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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2353F
Plant ID No.: 059-00082
Applicant: Unilin Flooring NC, LLC
Facility Name: Holden Facility
Location: Mingo County
NAICS Code: 321918
Application Type: Modification
Received Date: July 24, 2013
Engineer Assigned: Steven R. Pursley, PE
Fee Amount: \$1,000
Date Received: July 25, 2013
Complete Date: September 26, 2013
Due Date: December 24, 2013
Applicant Ad Date: July 30, 2013
Newspaper: *Logan Banner*
UTM's: Easting: 401.75 km Northing: 4,179.01 km Zone: 17
Description: Modification to add equipment already installed but not permitted, increase boiler emissions, and change various other emission limits.

DESCRIPTION OF PROCESS

The Holden facility can produce up to 51.5 million square feet of finished flooring products per year. The lumber is trucked to the site and unloaded by fork lifts then stacked in the raw storage lumber yard. The lumber is then hauled to the planer building where the wood is cut down to the proper thickness. Fines from this process go through the cyclone and into either the existing storage silo (B1) or the new silo (B2). The lumber is then stacked in the air dry lumber yard where it remains for at least 60 days. After drying, the wood is hauled by forklift to the pre-dryer building where the wood sits for additional drying. The predrying phase takes at least 30 days before it is placed in the kilns for steam drying. The steam for the twelve kilns is produced by the wood-waste boiler. Kilns 8-12 can hold

up to 60,000 board feet at one time and Kilns 1-7 can hold up to 125,000 board feet. The wood will sit in the kilns from anywhere from 5 to 14 days depending upon the type of wood.

Following kiln drying the lumber is moved to the Flooring Production Area, where the lumber is checked for moisture content and wood quality. All excessive crook and bow is removed from the lumber. The lumber is then milled. In the Milling section of the plant, rough flooring and other undesirable natural and machining defects are removed. The wood passes through rip saws, chop saws, planers and more saws. Then the flooring is end matched with a tongue and groove configuration and graded before finally being packaged. The fines from these processes are conveyed to a baghouse. The fines from the baghouse pass thru a cyclone before going into one of two silos.

Wood chips and large pieces of board are sent to the Hammermill hogger to grind the pieces up into smaller chips that are suitable for burning in the wood boiler. All the chopped wood from the hogger goes to a cyclone and into one of two silos, and the fines to a baghouse.

The packaged, unfinished flooring is then transferred to the Finished Good Warehouse. The remaining unfinished, unpacked flooring continues on for processing in the Finishing Department, where the material is sanded, stained with solvent based, UV based or water based stains; covered with three coats of sealant and one topcoat before being boxed and removed to the Finished Goods Warehouse. The new Doucet end matcher will grind or sand any ends that do not match. Sawdust, sander dust and shavings from this process go to a baghouse.

The new Scraper Cell machine is used to sand and groove the surface of the finished wood to give it a worn or weathered look for certain product lines. Fines from this line will go to a baghouse.

Fines from the baghouses along with pulverized wood scrap from the hogger are pneumatically conveyed thru a cyclone to one of two storage silos. Dust from cyclones EM2, EM3 and EPC1 go to Silo 1 and when B1 is full, excess is put in B2. This material is used as fuel for the 28.7 mmbtu/hr boiler. Dust and fines that are not used in the boiler are sold for fuel to other companies. Ash from the wood boiler is piled in a shed that has a water mister to prevent fire and PM emissions. Once the ash is cool, a front end loader puts the cooled ash in a dumpster for landfill.

SITE INSPECTION

No site inspection of the facility was performed since it is an existing, known, regularly inspected facility. The facility was last inspected on March 15, 2013 by Eric Ray of DAQ's Compliance and Enforcement Section. The facility was determined to be in compliance overall, however, some recordkeeping problems were noted that will be specifically addressed in this permit.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

All VOC and HAP emissions from the finishing line are based on material balances assuming 100% of all VOCs and HAPs are released from the stains/sealers etc. Individual HAP calculations assume that each process (staining, sealing, topcoating etc) uses only the material which gives the worst case for each individual HAP. Totals of each individual HAP may be less than the sum of the individual HAP from each process due to rounding. Total HAP emissions are based on a synthetic limit Unilin has proposed. The permit will require Unilin to track usage of all materials in order to ensure that the following limits are met. Since each process can only use one material at a time, the total HAP limit is NOT the sum of each individual HAP.

Pollutant	Stains		UV Filler		Sealer		Topcoat		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
VOC	33.12	89.66	0.20	0.86	0.19	0.81	0.07	0.31	33.58	91.64
Toluene	--	--	--	--	0.06	0.26	--	--	0.06	0.26
Glycol Ethers	27.08	9.50	--	--	--	--	--	--	27.08	9.50
Ethylene Glycol	10.40	9.50	--	--	--	--	--	--	10.40	9.50
Ethylbenzene	--	--	0.01	0.02	--	--	0.01	0.02	0.01	0.03
MIK	0.29	1.24	--	--	--	--	--	--	0.29	1.24
Toluene			0.01	0.01	0.06	0.26	0.01	0.01	0.06	0.26
Xylenes	0.06	0.23	0.02	0.07	0.01	0.01	0.02	0.06	0.09	0.36
Cumene	--	--	0.01	0.02	0.01	0.01	--	--	0.01	0.02
Total HAPs									38.00	18.72¹

¹Although the sum of each individual HAP is 21.17 tpy, the permit will synthetically limit total HAPs to 18.72 tpy.

NO_x and PM emissions from the boiler are based on the existing permit. VOC, CO and SO₂ emissions are based on February 16, 2005 stack testing performed on another wood fired boiler owned by Unilin at a different facility. HAP emissions are based on AP-42. Only individual HAPs which will be emitted in quantities of at least 0.01 pounds per hour or tons per year are included in the table below. "Total HAPs" include all HAPs, even those not listed in the Table. All annual emissions are based on 8,760 hours per year of operation.

Pollutant	lbs/hr	tons/year
CO	18.30	80.20
NO _x	4.84	21.20
PM/PM ₁₀ /PM _{2.5} ¹	7.10	31.10
SO ₂	1.00	4.38
VOCs	0.70	3.07
CO ₂	--	26,084.67
CH ₄	--	2.58
N ₂ O	--	1.64
CO _{2e}	--	26,647.19
Acetaldehyde	0.03	0.10
Acrolein	0.12	0.50
Benzene	0.12	0.53
Chlorine	0.03	0.10
Formaldehyde	0.13	0.56
HCl	0.55	2.40
Manganese	0.05	0.20
Styrene	0.06	0.24
Toluene	0.03	0.12
Total HAPs	1.11	4.88

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¹Including condensables

VOC emission factors for the Kilns are based on a report prepared by NCASI and published in November 2007. The study addressed white oak and red oak emissions with Red Oak emissions being higher. Since the Holden facility used both red and white oak, Unilin selected the red oak emission factor to be conservative. Hourly emissions are based on the fastest possible drying time of 5 days. However, annual emissions are based on an annual production limit of 51.508 million board feet of lumber dried per year. Formaldehyde and Methanol were not quantified in the study so Unilin used a report prepared by Oregon State University and published on September 20, 2000. This study examined several species of soft woods so no oak emission factors were supplied. Unilin assumed White Fir emission factors to be the most applicable. Note that there are no criteria pollutants (other than VOCs) from the Kilns because they are heated solely with the steam from the boiler. Also note, numbers may not add up due to rounding.

	VOCs		Formaldehyde		Methanol		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Kiln 1	0.02	0.27	0.01	0.01	0.01	0.13	0.01	0.14
Kiln 2	0.02		0.01		0.01			
Kiln 3	0.02		0.01		0.01			
Kiln 4	0.02		0.01		0.01			
Kiln 5	0.02		0.01		0.01			
Kiln 6	0.02		0.01		0.01			
Kiln 7	0.02		0.01		0.01			
Kiln 8	0.01		0.01		0.01			
Kiln 9	0.01		0.01		0.01			
Kiln 10	0.01		0.01		0.01			
Kiln 11	0.01		0.01		0.01			
Kiln 12	0.01		0.01		0.01			
Total	0.11	0.27	0.01	0.01	0.05	0.13	0.06	0.14

PM emissions from the baghouses and cyclones are calculated by multiplying the manufacturer rated exhaust air flow rate by the outlet grain loading emission factor. The outlet grain loading emission factor of 0.01 grains/dscf is conservatively based on testing Unilin did at its Arkansas plant which showed a loading of 0.0013 grains/dscf. All PM is conservatively assumed to be PM_{2.5}.

	PM/PM ₁₀ /PM _{2.5}	
	lb/hr	tpy
MAC1	6.21	27.22
FLDC	4.03	17.65
EM3	1.15	5.02
EM2	1.28	5.61
EB1	0.15	0.64
EB2	0.15	0.64
EPC1	0.86	3.75
Total	13.83	60.53

VOC emissions from the Diesel Storage tank were calculated using EPA TANKS Version 4.0 and determined to be less than 0.01 pound per hour and 0.01 tons per year based on a throughput of 20,500 gallons per year. Similarly, VOC emissions from loading of the tank were calculated using AP-42 Table 5.2-5 and determined to be insignificant (less than 1 pound per year.)

Emissions from the use of cleanup solvents is based on a mass balance assuming all VOCs and HAPs are emitted at the facility. The emissions are based on existing usage limits in the permit.

Solvent	VOCs	
	lb/hr	tpy
Isobutyl Acetate	36.30	18.15
Acetone	33.01	16.50

Solvent	VOCs	
	lb/hr	tpy
Total	69.31	34.65

Emissions from material handling operations were taken from AP-42 Section 13.2.4. The maximum ash transfer rate was assumed to be 7% of maximum wood waste throughput. 7% is based on the upper end of the average bottom ash content from wood-fired stoker boilers per a May 2010 report prepared for the United States Forest Service. Then an 80% control was taken for water sprays. This resulted in PM emissions of less than 0.01 pounds per hour and less than 0.01 tons per year.

Emissions from the natural gas oven are based on AP-42 Chapter 1.4 and the units MDHI. All PM is conservatively assumed to be PM_{2.5}. Greenhouse Gas emissions were not provided by the applicant, so they were performed by the writer using AP42 Table 1.4.2.

Pollutant	lbs/hr	tons/year
CO	0.11	0.45
NO _x	0.12	0.53
PM/PM ₁₀ /PM _{2.5} ¹	0.01	0.04
SO ₂	0.01	0.01
VOCs	0.01	0.03
Total HAPs	0.01	0.01
CO ₂	--	631.00
CH ₄	--	0.02
N ₂ O	--	0.02
CO _{2e}	--	637.62

¹Including condensables

Therefore, facility wide criteria and GHG emissions will be limited to the following:

	PM/PM _{2.5}		SO ₂		NO _x		CO		VOCs ¹		CO _{2e}	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Baghouses & Cyclones	13.83	60.53	--	--	--	--	--	--	--	--	--	--
Boiler BL1	7.10	31.10	1.00	4.38	4.84	21.20	18.30	80.20	0.70	3.07	--	26,648
Finishing Line	--	--	--	--	--	--	--	--	33.58	91.64	--	--
Cleanup Solvents	--	--	--	--	--	--	--	--	69.31	34.65	--	--
Kilns (combined)	--	--	--	--	--	--	--	--	0.11	0.27	--	--
Diesel Storage Tank	--	--	--	--	--	--	--	--	0.01	0.01	--	--
Ash Storage pile	0.01	0.01	--	--	--	--	--	--	--	--	--	--
Natural Gas Oven	0.01	0.04	0.01	0.01	0.12	0.53	0.11	0.45	0.01	0.03	--	637.62
Total	20.95	91.68	1.01	4.39	4.96	21.73	18.41	80.65	103.72	95.00 ¹	--	27,286

¹Although the sum of each individual processes VOC emissions is 130 tpy, the permit will synthetically limit it to 95 tons per year. It will do this by limiting the total VOC content of all materials used by the finishing line and cleanup solvents to 91.62 tons per year (95 tpy - the VOC emissions from all other sources)

Facility wide HAP emissions will be limited to the following:

HAP	lbs/hr	tons/year
Acetaldehyde	0.03	0.10
Acrolein	0.12	0.50
Benzene	0.12	0.53
Chlorine	0.03	0.10
Cumene	0.01	0.02
Ethylbenzene	0.01	0.04
Ethylene Glycol	10.40	9.50
Formaldehyde	0.13	0.56
Glycol Ethers	27.08	9.50
HCl	0.55	2.40
Manganese	0.05	0.20
Methyl Isobutyl Ketone	0.33	1.42
Naphthalene	0.01	0.02
Styrene	0.06	0.24
Toluene	0.09	0.37
Triethylamine	0.09	0.37
Xylene	0.01	0.02
Total HAPs¹	39.12	25.89

¹Although the sum of each individual HAP is 25.89 tpy, the permit will synthetically limit total HAPs to 23.75 tpy. It will do this by limiting total HAPs from the finishing line to 18.72 tpy (23.75 tpy - the total HAP emissions from all other sources).

REGULATORY APPLICABILITY

The facility is subject to the following state and federal rules.

STATE RULES

45CSR2 To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

The allowable particulate matter (PM) emission rate for the wood waste boiler, identified as a Type "c" source, per 45CSR2, Section 4.1.a(3), is contained in Table 45-2A and based upon total design heat input of the boiler in million Btu per hour. The total design heat input of the proposed Appalachian boiler is 28.8 MMBtu/Hr. Using linear interpolation a particulate matter limit of 7.1 pounds per hour is obtained. The permit will limit PM emissions from the boiler to 7.1 pounds per hour. The following is taken directly from the engineering evaluation for permit R13-2353:

"A PM emission factor was also supplied by Hurst Boiler Company (Hurst). The emission factor provided was 0.25 lb PM/MMBtu MDHI. Using this factor, a maximum hourly emission rate of 7.20 is calculated. This is 0.1 lb/hr greater than the 45CSR2 limit. However, in talking to Hurst, it was detailed to the writer that the above emission factor was conservative and that actual stack testing data conducted on similar boilers showed that PM emissions were closer to 0.20 lb PM/MMBtu MDHI."

Additionally, pursuant to 45CSR2, Section 3.1, the boiler is subject to an opacity limit of 10%. Proper maintenance and operation of the boiler and the multiclone should allow operation of the boiler well below 10%.

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45CSR7 To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations

Pursuant to 45CSR7, Section 7.11, the PM generated from the operation of the boiler is exempt from the PM standards under 45CSR7. However, the PM emissions from woodworking operations are subject to the PM standards under 45CSR7, Section 4.1. The PM limits under Section 4.1 of are based on process weight rates, which in the case of the of the wood-working operations at Unilin, are very difficult to quantify. The point sources associated with the wood-working operations are well controlled with the cyclone and the bin vent filter atop the silo. Therefore, compliance with 45CSR7 should be based on the opacity limit pursuant to 45CSR7, Section 3.1. Due to the fact that both point sources are control devices and the weight of wood through the planing and flooring plants will be substantial, it is in the writer's opinion that compliance with the opacity limit will demonstrate compliance with PM limits under Section 4.1.

45CSR10 To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

The allowable sulfur dioxide (SO₂) emissions for the wood waste boiler, identified as a Type "c" source, per 45CSR10, Section 3.3.f, is the product of 3.2 and the total design heat input of the boilers in million Btu per hour. The total design heat input of the Unilin boiler is 28.8 MMBtu/Hr. Using the above equation results in a SO₂ limit of 92.16 pounds per hour. The maximum potential SO₂ emissions from the boiler is estimated to be 0.15 pounds per hour. This emission estimate is 99.84% below the 45CSR10 limit of 91.84 pounds per hour.

45CSR13 Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation

The proposed modification of the Holden facility has a potential to emit in excess of six (6) lbs/hour and ten (10) TPY of a regulated pollutant. Therefore, Unilin is required to obtain a permit under 45CSR13

for the modification and operation of the facility.

As required under §45-13-8.3 ("Notice Level A"), Unilin placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on July 30, 2013 in the Logan Banner and the affidavit of publication for this legal advertisement was submitted on August 8, 2013.

45CSR16 Standards of Performance for New Stationary Sources

Since the facility is subject to 40 CFR 60 Subpart Dc (see below) it is subject to 45CSR16.

45CSR30 Requirements for Operating Permits.

Since the facility is subject to 40 CFR 60 Subpart Dc (see below) it is subject to 45CSR30. However, since the facility's potential to emit is less than 100 tpy of any criteria pollutant, less than 10 tpy for any individual HAP and less than 25 tpy for all combined HAPs, it will be a Title V "deferred source."

FEDERAL REGULATIONS:

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

The boiler is subject to 40 CFR 60, Subpart Dc under the applicability requirements of §60.40c(a). However, wood-waste fired boilers with a MDHI less than 30 MMBtu/Hr are exempt from the emission limits within Subpart Dc. However, the boiler is subject to the reporting and record-keeping requirements under Section §60.48c. For this reason, the facility is subject to Title V and, based on its minor source status, will be eligible to become a deferred source.

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40 CFR 63, Subpart JJJJJJ: National Emissions Standards for Hazardous Air Pollutants, For Industrial, Commercial and Institutional Boilers Area Sources

The Holden facility is an area source. Additionally, the existing boiler (BL1) combusts waste wood, which is one of the applicable boiler subcategories per 40 CFR 63.11200(b). Therefore the boiler is subject to Subpart JJJJJJ.

Because the boiler combust wood waste (biomass) and was constructed before June 4, 2010 (existing) it is not subject to any emission limits. However, it is subject to the following requirements.

- * Conduct a one-time energy assessment (Table 2 of Subpart JJJJJJ)
- * Conduct an initial (40 CFR 63.11214) and every other year (40 CFR 63.11223) tuneup
- * Submit an initial notification and notification of compliance (40 CFR 63.11225(a)(2))
- * Submit biennial compliance certifications (40 CFR 63.11225(b))
- * Maintain required records (40 CFR 63.11225(c))

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the facility and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM₁₀), Particulate Matter

less than 2.5 microns (PM_{2.5}), and Sulfur Dioxide (SO₂). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. Unilin included the HAPs listed in the following table as emitted in substantive amounts (at least 0.01 lb/hr or 0.01 tpy) in their emissions estimate. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Ethylene Glycol	VOC	No	Not Assessed
Glycol Ethers	VOC	No	Not Assessed
Acetaldehyde	VOC	Yes	Category B2 - Probable Human Carcinogen
Acrolein	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Chlorine	VOC	No	Not Assessed
Cumene	VOC	No	Category D - Not Classifiable as to Human Carcinogenicity
Methylene Chloride	VOC	Yes	Category B2 - Probable Human Carcinogen
Ethylbenzene	VOC	No	Category D - Not Classifiable as to Human Carcinogenicity
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen
Hydrochloric Acid		No	Not Assessed
Manganese Compounds	TSP	No	Category D - Not Classifiable as to Human Carcinogenicity
Methyl Isobutyl Ketone	VOC	No	Category D - Not Classifiable as to Human Carcinogenicity
Naphthalene	VOC	Yes	Category C - Possible Human Carcinogen
Styrene	VOC	No	Currently undergoing Assessment
Toluene	VOC	No	Inadequate Data

Triethylamine	VOC	No	Not Assessed
Xylene	VOC	No	Inadequate Data

AIR QUALITY IMPACT ANALYSIS

Since this is a minor modification to an existing minor source, no modeling was performed.

MONITORING OF OPERATIONS

The permit will require Unilin to monitor and record the following:

- * Monthly records of water truck usage
- * Monthly records of wood waste fed to the boiler
- * Records of notifications, reports, the energy assessment, biennial tune ups, the legitimacy of the fuel as secondary non-hazardous material, and any malfunctions of the boiler per 40 CFR 63.11225.
- * Monthly records of the amount of each VOC or HAP containing material (stain, solvent, cleaner, sealer, filler, etc.) used. Calculations will then be performed on a monthly basis to ensure compliance with the permits emission limits.
- * The amount of lumber (in board feet) dried in the kilns on a monthly basis.
- * The amount of diesel delivered to the diesel storage tank.

CHANGES TO PERMIT R13-2353D

The existing permit is in the old boilerplate. Therefore, the new permit is almost completely different than the existing permit.

RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-2353F for the modification of wood flooring manufacturing facility near, Holden, but in Mingo County, be granted to Unilin Flooring NC, LLC.

Steven R. Pursley, PE
Engineer

October 3, 2013

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