

**NORTH CAROLINA DIVISION OF
AIR QUALITY**

Air Permit Review

Permit Issue Date: DRAFT

Region: Winston-Salem Regional Office
County: Surry
NC Facility ID: 8600009
Inspector's Name: Ray Stewart
Date of Last Inspection: 05/14/2009
Compliance Code: 3 / Compliance - inspection

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| <p style="text-align: center;">Facility Data</p> <p>Applicant (Facility's Name): Vaughan-Bassett Furn Co - Elkin Furniture</p> <p>Facility Address: Vaughan-Bassett Furn Co - Elkin Furniture 501 E. Main Street Elkin, NC 28621</p> <p>SIC: 2511 / Wood Household Furniture NAICS: 337122 / Nonupholstered Wood Household Furniture Manufacturing</p> <p>Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V</p> | <p style="text-align: center;">Permit Applicability (this application only)</p> <p>SIP: N/A NSPS: N/A NESHAP: N/A PSD: N/A PSD Avoidance: N/A NC Toxics: N/A 112(r): N/A Other: 15A NCAC 2D .1109</p> |
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| Contact Data | | | Application Data |
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| <p style="text-align: center;">Facility Contact</p> <p>Ros Folger Safety Director (336) 835-1711 501 E. Main Street Elkin, NC 28621</p> | <p style="text-align: center;">Authorized Contact</p> <p>Michael DeHart Vice President/Plant Manager (336) 835-1711 501 E. Main Street Elkin, NC 28621</p> | <p style="text-align: center;">Technical Contact</p> <p>Barry Branscome Vice Pres/Director of Eng. & Env. Comp. (276) 238-2205 300 E. Grayson Street Galax, VA 24333</p> | <p>Application Number: 8600009.09A Date Received: 09/14/2009 Application Type: 112(j) Part II Application Schedule: TV-Significant</p> <p style="text-align: center;">Existing Permit Data</p> <p>Existing Permit Number: 02467/T26 Existing Permit Issue Date: 01/04/2008 Existing Permit Expiration Date: 12/31/2012</p> |

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| <p>Review Engineer: Fern Paterson, P.E.</p> <p>Review Engineer's Signature: _____ Date: _____</p> | <p style="text-align: center;">Comments / Recommendations:</p> <p>Issue: 02467/T27 Permit Issue Date: DRAFT Permit Expiration Date: 12/31/2012</p> |
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I. Purpose of Application No. 1400007.09B

Vaughan-Bassett Furniture Co - Elkin Furniture Plant is located in Elkin, Surry County, North Carolina. Application No. 8600009.09A, received September 14, 2009, is a Part 2 MACT "Hammer" application for four existing boilers, as listed below:

- **ES-4** – One firetube design wood/coal-fired boiler (29.3 MMBtu/hr maximum heat input capacity)
- **ES-5** – One firetube design wood/coal-fired boiler (29.1 MMBtu/hr maximum heat input capacity)

II. Permit Modifications/Changes

The following table describes the modifications to the current permit.

| Pages | Section | Description of Changes |
|-------|-------------------------------------|--|
| Cover | - | Amend permit revision numbers and all dates |
| All | Page Headers | Amend permit revision number |
| 3 | Section 1. List of Affected Sources | Add Case-By-Case MACT designation to affected boilers. |
| 5 | Section 2.1 A. | Add 15A NCAC 2D .1109: Case-by-Case MACT to the table of applicable regulations. |
| 9-11 | Section 2.1 A.6. | Add 15A NCAC 2D .1109: Case-by-Case MACT requirements. |

| Pages | Section | Description of Changes |
|-------|------------------|--|
| 12 | Section 2.1 B. | Add 15A NCAC 2D .1109: Case-by-Case MACT to the table of applicable regulations. |
| 17-19 | Section 2.1 B.7. | Add 15A NCAC 2D .1109: Case-by-Case MACT requirements. |

III. Regulatory Review – 15A NCAC 2D .1109 –Case-by-Case MACT

1. **Generally:** On July 20, 2007, the D.C. Circuit Court vacated the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Industrial, Commercial, and Institutional Boilers and Process Heaters, which had been promulgated under 40 CFR 63, Subpart DDDDD. The North Carolina Attorney General’s office has determined that the NESHAP vacatur equates to the failure of the U.S. EPA to promulgate a standard as required under Section 112(d) of the Clean Air Act (CAA). As a result, the site-specific Maximum Achievable Control Technology (MACT) standards required under CAA §112(j), commonly referred to as the MACT “hammer” provisions, have been triggered. North Carolina regulations implementing the MACT hammer are found at 15A NCAC 2D .1109.

On September 14, 2009, the NC DAQ received a Part 2 MACT “Hammer” application from this facility asking that the NC DAQ establish 112(j) emissions limitations.

NC DAQ has developed this guidance to provide standards and compliance procedures that it has determined meet the requirements of § 112(j) (<http://daq.state.nc.us/permits/112j/>).

2. **Case-By-Case MACT Determination:** Each of the two affected sources (**ID Nos. ES-4 and ES-5**) can fire either dry wood or coal, each have a heat input capacity of less than 30 MMBtu/hr, and each is equipped with two multiclones.

The facility proposed to comply with mercury (Hg) and carbon monoxide (CO) emission limitations that are consistent with the NC DAQ application guidance (<http://daq.state.nc.us/permits/112j/>). NC DAQ has developed this guidance to provide standards and compliance procedures that it has determined meet the requirements of § 112(j). The facility has chosen to comply with a Health-Based Compliance Alternative (HBCA) for both manganese (Mn) and hydrogen chloride (HCl). A discussion of each proposed standard proposed pursuant to 15A NCAC 2D .1109 is provided below:

a. Total Selected Metals (TSM), including HBCA for Manganese

In accordance with the 112(j) application guidance provided by NC DAQ, affected facilities may propose either a total selected metal (TSM) limit or a filterable PM limit. This facility has chosen to comply with the TSM limit. In general TSM includes arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and selenium. However, by showing it is eligible for the HBCA for Mn, the facility may comply with the TSM emission limitation proposed in the NC DAQ application guidance without including manganese in the compliance demonstration.

This facility used the look-up table approach provided in Section 15 of the NC DAQ application guidance, which is identical in substance to Appendix A of the vacated 112(d) standard. The look-up table approach to the HBCA requires the facility to determine the Allowable Manganese Emission Rate in HCl-equivalent according to the following steps:

- Calculate the weighted average stack height (in meters, m) using the following equation:

$$H_{Mn} = \frac{\sum(E_{Mn,s} \times H_s)}{E_{Mn,T}}$$

Where:

- H_{Mn} = Weighted average stack height (in m);
- s = Individual affected emission sources;
- E_{Mn,s} = Maximum hourly Mn emissions from emission point s (in lbs/hr);

H_s = Height of each individual stack s
 $E_{Mn,T}$ = Total maximum hourly Mn emissions (in lbs/hr)

- Determine the shortest distance to property boundary (in m) from any affected source.
- Use the look-up table provided in the NC DAQ application guidance, which is identical to the look-up table provided in the vacated 112(d) standard, to determine the Allowable Manganese Emission Rate (in lbs/hr)
- Determine the worst-case manganese emission rates from each affected source (in lbs/hr) and sum the values to determine the total manganese emission rate.
- Compare the allowable manganese emission rate to the total manganese emission rate. If the total manganese emission rate is less than the allowable emission rate provided in the table, the facility is eligible for the HBCA.

The summary of stack heights and distance of stacks from the property boundary for each affected source is provided in the following table:

| Affected Source | Distance to Property Boundary (m) | Stack Height (m) | Potential Mn Emission Rate* (lbs/hr) |
|---------------------------------------|-----------------------------------|------------------|--------------------------------------|
| ES-4 | 99.7 | 18.6 | 0.047 |
| ES-5 | >100 | 18.6 | 0.047 |
| Total Manganese Emission Rate: | | | 0.94 |

* Potential Mn emissions are based on the heat input capacity of the boiler and the AP-42 emission factor for wood, the worst case fuel for Mn emissions. No emission control was assumed from the multiclones.

Based on the information provided above, the Distance to Property Boundary is 99.7 m, the weighted stack height is 18.6 m, and the total manganese emission rate is 0.094 lbs/hr. Using the look-up table, as provided below, the maximum allowable manganese emission rate is 0.47 lbs/hr.

Table. Allowable Manganese Emission Rate (lbs/hr)

| Stack Ht. (m) | Distance to Property Boundary (m) | | | | | | | | | | | |
|---------------|-----------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|
| | 0 | 50 | 100 | 150 | 200 | 250 | 500 | 1000 | 1500 | 2000 | 3000 | 5000 |
| 5 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.36 | 0.72 | 0.93 | 0.93 | 0.93 | 0.94 |
| 10 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.49 | 0.82 | 1.08 | 1.08 | 1.08 | 1.08 |
| 20 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 1.06 | 1.45 | 1.51 | 1.51 | 1.51 |
| 30 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 1.09 | 1.49 | 1.72 | 2.02 | 2.04 |
| 40 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.02 | 1.12 | 1.53 | 1.79 | 2.08 | 2.42 |
| 50 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.15 | 1.58 | 1.87 | 2.15 | 2.51 |
| 60 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 | 1.18 | 1.62 | 1.95 | 2.21 | 2.61 |
| 70 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.22 | 1.67 | 2.03 | 2.28 | 2.72 |
| 80 | 1.16 | 1.16 | 1.16 | 1.16 | 1.16 | 1.16 | 1.16 | 1.25 | 1.71 | 2.12 | 2.35 | 2.84 |
| 100 | 1.24 | 1.24 | 1.24 | 1.24 | 1.24 | 1.24 | 1.24 | 1.32 | 1.81 | 2.29 | 2.50 | 3.10 |
| 200 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.71 | 2.30 | 2.92 | 3.48 | 4.81 |

Because the total, worst-case manganese emission rate is less than the allowable manganese emission rate, the facility is eligible to use the HBCA, and it need not include manganese emissions in its compliance demonstrations for TSM for either coal or wood.

b. Mercury (Hg)

This facility has proposed a mercury limit of 5e-06 lbs/MMBtu when firing dry wood and 3e-06 lbs/MMBtu when firing coal, which is consistent with the NC DAQ application guidance.

c. Carbon Monoxide (CO)

This facility proposed a CO limit of 269 ppmvd (corrected to 7% oxygen) when firing dry wood and 133 ppmvd (corrected to 7% oxygen) when firing coal, which is consistent with the NC DAQ application guidance.

d. HCl

In the 112(j) application guidance, NC DAQ provided for a risk-based HBCA that is consistent with the approach provided by U.S. EPA in Appendix A of the vacated 112(d) standard. This facility proposed to establish a facility-specific HCl-equivalent emission rate using this HBCA approach. A summary of the HBCA eligibility demonstration and resulting emissions limitations is provided below.

The look-up table approach to the HBCA requires the facility to determine the Allowable Toxicity Weighted Emission Rate in HCl-equivalent according to the following steps:

- Determine the worst-case HCl and Cl₂ emission rates (in lbs/hr) and calculate the toxicity-weighted emission rate in HCl-equivalents (in lbs/hr) using the following equation

$$TW = E_{HCl} + E_{Cl_2} \left(\frac{RV_{HCl}}{RV_{Cl_2}} \right)$$

Where “RV” denotes the reference values. The reference value of HCl is 20 µg/m³. The reference value for Cl₂ is 0.2 µg/m³.

- Calculate the weighted average stack height (in meters, m)
- Determine the distance to property boundary (in m)
- Use the look-up table provided in the NC DAQ application guidance, which is identical to the look-up table provided in the vacated 112(d) standard, to determine the Allowable Toxicity Weighted Emission Rate in HCl-equivalent (in lbs/hr)
- Compare the Allowable Toxicity Weighted Emission Rate in HCl-equivalent to the maximum toxicity-weighted emission rate to determine eligibility.

HCl-Equivalent Emission Rates

The calculation of the HCl-equivalent emission rates for the affected sources at this facility are provided below.

| Boiler ID No. | HCl Emission Rate (lbs/hr) | Cl ₂ Emission Rate (lbs/hr) | HCl-Equivalent Emission Rate (lbs/hr) |
|--|----------------------------|--|---------------------------------------|
| ES-4 | 0.556 | 0.023 | 2.86 |
| ES-5 | 0.553 | 0.023 | 2.85 |
| Total HCl-Equivalent Emission Rate: | | | 5.71 |

* Potential HCl and Cl₂ emissions are based on the heat input capacity of the boiler and the AP-42 emission factor for wood, the worst case fuel. No emission control was assumed from the multiclones.

Calculate the Weighted Average Stack Height & Determine the Distance to Property Boundary

The summary of stack heights and distance of stacks from the property boundary for each affected source is provided in the following table:

| Affected Source | Distance to Property Boundary (m) | Stack Height (m) | HCl-Equivalent Emission Rate (lbs/hr) |
|-----------------|-----------------------------------|------------------|---------------------------------------|
| ES-4 | 99.7 | 18.6 | 2.86 |
| ES-5 | >100 | 18.6 | 2.85 |

Based on the information provided above, the Distance to Property Boundary is 99.7 m and the weighted stack height is 18.6 m.

Determine the Allowable Toxicity Weighted Emission Rate in HCl-Equivalents
Based on the following look-up table:

Table. Allowable Toxicity Weighted Emission Rate Expressed in HCl Equivalents (lbs/hr)

| Stack Ht. (m) | Distance to Property Boundary (m) | | | | | | | | | | | |
|---------------|-----------------------------------|--------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| | 0 | 50 | 100 | 150 | 200 | 250 | 500 | 1000 | 1500 | 2000 | 3000 | 5000 |
| 5 | 114.9 | 114.9 | 114.9 | 114.9 | 114.9 | 114.9 | 144.3 | 287.3 | 373.0 | 373.0 | 373.0 | 373.0 |
| 10 | 188.5 | 188.5 | 188.5 | 188.5 | 188.5 | 188.5 | 195.3 | 328.0 | 432.5 | 432.5 | 432.5 | 432.5 |
| 20 | 386.1 | 386.1 | 386.1 | 386.1 | 386.1 | 386.1 | 386.1 | 425.4 | 580.0 | 602.7 | 602.7 | 602.7 |
| 30 | 396.1 | 396.1 | 396.1 | 396.1 | 396.1 | 396.1 | 396.1 | 436.3 | 596.2 | 690.6 | 807.8 | 816.5 |
| 40 | 408.1 | 408.1 | 408.1 | 408.1 | 408.1 | 408.1 | 408.1 | 448.2 | 613.3 | 715.5 | 832.2 | 966.0 |
| 50 | 421.4 | 421.4 | 421.4 | 421.4 | 421.4 | 421.4 | 421.4 | 460.6 | 631.0 | 746.3 | 858.2 | 1002.8 |
| 60 | 435.5 | 435.5 | 435.5 | 435.5 | 435.5 | 435.5 | 435.5 | 473.4 | 649.0 | 778.6 | 885.0 | 1043.4 |
| 70 | 450.2 | 450.2 | 450.2 | 450.2 | 450.2 | 450.2 | 450.2 | 486.6 | 667.4 | 813.8 | 912.4 | 1087.4 |
| 80 | 465.5 | 465.5 | 465.5 | 465.5 | 465.5 | 465.5 | 465.5 | 500.0 | 685.9 | 849.8 | 940.9 | 1134.8 |
| 100 | 497.5 | 497.5 | 497.5 | 497.5 | 497.5 | 497.5 | 497.5 | 527.4 | 723.6 | 917.1 | 1001.2 | 1241.3 |
| 200 | 677.3 | 677.3 | 677.3 | 677.3 | 677.3 | 677.3 | 677.3 | 682.3 | 919.8 | 1167.1 | 1390.4 | 1924.6 |

For a stack height of 10 meters and a distance to boundary of 50 meters, the allowable toxicity weighted emission rate is **188.5 lbs/hr**.

The maximum, worst case HCl-equivalent emission rate (5.71 lbs/hr) is 3% of the allowable toxicity-weighted emission rate determined using the look-up table approach. Based on this large compliance margin, NC DAQ had determined that the facility is eligible to use the HBCA compliance option for HCl for its two affected boilers.

IV. Recommendations

This permit modification application for the Vaughan-Bassett Furniture Co - Elkin Furniture Plant located in Elkin, Surry County, North Carolina has been reviewed by NC DAQ to determine compliance with all procedures and requirements. NC DAQ has determined that this facility appears to be complying with all applicable requirements.

Issue Permit No. 02467T27