001 and ES-002 included in the permit application (and subsequent revisions) were based on a European standard of (a maximum of) 20 mg/m³/min for the spot filters. Rather than basing PM emissions on the limit the spot filters would allow, the emissions calculations performed by AB Air Quality for these sources were based on an AP-42 emission factor of 0.016 lb/ton (controlled) and a particle size distribution (%PM-10 and %PM-2.5) and filter efficiency also from AP-42. The emission calculations for the insignificant sources in the permit application were based on AP-42 emission factors, mass balance, and manufacturer's data, and were generally acceptable. Using the same methods, AB Air Quality also made emission calculations for some of these sources.

Emissions for B-01 and B-02 were based on both manufacturer supplied data, or AP-42, whichever was higher. Manufacturer supplied data is included in the Permit Review folder. Maximum potential emissions for the two boilers were calculated assuming a mixture of natural gas and biogas.

Emissions for ES-017, the flare, were based on both manufacturer supplied data, or AP-42, whichever was higher. The SO₂ Emission Factor was derived from the application submittal of 800 ppm of H₂S being fully converted to SO₂ (See Equation 1, Section 2.0 in [sdakota_emissionfactors.pdf](#) in 11-904-14A Permit folder or http://agrienvarchive.ca/bioenergy/download/sdakota_emissionfactors.pdf).

SECTION E
SUPPORTING DOCUMENTATION (Provide brief description of any attachments)

1. Application.
2. Invoice for permit modification fee.
3. Copy Scanned check for application fee.
4. Zoning consistency determination.
5. Copy of permit cover letter
6. Emission Calculations.
7. Draft of Permit.