



NARRATIVE

TO: Jeng-Hon Su
FROM: Nada Osman
DATE: July 18, 2023

Facility Name: **King's Hawaiian Bakery**
AIRS No.: 139-00126
Location: Oakwood, GA (Hall County)
Application #: 28659
Date of Application: November 28, 2022

Background Information

King's Hawaiian Bakery (hereinafter "facility") is a commercial bakery located at 5420 H.F. Reed Industrial Parkway in Oakwood, Georgia. The facility is located in Hall County, which is an attainment county for all criteria air pollutants. Equipment at the facility includes four baking ovens (ID Nos. OV01-OV04), code daters (ID No. CD01), and a variety of cleaners and sanitizers (ID No. CS01). Emissions from the baking ovens are each controlled by a catalytic oxidizer (ID Nos. TOX1-TOX4).

The facility produces a variety of bread products through a method called the "straight dough method," which is a single-step process where all ingredients are mixed into a single batch. The dough is fermented for 2-4 hours before being divided, rounded, and weighed. The pieces are then moulded, proofed, and baked by being conveyed through one of the baking ovens (ID Nos. OV01-OV04). The bread product is then cooled before being packaged and stored for shipping. Dry ingredients (flour, sugar, etc.) are stored in storage silos equipped with bin vent fabric filters.

The facility is considered a synthetic minor source because its potential-to-emit (PTE) for volatile organic compounds (VOC) could exceed the Title V major source threshold of 100 tons per year (tpy), and its PTE for single hazardous air pollutants (HAP) could exceed the major source threshold of 10 tpy. The facility currently operates with synthetic minor caps of 99 tpy for VOC and 9.9 tpy for acetaldehyde. Emissions of all other criteria air pollutants and combined HAP are each below their respective Title V major source thresholds.

The facility currently operates under Air Quality Permit No. 2051-139-0126-S-02-0, issued on February 17, 2014, and Permit Amendment No. 2051-139-0126-S-02-1, issued on October 12, 2017.

Purpose of Application

On November 28, 2022, the facility submitted Application No. 28659 for the expansion of its operations, including the installation of a new baking oven (ID No. OV05), four ingredient storage silos (ID Nos. Silo-A, Silo-B, Silo-C, and Silo-D) equipped with bin vent filters, a code dater (ID No. CD02), and additional

cleaners and sanitizers (ID No. CS02). Note that emissions from the new baking oven (ID No. OV05) will not be controlled. A Public Advisory was issued for this application on December 21, 2022.

Updated Equipment List

Table 1: Equipment List

Emission Units		Associated Control Devices	
Source Code	Description	Source Code	Description
OV01	Baking Oven #1	TOX1	Thermal Oxidizer
OV02	Baking Oven #2	TOX2	Thermal Oxidizer
OV03	Baking Oven #3	TOX3	Thermal Oxidizer
OV04	Baking Oven #4	TOX4	Thermal Oxidizer
OV05	Baking Oven #5	--	--
SILO-A	Flour Silo	BV01	Bin Vent Filter
SILO-B	Flour Silo	BV02	Bin Vent Filter
SILO-C	Sugar Silo	BV03	Bin Vent Filter
SILO-D	Sugar Silo	BV04	Bin Vent Filter
CD01	Code Dater	--	--
CD02	Code Dater	--	--
CS01	Cleaners / Sanitizers	--	--
CS02	Cleaners / Sanitizers	--	--

New units are in bold

Table 2: Fuel-Burning Equipment

Emission Units		Associated Control Devices	
Source Code	Description	Source Code	Description
B001	8 MMBtu/hr Natural Gas-fired Boiler	--	--

Emissions Summary

The proposed 2.5 MMBtu/hr baking oven (ID No. OV05) will result in an increase in facility-wide VOC emissions from combustion of natural gas and fermentation of the baking dough. The oven will also result in an increase in acetaldehyde emissions.

Note that, although PM emissions were calculated while accounting for material capture by the silo bin vent filters (ID Nos. BV01-BV04), the filters are considered inherent process equipment due to the fact that all material captured (sugar, flour, etc.) is returned to the manufacturing process to be used again and is not disposed of as waste.

Potential emissions calculations are based on 8,760 hours per year of operation and maximum capacity.

Table 3: Facility-wide Emissions (tpy)

Pollutant	Potential Emissions			Actual Emissions		
	Before Mod.	After Mod.	Emissions Change	Before Mod.	After Mod.	Emissions Change
PM/PM ₁₀ /PM _{2.5}	1.4	1.5	0.1	1.3	1.4	0.1
NO _x	18.8	19.9	1.1	16.8	17.9	1.1
SO ₂	0.1	0.1	0	0.1	0.1	0
CO	15.8	16.7	0.9	14.1	15.1	1.0
VOC	99	99	0	22.2	46.8	24.6
Max. Individual HAP	9.9	9.9	0	0.45	1.0	0.55
Total HAP	2.3	2.9	0.6	0.77	1.32	0.55
GHG (CO ₂ e)	33,392	33,409	17	20,104	20,121	17

Regulatory Applicability

Georgia Rule 391-3-1-.02(2)(b), Visible Emissions

Georgia Rule (b) limits visible emissions from manufacturing equipment to no more than 40% opacity. Operation of the new natural gas-fired drying oven (ID No. OV05) is not expected to produce any visible emissions, and therefore, it is expected to comply with Georgia Rule (b) limits.

Georgia Rule 391-3-1-.02(2)(d), Fuel-Burning Equipment

Georgia Rule (d) limits the PM emission rate and opacity of visible emissions from fuel-burning equipment. The definition of “fuel-burning equipment” as defined in 391-3-1-.01(cc) includes equipment that “furnishes process heat indirectly, through transfer by fluids or transmissions through process vessel walls.” Because Oven OV05 provides heat directly to the baking process through combustion, it does not meet the above definition of “fuel-burning equipment.” Therefore, GA Rule (d) does not apply.

The only emission unit in the entire facility that would be subject to GA Rule (d) is the natural gas fired boiler (ID No. B001).

Georgia Rule 391-3-1-.02(2)(e), Particulate Matter Emissions from Manufacturing Processes

Georgia Rule (e) limits PM emissions from manufacturing equipment based on process input weight rate. The storage silos and their pneumatic transfer systems include filters that remove and recycle the majority of airborne material before the air is vented from the building, and therefore, the storage silos (ID Nos. Silo-A, Silo-B, Silo-C, and Silo-D) are expected to comply with Georgia Rule (e) limits.

The proposed Oven OV05 fires natural gas, which inherently produces very little PM emissions. As a result, it is also expected to comply with Georgia Rule (e) limits.

Georgia Rule 391-3-1-.02(2)(g), Sulfur Dioxide

Georgia Rule (g) limits the sulfur content of fuel combusted in sources below 100 MMBtu/hr to no more than 2.5% by weight. The proposed oven burner (ID No. OV05) burns only natural gas, automatically complying with Georgia Rule (g) fuel sulfur limits.

Georgia Rule 391-3-1-.02(2)(tt), VOC Emissions from Major Sources

Georgia Rule (tt) would apply to facilities in Hall County with 100 tpy or more VOC emissions. The facility operates with a facility-wide synthetic minor limit of 99 tpy for VOC, and therefore, is not subject to any VOC reasonably available control technology (RACT) requirements.

Georgia Rule 391-3-1-.02(2)(yy), Emissions of Nitrogen Oxides from Major Sources

Georgia Rule (yy) would apply to facilities in Hall County with 100 tpy or more NOx emissions. NOx emissions from the facility are well below this threshold and are therefore not subject to any NOx RACT requirements.

Georgia Rule 391-3-1-.02(2)(rrr), NOx Emissions from Small Fuel-Burning Equipment

Georgia Rule (rrr) limits NOx emissions from small fuel-burning equipment. The proposed oven (ID No. OV05) is not considered fuel-burning equipment based on the 391-3-1-.01(cc) definition, and therefore, GA Rule (rrr) does not apply. Additionally, being a NOx minor source in Hall County, none of the facility's fuel burning equipment (i.e., boilers) would be subject to GA Rule (rrr).

Georgia Rule 391-3-1-.02(2)(aaaa), Industrial Cleaning Solvents

Georgia Rule (aaaa) outlines work practice standards intended to minimize VOC emissions from solvents routinely used for equipment cleaning and sanitization. Paragraph 6 states that the requirements of Rule (aaaa) will no longer apply to named counties that are redesignated to "attainment" for the 1997 ozone NAAQS before January 1, 2015. Hall County was redesignated to "attainment" for 8-hour ozone on January 2, 2014; therefore, GA Rule (aaaa) never becomes effective.

Permit Conditions

Existing Condition 6.2 required the initial VOC destruction efficiency test for Catalytic Oxidizer TOX4. This test was conducted on December 9, 2020. Therefore, the initial testing requirement was satisfied and has been deleted by the proposed permit amendment.

Existing Condition 6.3 requires the repeated VOC destruction efficiency tests for each of Catalytic Oxidizers TOX1 through TOX4. The requirement has been modified to require repeated tests be conducted at a frequency of sixty (60) months intervals not to exceed sixty-one months between tests following the previous performance test. The language about the initial performance testing is not necessary and has been removed.

Existing Condition 7.3 was modified to remove the reference to the now-completed performance testing required by Removed Condition 6.2.

Note that the facility must continue to use the equations provided in existing Conditions 7.2 through 7.7 to track actual VOC and acetaldehyde emissions from the entire facility, including new Baking Oven OV05.

Note that OV05 is not controlled by any control devices; the facility should use the second half of the equation in Condition 7.3, which is for ovens without any controls (in other words, no catalytic oxidizers are working on OV05) to calculate its VOC emissions.

Toxic Impact Assessment

The facility performed a toxic impact assessment (TIA) in order to demonstrate compliance with Georgia Air Toxic Guidelines. Because the facility only emits from point sources, the minimum emission rate (MER) method was used to determine whether modeling was needed. Potential toxic air pollutants (TAP) emissions were compared with their respective MER, and potential emissions of acetaldehyde and arsenic each exceeded their associated MER, as shown in Table 4.

Table 4: PTE of Key HAP and Corresponding MER

Pollutant	Emission Rate (lb/hr)	Emission Rate (lb/yr)	MER (lb/yr)	Modeling Required?
Acetaldehyde	0.65	5,762	1,110	YES
Arsenic	8.12E-06	0.0712	0.0567	YES
Ethanol	19.07	167,055	219,000	NO

A toxic impact analysis of the two HAP was performed by using AERMOD to calculate the maximum ground level concentration (MGLC) and comparing the value to its associated acceptable ambient concentration (AAC), as shown in Table 4. Nine point sources were modeled for each pollutant.

Table 5: Summary of AERMOD Analysis

Pollutant	Averaging Period	AAC (µg/m3)	MGLC (µg/m3)
Acetaldehyde	15-min	4,500	24.47
	Annual	4.55	1.35
Arsenic	15-min	0.2	0.001
	Annual	0.000233	0.00004

The short-term and long-term MGLC of acetaldehyde and arsenic are each below their respective AAC values. Therefore, both pollutants comply with Georgia Air Toxic Guidelines and no further modeling is needed. MER and AAC values for each HAP were referenced from Appendix A of the Summary of Ambient Impact Assessment of Toxic Air Pollutant Emissions (2018).

Summary & Recommendations

King's Hawaiian Bakery is a commercial bakery located in Oakwood, GA. The facility is a synthetic minor source for VOC and single HAP (acetaldehyde). The Stationary Source Compliance Program (SSCP) will continue to be responsible for inspection and compliance of this facility.

The Public Advisory for this facility expired on January 20, 2023. No comments were received.