

Air Permit Review

Region: Washington Regional Office
County: Wayne
NC Facility ID: 9600235
Inspector's Name: Yongcheng Chen
Date of Last Inspection: 09/28/2011
Compliance Code: 3 / Compliance - inspection

Permit Issue Date:

Facility Data			Permit Applicability (this application only)
Applicant (Facility's Name): Franklin Baking Company - Goldsboro Facility Address: Franklin Baking Company - Goldsboro 500 West Grantham Street Goldsboro, NC 27530 SIC: 2051 / Bread Cake And Related Product NAICS: 311812 / Commercial Bakeries Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V			SIP: NSPS: NESHAP: PSD: PSD Avoidance: Replaced production limits with emissions tracking. NC Toxics: 112(r): Other:
Contact Data			Application Data
Facility Contact	Authorized Contact	Technical Contact	Application Number: 9600235.11B Date Received: 10/12/2011 Application Type: Modification Application Schedule: TV-Significant Existing Permit Data Existing Permit Number: 07844/T08 Existing Permit Issue Date: 03/22/2011 Existing Permit Expiration Date: 05/31/2014
John Sugg Environmental, Safety/ Security Director (919) 705-2106 500 West Grantham Street Goldsboro, NC 27530	Tom Buffkin President (919) 705-2000 500 West Grantham Street Goldsboro, NC 27530	Richard Dustin Chief Engineer (919) 735-0344 PO Drawer 228 Goldsboro, NC 27533	
Review Engineer: Jenny Kelvington Review Engineer's Signature: _____ Date: _____		Comments / Recommendations:	
		Issue 07844/T09 Permit Issue Date: Permit Expiration Date:	

I. Purpose of Application

Franklin Baking Company, LLC, located in Goldsboro, Wayne County, North Carolina is requesting the second step of a "significant" modification. The application was considered complete for processing on October 12, 2011 and satisfies the following permit requirement:

This emission source (ID No. ES-S-O-2) is listed as a 15A NCAC 2Q .0501(c)(2) modification and shall replace the existing oven with the same ID number. The existing oven may operate until the new emission source commences operation. The Permittee shall file a Title V Air Quality Permit Application on or before 12 months after commencing operation of the new source in accordance with General Condition NN.1.

The draft permit will go through a 30 day public notice and a 45 day EPA review for the new oven, revisions made to the PSD avoidance condition, and all other updates made by the NC DAQ. After issuance, the permit shield described in General Condition R will apply and compliance certification as described in General Condition P will be required.

With this modification, Franklin Baking Company has requested the No. 2 fuel oil and propane be removed

from the permit as fuels that are permitted to be fired in their four boilers and three ovens. The facility only has the capability to burn natural gas in their ovens at this time. If natural gas is not available to run the ovens, they do not need to operate the boilers. These two fuels have been removed from the permit.

II. Facility Description

Franklin Baking Company, LLC operates a commercial bakery in Goldsboro, North Carolina. The facility is divided into two different plants. The bread plant produces loaf and white sandwich breads and the roll plant produces hotdog and hamburger buns. Bulk quantities of flour are shipped to the facility in tank trucks and conveyed into one of the five storage silos. These silos utilize process filters to minimize loss of flour during loading. The flour is weighed and mixed with sugar, yeast, water, and other miscellaneous ingredients. Sugar is shipped in bulk liquid form by tank trucks. Franklin Baking Company processes four basic types of dough including sponge dough, straight dough, liquid brew, and no-time dough. Each process varies in the manner in which the dough ingredients are mixed and the amount of fermentation time available. Fermentation, which begins immediately following the initial mixing of ingredients and continues until the yeast is killed in the oven, varies from less than 20 minutes to more than five hours but usually averages two to two and a half hours. Fermentation causes sugars and starches to be converted to ethanol, carbon dioxide, and water. At the start of fermentation, a skin forms on the top of the dough. The skin keeps the ethanol and carbon dioxide in the dough, thereby allowing the dough to rise. It remains on the dough until broken during the baking process. The dough is allowed to rise in a high temperature, high humidity “proof box.” Steam required for the proof box environment is supplied by boilers, with normally two of four boilers (ID Nos. ES-B-1, ES-B-2, ES-B-3, and ES-B-4) in operation at any one time. Baking occurs in three ovens (ID Nos. S-O-1, S-O-2, and S-O-3) and involves the expansion of the loaf or bun to final volume, crust formation, yeast and enzymatic activity inactivation, coagulation of the dough proteins, partial gelatinization of the starch, and reduction of loaf moisture. The ovens generate emissions from both the combustion of natural gas and the off-gassing of the bread itself. VOC emissions from the bread/bun baking process exceed 100 tons per year.

III. Facility Compliance Status

The DAQ has reviewed the compliance status of this facility. Yongcheng Chen of the Washington Regional Office (WaRO) last inspected the facility on September 28, 2011 and found that it appeared to be operating in compliance with all applicable regulations and permit conditions at the time. No visible emissions were observed from any of the emissions sources in operation at the time. Furthermore, no objectionable odors were detected. During this past five years, Franklin Baking Company has operated in compliance with all permit conditions. Continue compliance is expected.

IV. Permit Changes

The following table lists all modifications associated with this permit action:

Page(s)	Current Section	Description of Change(s)
Cover	-	Amended all dates and permit revision numbers
3	Section 1, Table of Permitted Sources	Removed No. 2 fuel oil as a fuel that can be fired in each of the four boilers (ID Nos. ES-B-1, ES-B-2, ES-B-3, and ES-B-4); Removed propane as a fuel that can be fired in each of the three ovens (ID Nos. ES-S-O-1, ES-S-O-2, and ES-S-O-3) Removed footnote that a permit application is required to be submitted within 12 months of commencing operation of oven (ID No. ES-S-O-2)
13-21	Section 3, General Conditions	Updated shell language

V. New Source Description, Emissions, and Regulatory Review

Natural gas-fired oven modification

Oven removed: ID No. ES-S-O-2; 5.4 million Btu/hour maximum heat input

Oven added: ID No. ES-S-O-2; 11.87 million Btu/hour maximum heat input

The new baking oven was placed into operation in 2011 as part of the bread production line. The oven generates emissions from both the combustion of natural gas or propane used to heat it and the off-gassing of the bread. During the baking process, the skin on the dough breaks releasing carbon dioxide, water, ethanol, and acetaldehyde trapped in the dough through the oven vent.

Emissions - Potential combustion emissions from the baking oven are as follows:

Pollutant	Natural Gas Combustion (tons/year)
Nitrogen oxides	5.20
Sulfur dioxide	0.03
Carbon monoxide	4.28
PM/PM ₁₀	0.40
VOCs	0.57

VOC emissions associated with bread and bun production are estimated using the following emission factor equation contained in AP-42, Section 9.96 – Bread Baking, February 1997:

$$\text{VOC Emission Factor} = 0.95Y_i + 0.195t_i - 0.51S - 0.86t_s + 1.90$$

Where: VOC E.F. = pounds of VOC per ton of baked bread (emission factor)
Y_i = initial baker's percent of yeast
t_i = total yeast action time in hours
S = final (spike) baker's percent of yeast
t_s = spiking time in hours

Franklin Baking Company utilizes many different formulas in the production of bread and buns which result in varying pounds of VOC emitted per ton of bread baked. At 8760 hours of operation per year for the "worst case" dough at maximum production, VOC emissions from bread baking (in this new oven and the other two existing ovens combined) exceed 250 tons per year.

Regulatory Review

- a. 15A NCAC 2D .0503: PARTICULATES FROM FUEL BURNING INDIRECT HEAT EXCHANGERS
Emissions of particulate matter from the combustion of natural gas and propane that are discharged from the oven into the atmosphere shall not exceed 0.5165 pounds per million Btu heat input. No monitoring/recordkeeping/reporting is required for particulate emissions from the firing of natural gas and propane as these fuels result in low particulate emissions.

Natural gas is inherently low in particulate emissions with maximum particulate emissions at 0.01 pounds per million Btu heat input. Compliance is indicated.

- b. 15A NCAC 2D .0516: SULFUR DIOXIDE EMISSIONS FROM COMBUSTION SOURCES
Emissions of sulfur dioxide from the boilers shall not exceed 2.3 pounds per million Btu heat input. No monitoring/recordkeeping/reporting is required for sulfur dioxide emissions from natural gas and propane as these fuels result in low sulfur dioxide emissions.

Natural gas is inherently low in SO₂ emissions with maximum SO₂ emissions at less than 0.01 pounds per million Btu heat input. Compliance is indicated.

c. 15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS

Visible emissions from the boilers shall not be more than 20 percent opacity when averaged over a six-minute period. No monitoring/recordkeeping/reporting is required for visible emissions from the firing of natural gas or propane as these fuels result in low VE emissions. Compliance is expected.
No visible emissions have been observed from any of the ovens during the last five annual inspections. Similar compliance is expected for the new oven.

d. 15A NCAC 2Q. 0317: AVOIDANCE CONDITIONS FOR 15A NCAC 2D. 0530: PREVENTION OF SIGNIFICANT DETERIORATION

As previously requested by Franklin Baking Company, the existing permit contains a less than 250 tons per year facility wide VOC limit in order to avoid applicability of Prevention of Significant Deterioration (PSD). The facility was previously subject to the following bread production limits for PSD avoidance:

Emission Source	Limit	Emission Factor
Oven S-O-1 (all doughs)	30,000,000 pounds per year *	5.659 lbs VOCs/ton
Oven S-O-2 (all doughs)	70,000,000 pounds per year *	6.1095 lbs VOCs/ton
Oven S-O-2 (straight dough) **	15,000,000 pounds per year *	12.2795 lbs VOCs/ton
Oven S-O-3 (all doughs)	42,000,000 pounds per year *	5.659 lbs VOCs/ton

* Production values represent “as-baked” weights. “Pre-baked” dough losses are approximately 10 percent by weight of water vapor during the baking process.

** Of the 70,000,000 pounds per year of dough, no more than 15,000,000 pounds per year shall be straight dough.

During the first step of this modification, the production limits were replaced with monthly facility wide VOC emissions tracking to allow additional operational flexibility. The new condition requires that facility wide VOC emissions be determined as the sum of Equations 1 through 5 below:

Equation 1: VOC Emissions from Bread Baking

$$\text{VOC (ton/month)} = \sum(\text{BB}_i \times \text{EF}_i) \div 2000$$

Where: \sum = summation of the VOC emissions from each type of bread baked during the month

BB_i = tons of bread type i baked during the month

EF_i = emission factor for bread type i in pounds per ton calculated according to Eqn 1.a below.

Equation 1.a.

$$\text{EF}_i = (0.95)Y_i + (0.195)t_i - (0.51)S_i - (0.86)ts_i + 1.90$$

Where: EF_i = emission factor for bread type i in pounds per ton

Y_i = initial baker’s percent of yeast in bread type i to the nearest tenth of a percent

t_i = total yeast action time for bread type i to the nearest tenth of a percent

S_i = final (spike) baker’s percent of yeast in bread type i to the nearest tenth of a percent

Ts_i = spiking time in hours for bread type I to the nearest tenth of an hour

Equation 2: VOC Emissions from Combustion

$$\text{VOC (ton/month)} = (5.5)NG \div 2000$$

Where: NG = millions of standard cubic feet of natural gas combusted in the boilers and ovens during the month

Equation 3: VOC Emissions from Label Printing

$$\text{VOC (ton/month)} = [(VC_I)(I) + (VC_M)(M)] \div 2000$$

Where: VC_I = VOC content of the ink in pounds per gallon
I = gallons of ink used during the month
 VC_M = VOC content of the makeup fluid in pounds per gallon
M = gallons of makeup fluid used during the month

Equation 4: VOC Emissions from Lubricants

$$\text{VOC (ton/month)} = [(VC_L)(L)] \div 2000$$

Where: VC_L = VOC content of the lubricant in pounds per gallon
L = gallons of ink used during the month

Equation 5: VOC Emissions from Parts Washer

$$\text{VOC (ton/month)} = [(VC_{PW})(PW)] \div 2000$$

Where: VC_{PW} = VOC content of the fluid used in the parts washer in pounds per gallon
PW = gallons of fluid used in the parts washer during the month

This approach appears to be a reasonable method for ensuring annual VOC emissions remain below 250 tons per year. The facility's records indicate that they emitted 107.02 tons of VOCs during the 12 month period from January 1, 2010 through December 31, 2010 from the baking operations, label printing and the parts washer. Continued compliance is expected.

e. 15A NCAC 2D .0957: COMMERCIAL BAKERIES

These rules apply to bakeries with greater than 100 tpy of VOC emissions located in Cabarrus, Gaston, parts of Iredell, Lincoln, Mecklenburg, Rowan, or Union County. The bakery is located in Wayne County which is currently listed as "unclassifiable/attainment" for ozone. Therefore, Franklin Baking Company is not subject to these requirements.

f. 15A NCAC 2D .1100: CONTROL OF TOXIC AIR POLLUTANTS

Franklin Baking Company replaced an existing toxic exempt oven with a new oven subject to NC's air toxics rules. At the maximum expected rate of toxic emissions¹ from the new oven, facility-wide emissions of each toxic air pollutant (TAP) are below the toxic permit emission rate (TPER) in 15A NCAC 2Q .0711. Not considering metals, the new oven results in the net increase of the following TAPs:

¹ . On February 9, 2011, Mr. William Willets, NC DAQ Permits Supervisor, informed Franklin's consultant, Ms. Amy Marshall, that the AP-42 metal emission factors need not be used for natural gas/propane combustion evaluations as combustion of these fuels on their own do not normally result in the emission of metals.

TAP	TPER	ES-S-O-2 Potential Emissions	Highest Facility Wide Emissions 2005-2010	Expected Maximum Emissions	Modeling Required?
acetaldehyde ²	6.8 lbs/hr	2.0 lbs/hr	6870 lb/yr (1 lb/hr)	3 lb/hr	No
benzene	8.1 lbs/yr	0.214 lbs/yr	0.156 lb/yr	0.4 lb/yr	No
benzo(a)pyrene ²	2.2 lbs/yr	0.000122 lbs/yr	<0.0001	0.0002 lbs/yr	No
formaldehyde	0.04 lbs/hr	0.001 lbs/hr	5.58 lb/yr (0.001 lb/hr)	0.002 lb/hr	No
n-hexane	23 lbs/day	0.50 lbs/day	134 lb/yr (0.4 lb/day)	0.9 lb/day	No
toluene	14.4 lbs/hr 98 lb/day	0.01 lbs/day	0.25 lb	0.002 lb/day	No

No compliance demonstration is necessary since the expected facility wide maximum emissions of each TAP are less than their respective TPER. Therefore 2D .1100 does not apply to Franklin Baking Company because no TPER is exceeded.

- g. 15A NCAC 2Q .0711: TOXIC AIR POLLUTANTS EMISSION RATES REQUIRING A PERMIT
This regulation applies for the following TAPs: acetaldehyde, benzene, benzo(a)pyrene, formaldehyde, n-hexane, and toluene; and requires Franklin Baking Company to obtain a permit prior to exceeding the toxic emission rates requiring a permit (TPER). Compliance is expected as maximum actual emissions of these TAPs are well below their respective TPER.

VII. NSPS, NESHAPS/MACT, PSD, 112(r), Facility Wide Toxics, and CAM

NSPS – The facility is not subject to any New Source Performance Standard.

NESHAPS/MACT/GACT - The facility is not a major source of any HAPs and as such is not subject to any MACT standards. Furthermore, the facility is not subject to the new Boiler GACT in 40 CFR 63, Subpart JJJJJ as §63.11195(e) excludes all gas-fired boilers from any requirement in this subpart.

PSD – The facility has a PSD avoidance condition for VOCs only. The facility is a true minor for all other criteria pollutants for PSD purposes.

112(r) – The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store regulated substances in quantities above the thresholds in the Rule. The permit modification does not affect this status.

Facility Wide Air Toxics – The facility has not triggered air toxics regulations. Facility wide toxic air emissions of TAPs emitted from the new baking oven are below the TPERs.

CAM – Compliance Assurance Monitoring (CAM) (40 CFR Part 64) applies to all controlled emissions sources that are subject to an emission limit or standard, other than those exempted under 2D .0614(b)(1), with pre-controlled emissions of at least one regulated pollutant equal to or greater than 100 tons per year. The only emissions sources with control devices are the five storage silos. Potential uncontrolled particulate emissions from all of the silos combined are only 15.3 tons per year and thus, CAM does not apply.

² Acetaldehyde comprises 3.5% of the VOCs emitted from baking. The highest VOC emissions at 12.3 lbs VOCs/ton occur with “straight dough” is baked. Worst-case actual acetaldehyde hourly emissions from baking are conservatively estimated at 3 times the average maximum allowable emission rates based upon the PSD avoidance limit for VOC emissions.

VIII. Facility Emissions Review

The following is an emission summary for the facility. Actual emissions are for year 2010 as reported in the emissions inventory.

Pollutant	Unlimited Potential Emissions (Tons/Year)	Potential Emission with Control/Limits (tons/year)	2010 Actual Emissions Tons/Year
PM	11.7	2.5	0.3
CO	14.1	14.1	2.9
NOx	16.8	16.8	3.5
SO ₂	0.10	0.10	0.02
VOC	> 250	< 250	107
Single/total HAPs	< 10/25	< 10/25	3.1/3.1

IX. Public Notice/EPA and Affected State(s) Review

Public notice will be performed consistent with the requirements of 15A NCAC 2Q .0521. The notice will provide for a 30-day comment period with an opportunity for a public hearing. Copies of the public notice will be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 2Q .0522, a copy of the permit application and the draft permit will be provided to EPA.

X. Conclusions, Comments, and Recommendations

The WaRO and the facility were provided a draft permit to review on October 19, 2011. The NC DAQ recommends permit issuance.

ISSUE PERMIT NUMBER 07844T09