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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2274G
Plant ID No.:	009-00001
Applicant:	Koppers, Inc.
Facility Name:	Follansbee Tar Plant
Location:	Follansbee
NAISC Code:	325192
Application Type:	Modification
Received Date:	January 28, 2011
Engineer Assigned:	Edward Andrews
Fee Amount:	\$2000.00
Date Received:	January 28, 2011
NSPS Fee:	May 25, 2011
Completeness Date:	May 25, 2011
Due Date:	August 24, 2011
Newspaper:	<i>The Brook County Review</i>
Applicant Ad Date:	February 11, 2011
UTMs:	Easting: 533.5 km Northing: 4,465.0 km Zone: 17
Description:	This modification is for the replacement of Tube Heater #31 with dual fuel tube heater.

DESCRIPTION OF MODIFICATION

Koppers, Inc. (Koppers) is proposing to construct a new tube heater, to be denoted the #31 Tube Heater, at the Follansbee Tar Plant in Follansbee Brook County, WV. The new heater will replace the existing #31 Tube Heater.

The proposed equipment to be constructed at the facility includes a new tube heater manufactured by Born, Inc. The proposed heater is a vertical type heater with three dual fuel burners. Each burner has a maximum designed heat input rating of 9.67 MMBtu/hr and a normal

heat input rating of 9.0 MMBtu/hr, which makes the total maximum heat input rating of the heater at 29.01 MMBtu/hr.

The combustion system for this unit is design to use natural gas and liquid fuel. This liquid fuel is a mixture of debenzolizer overheads and unwashed solvents generated at the facility. Currently, this liquid fuel is consumed by Boilers #2 and #3 at the facility.

The equipment to be replaced is the existing #31 Tube Heater, rated at 27 MMBtu/hr, capable of firing natural gas only.

SITE INSPECTION

The Follansbee Tar Plant is an existing major Title V source. Therefore, the Compliance and Enforcement Section routinely inspects the facility. Mr. Steven Sobutka, P.E., an engineer assigned to the Northern Panhandle Region Office, last inspected the facility on October 7, 2010.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The applicant used pollutant concentrations developed by the burner manufacturer, Hamworthy Combustion for estimating oxides of nitrogen, carbon monoxide, and VOCs. Sulfur dioxide emissions were based on data from compliance testing of Boiler #3 for firing with the liquid fuel. Particulate matter for liquid fuel and hazardous air pollutants (HAPs) were based on emissions factors from Chapters 1.3 and 1.4 of AP-42.

In calculating the emission rates using the burner manufacturers' concentrations, the applicant used standardized F-factors published in U.S. EPA Method 19 for oil and natural gas, which are $F\text{-factor}_{oil} = 9190 \text{ dscf/MMBtu}$ and $F\text{-factor}_{ng} = 8710 \text{ dscf/MMBtu}$. The hourly emissions for firing solely on liquid fuel and natural gas are presented in the following table for this 29 MMBtu/hr tube heater.

Table #1 – Hourly Emissions for Tube Heater #31				
Pollutant	Natural Gas Firing		Liquid Fuel	
	Emission Factor	Hourly Rate (lb/hr)	Emission Factor	Hourly Rate lb/hr
PM/PM ₁₀ /PM _{2.5} Filterable	5 mg/Nm ³	0.09	10 lb/M gal	2.11
PM Condensable Faction	5.7 lb/MMcf	0.17	1.5 lb/M gal	0.31
SO ₂	0.6 lb/MMcf	0.02	0.2 % of S	6.98
NO _x	106 mg/Nm ³	1.84	652 mg/Nm ³	11.99
CO	30 mg/Nm ³	0.52	100 mg/Nm ³	1.84
VOCs	10 mg/Nm ³	0.17	150 mg/Nm ³	2.76
Total HAPs		0.05		0.03

REGULATORY APPLICABILITY

The facility proposed to be permitted under this application is subject to the following state rules and federal regulations:

WV STATE RULES

45CSR2 To Prevent and Control Particulate Air Pollution From Combustion of Fuel In Indirect Heat Exchangers

This rule establishes emission limitations for smoke and particulate matter, which are discharged from fuel burning units. Koppers proposed to install a new tube heater for the Follansbee Tar Plant. This unit meets the definition of a “Fuel Burning Unit” as defined in 45CSR§2-2.10. Therefore, this unit is subject to the emission standards established in this rule.

Koppers’ proposed new tube heater is classified as “Type b” fuel burning unit. Thus, these units are subject the weight emission standards in 45CSR§2-4.1.b., which sets an allowable PM limit of 0.09 lb. of PM per million (MM) BTUs for the tuber heater. Based on the fuel that generates the most PM, the unit operating on liquid fuel would have a PM rate of 2.44 lb. per hour, which is less than the allowable limit of 2.61 lb per hour. Under 45CSR§2-3, visible emissions from this unit would be limited to a visual emission standard of 10% opacity.

45CSR10 To Prevent and Control Air Pollution From Emissions of Sulfur Oxides

The purpose of this rule is to prevent and control air pollution from the emission of sulfur oxides. As determined in the above section, the proposed unit is classified as a “Type b” fuel burning unit per 45CSR§10-2.8.b. and located in Region I. Therefore, the unit is subject to 45 CSR §10-3.1.e., which set an allowable sulfur dioxide limit of the product of 3.1 and the total design heat input of the unit in terms of million BTU per hour. For this unit, the allowable sulfur dioxide rate would be 90 pounds per hour.

Of the two fuels, only the liquid fuel has significant sulfur content. The manufacturer’s data sheets note the sulfur content of 0.2 % by wt. The most recent Rule 2 and 10 monitoring data indicates that the sulfur content of the liquid is 0.15% by wt. At 0.2%, the sulfur dioxide emissions would be about 7 pounds per hour, which is significantly less than the allowable. Thus, the use of the proposed liquid fuel should not have adverse effect on the unit’s ability to comply with the emission limitation of this rule.

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

The potential to emit from the proposed emission units exceeds the 6 pounds per hour and 10 tons per year for oxides of nitrogen, carbon monoxide and sulfur dioxide, which is the trigger level of a source as defined in 45CSR§13-2.24. Thus, the facility is required to obtain a permit as required in 45CSR-13.5.1.

The facility has met the applicable requirements of this rule by publishing a Class I Legal Advertisement in *The Brook County Review* on February 11, 2011, paid the \$1000.00 application fee, \$1000.00 NSPS fee, and submitted a complete permit application.

Since Koppers has proposed a liquid fuel usage limit to avoid NNSR permitting requirements, the applicant must publish a commercial ad and post a sign in accordance with 45CSR§§13-8.5., 8.5.a., and 8.4.a.

45CSR 14 & 19 Prevention of Significant Deterioration (PSD) and Non-Attainment (NNSR) Permitting

The Follansbee Tar Plant is an existing major source and located in Brook County, which is classified as non-attainment for particulate matter less than 2.5 microns. If this unit has the potential to emit of the triggered levels in the following table then the requirements of one of these rules is triggered.

Pollutant	Trigger Level (tpy)	Max Potential W/O Liquid Fuel Limit (TPY)	Max Potential W/Liquid Fuel Limit (TPY)
PM _{2.5 Direct} (NNSR Only)	10	10.7	8.0 ¹
PM ₁₀ (PSD Only)	15	10.7	8.0 ¹
NO _x (Both)	40	55.5	39.5 ^{1,2}
SO ₂ (Both)	40	30.1	22.7 ¹
CO (PSD Only)	100	8.1	6.4 ²
VOCs (PSD Only)	40	12.8	9.1 ¹

1 - Limited to 1,395,515 gallons per year of liquid only.

2 - Limited to 1,311,840 gallons per year of liquid fuel and 74.41 MMcf of NG.

Since Koppers elected to limit the use of liquid fuel to keep annual below the trigger levels, then no additional analysis is required under 45 CSR 14 and/or 19. The actual emission increase due to this modification will be less than the max potential w/liquid fuel limit. Using the average of 2008 and 2009 years of NO_x from the existing tube heat, the maximum possible increase would less than 30 tpy of NO_x.

FEDERAL REGULATIONS

45CSR30 Requirements for Operating Permits

This rule provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act, and provides for a transition period prior to the implementation of the permitting system. The Follansbee Tar is an existing major source with a Title V Operating Permit. Because of this action, the facility is being required to update their operating permit to reflect the proposed changes.

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

The proposed tube heater is subject to 40 CFR 60, Subpart Dc under the applicability requirements of §60.40c(a). because the maximum rate heat input into this unit is greater than 10 MMBtu/hr.

There are no sulfur dioxide or particulate matter standards for affected units combusting natural gas, non-conventional liquid fuel, or combination of these fuels under this regulation. The proposed liquid fuel is a mixture of debenzolizer overheads and unwashed solvent. Debenzolizer overheads are the overheads from the distillation of refined chemical oil (RCO). Unwashed solvent is the overhead cut from the solvent distillation column in the Naphthalene Distillation Unit (NDU). This type of fuel is not clearly defined in Subpart Dc as fuel subject to an emission standard.

This unit is only subject to a few portions of the reporting and recordkeeping requirements of this regulation, which are §§60.48c(a) and (g). Koppers has noted that it would prefer to comply with the alternative monitoring requirement of §60.48c(g)(2), which is recording the total amount of natural gas and liquid fuel combusted each month.

40 CFR 63 National Emission Standard for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers

This regulation establishes emission limitations for area sources (minor sources of HAPs) that operates boilers. Thus, the emission standard under this regulation only applies to boilers and not process heaters. In addition, waste heat boilers are not subject too.

This proposed tube heater is a clearly a process heater with a waste heat boiler. The primary function of it is to heat a process fluid (the bottoms from Naphthalene Column) as part of the manufacturing process at the facility. Therefore, the proposed tube heater is not subject to this regulation.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Permit R13-2274G limits the facility potential to emit of hazardous air pollutants (HAPs) below 10 tons per year of any single HAP and the combine total of HAP to less than 25 tons per year. This dual-fuel tube heater has the potential of 0.05 tons per year. Currently, the facility burns natural gas and liquid fuel in other emission units at the facility. Thus, no new HAP will be emitted and this increase in HAPs should not affect the facility status as a synthetic minor source of HAPs. Therefore, there is no further discussion of the toxicity of non-criteria regulate pollutants in this evaluation.

AIR QUALITY IMPACTS ANALYSIS

This writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition as a major modification as defined in 45CSR14.

MONITORING OF OPERATIONS

Koppers proposed using the existing alternative monitoring plan for this new tube heater in addition to the other fuel burning units at the facility. The pollutant of concern from this new heater is NO_x. The existing plan does not cover NO_x. According to the application, a significant amount of NO_x is predicted to be generated when the new tube heater is combusting liquid fuel.

This writer believes that the actual F-factor for the liquid fuel is significantly lower than the average F-factor for oil, which was used in the calculations to estimate the emissions. Based on data from past compliance tests of Boiler #3 combusting liquid fuel, this writer believes the F-factor for the liquid fuel is about 20% less than the average for oil. In addition, the burner manufacturer noted a maximum of 0.53% fixed nitrogen in its basics for the high NO_x concentration rate for firing with liquid fuel. Finally, this tube heater can burn a mixture of natural gas and liquid. This writer recommends that monitoring for this unit should include determining the nitrogen content of this liquid fuel on a quarterly basis and the F-factor on an annual basis in addition to the facility's current Rule 2 and 10 monitoring plan.

The proposed NO_x is considerably high for this size of fuel burning unit. An identical size unit-burning diesel would have an annual NO_x potential of less than 19 tons without low NO_x burners. According to the manufacturer's specifications, this unit will be equipped with low NO_x oil burners. In this writer's opinion, the proposed NO_x concentration rate does not reflect this combustion technology. In addition, the proposed NO_x concentration rate was given at 3% oxygen content that is normal or typical for fuel burning units. However, the applicant corrected the proposed emission rates to 0% oxygen as outlined in Method 19. Because the DAQ does not have a rule or policy, requiring measured emission rates to be corrected for oxygen; typically, the measured emission rate is not corrected to standard oxygen content for compliance purposes unless the demonstration is for a specific emission standard that stipulates one. Therefore, there is no requirement to conduct emission testing to demonstrate initial compliance.

However, this writer believes if certain parameters were exceeded then actual compliance, testing should be conducted to verify compliance. These parameters are the nitrogen content of 0.53% and F-factor of 9190 dscf/MMBtu of the liquid fuel and the annual liquid fuel usage that equates to 80% of the annual NO_x emission limit. It is understood that 80% or less of an emission limit is to be considered to be reasonably in compliance without being verified. Established event trigger based off the mentioned indicators, the permittee shall be required to conduct NO_x and CO testing to verify compliance. CO is required because CO is an indirect function of NO_x.

Visible emission checks to demonstrate compliance with the Rule 2 opacity limit are only necessary when the unit is operating on liquid fuel. Thus, the draft permit will be updated to include the visible emission checks for this unit as currently conducted on Boiler #3 on a monthly basis.

CHANGES TO PERMIT R13-2274F

The facility operates several fuel-burning units at the Follansbee Tar Plant, which includes the existing Tube Heater #31. Within Permit R13-2274F, the requirements for these units were not organized or arranged in any reasonable manor in Section 4.0 of the permit. These conditions were omitted from Section 4.0 and placed in a new created Section 5.0, which is dedicated for boilers and process heaters. The following table is a list of conditions moved from Section 4.0 to Section 5.0 and their new condition number.

Table #3 List of Relocated Conditions		
Permit R13-2274G Condition No.	Permit R13-2274F Condition No.	Notes
4.1.7.	5.1.1	Moved
4.1.8.	5.1.3	Moved
4.1.9.	5.1.5.	Moved/Edited (See Comments and Table 4)
4.1.13.	5.1.2.	Moved
4.1.27.	5.1.4.	Moved
4.1.28.	5.1.6.	Moved
4.1.29.	5.1.7.	Moved
4.1.31.	None	Omitted (Piggy back flare is removed from service)
4.2.1.5.	5.2.1	Moved
4.2.2.	4.2.2.	Edited (Removed Emission Point 993)
4.2.5.	5.2.3.	Moved/Edited to include Nitrogen Content

The emission limits of Condition 4.1.9. included the old tube heater, which is being replaced. All of these emission limits were based on the maximum heat input capacity of the units and emission factors from AP-42, Chapter 1.4. Presented in Table #4 is the breakdown of the existing limits by heater and the new limits for this condition.

Condition 4.1.8. was corrected from “0.38 pounds per year” to “0.38 pounds per hour”. The omitted emission point (Stack 993) in Condition 4.2.2. was included in condition 5.2.2. Condition 5.2.2. adopted the language of Condition 4.2.2. but added that that visible emission checks were not required when the Tube Heater #31 was operating on natural gas. Condition 5.1.8. was established for the new tube heater, which includes emission limits and operating restrictions . Condition 5.1.9. was established to define “liquid fuel”, which was adopted from

Condition 4.1.6. of the facility Title V Permit. Other changes included recent changes to the standardize requirements for compliance testing in Condition 3.4.1. and updating the tilted of Rule 13 in Condition 2.3.1. Conditions 2.3.2. and 2.3.3. were add since the source took limitations to avoid major source permitting requirements.

RECOMMENDATION TO DIRECTOR

Therefore, I recommend that the Director grant a modification permit to Koppers, Inc. for the construction of replacement of tube heater #31 at the Follansbee Tar Plant.

Edward S. Andrews, P.E.
Engineer

Date: June 30, 2011
Revised: July 6, 2011

Table #4 Emission for Existing Process Heaters													
Tube Heater No.	Heat Input Capacity	PM		NOx		SO2		CO		VOC		HAP	
		MMBtu	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr
#1	10	0.08	0.33	1.00	4.38	0.01	0.03	0.84	3.68	0.06	0.24		
#2	10	0.08	0.33	1.00	4.38	0.01	0.03	0.84	3.68	0.06	0.24		
#4	10	0.08	0.33	1.00	4.38	0.01	0.03	0.84	3.68	0.06	0.24		
#31 (old)	27	0.21	0.90	2.70	11.83	0.02	0.07	2.27	9.93	0.15	0.65	0.05	0.22
Other Process Heaters													
Pencil Pitch Dryer	6	0.05	0.20	0.60	2.63	0.00	0.02	0.50	2.21	0.03	0.14		
Hot Oil Heater	5	0.04	0.17	0.50	2.19	0.00	0.01	0.42	1.84	0.03	0.12		
Total	68	0.52	2.26	6.80	29.78	0.04	0.18	5.71	25.02	0.37	1.64	0.13	0.57
Existing Limit (4.1.9.)		0.52	2.27	6.80	29.90	0.04	0.18	5.71	25.12	0.37	1.65		
New Total (w/o Tube Heater #31)	41	0.31	1.36	4.10	17.96	0.02	0.11	3.44	15.08	0.23	0.99		
New Tube Heater	29	2.44	8.02	11.99	39.50	6.88	22.67	1.84	6.37	2.76	9.09	0.05	0.24
Net Changes in Permitted Limits		2.23	7.13	9.29	27.67	6.86	22.6	-0.43	-3.57	2.61	8.44	0.00	0.02