



west virginia department of environmental protection

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## ENGINEERING EVALUATION / FACT SHEET

### BACKGROUND INFORMATION

Application No.: R13-1830G  
Plant ID No.: 099-00010  
Applicant: Sunoco Chemicals, Inc.  
Facility Name: Neal Plant  
Location: Wayne County  
SIC Code: 2821  
Application Type: Modification  
Received Date: April 13, 2010  
Engineer Assigned: Joe Kessler  
Fee Amount: \$2,000  
Date Received: April 13, 2010  
Complete Date: May 10, 2010  
Due Date: July 12, 2010  
Applicant Ad Date: April 13, 2010  
Newspaper: *Wayne County News*  
UTM's: 360.6 km Easting • 4,246.1 km Northing • Zone 17  
Description: Making permanent the operation of the 96.72 mmBtu/Hr natural-gas fired boiler permitted under R13-2819T (B603) and permanently removing the 155 mmBtu/Hr coal-fired boiler (B602) from service.

Sunoco owns and operates a polypropylene resin manufacturing facility (Neal Plant) located near Kenova, WV. The process to produce polypropylene resin includes a feed purification system, polymerization processes, and a product storage area. The polymerization area includes a catalyst preparation system, two reaction loops, a material recovery step, and product extrusion process. The Neal Plant also operates a number of boilers to supply steam to various areas of the plant.

### DESCRIPTION OF PROCESS/MODIFICATIONS

From application R13-1830G:

Historically, the Neal Plant has utilized B602, a 155 MMBtu/hr coal-fired boiler, and B600, a 77 MMBtu/hr natural-gas fired boiler, as the facility's two main sources of steam production. At

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least one boiler must operate at all times in order for the plant to remain in operation with another boiler serving as a back-up in case the main boiler that is operating experiences [sic] operational issues. Sunoco Chemicals received approval to install a temporary natural-gas fired boiler (B603) at the Neal Plant [Permit R13-2819T issued on December 7, 2009] while maintenance was performed on B600 and B602. Sunoco Chemicals recently developed plans to replace B602 with a new natural gas boiler, Boiler #4 (B604). However, the new boiler is not expected to be ready for installation and operation until 2011. Since the B602 will be permanently shutdown, Sunoco Chemicals will require a backup for B600 until the new natural gas boiler is installed. As such, Sunoco Chemicals intends to incorporate B603 as a permanent fixture at the Neal Plant until such time as B604 is installed. With this application, Sunoco Chemicals is requesting approval for the incorporation of B603 as a permanent fixture and the permanent shutdown of B602 and its associated equipment.

The boiler that was granted a temporary permit under R13-2819T and that Sunoco is now requesting to be permitted as a permanent fixture at the Neal Plant has the following specifications:

**Table 1: B603 Specifications**

Equipment		Stack or Vent Data	
Manufacturer:	Tempella Power Corporation	Inside Diameter	4 ft
Model No.	Keeler MPO-21 O-Type	Height	19.75 ft
Serial No.	93120-3	Gas Flow Rate	20,620 (standard) cfm
Date Constructed	1993	Gas Exit Temperature	585
Maximum Design Heat Input	96.72 mmBtu/hr	Estimated % moisture	0.027%
Steam Produced at Maximum Design Output	72,000 lb/hr @325 psig	Stack Serves	This Equipment Only
Projected Operating Schedule	24 hr/day; 7 days/week	<b>Fuel Requirements</b>	
Type of Firing Equipment to be Used	Natural Gas Burner	Type	Natural Gas
Proposed Type of Burners and Orientation	Front Wall	Quantity	96,720 ft <sup>3</sup> /hr
Type of Draft	Forced	Annual Usage	700 mmft <sup>3</sup>
		Sulfur	< 20 gr/100 f <sup>3</sup>
		BTU Content	1,000 Btu/ft <sup>3</sup>
		Source	No Specified
Gas Burner Mode of Control	Automatic Full Modulation		
Gas Burner Manufacturer	Tampella/Faber		

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## SITE INSPECTION

Due to the time sensitive nature of this permitting action (expiration of the temporary permit on July 7, 2010) and the previous permitting of the natural gas-fired boiler in question, a site inspection was not performed.

## REVIEW OF APPLICANT'S EMISSIONS ESTIMATE

An emissions estimate was provided by the applicant for B603 under Attachment N of the permit application. Emission factors were based on data supplied by the vendor and on AP-42, Section 1.4-2. Annual emissions were based on a natural gas combustion limit of 700.06 mmscf/yr (equates to operating at MDHI for 7,240 hours/yr).

**Table 2: Criteria Pollutant Emissions from B603**

Pollutant	Emission Factor	Source	Maximum Emission Rates	
			Hourly (lb/hr)	Annual (ton/yr)
CO	200 ppm <sup>(1)</sup>	Vendor	19.30	69.83
NO <sub>x</sub>	0.10 lb/mmBtu <sup>(2)</sup>	Vendor	9.67	35.00
PM <sub>2.5</sub>	7.6 lb/mmscf	AP-42, Table 1.4-2	0.74	2.66
PM <sub>10</sub>	7.6 lb/mmscf	AP-42, Table 1.4-2	0.74	2.66
PM	7.6 lb/mmscf	AP-42, Table 1.4-2	0.74	2.66
SO <sub>2</sub>	0.6 lb/mmscf	AP-42, Table 1.4-2	0.06	0.21
VOC	5.5 lb/mmscf	AP-42, Table 1.4-2	0.53	1.93

(1) Sunoco converted CO factor to 199.5 lb/mmscf using expected stack characteristics. The AP-42, Table 1.4-1 CO emission factor given is 84 lb/mmscf. The Sunoco emission factor is considered conservative.

(2) Based on use of FGR.

Additionally, the permanent removal of the coal-fired boiler (B602) and the associated coal storage/handling operations resulted in a reduction of potential emissions from the Neal Plant. The annual reductions are shown in Table 3.

**Table 3: Reduction in Annual PTE (TPY) from Removal of B602**

Pollutant	B602	Coal Storage Piles	Coal Transfer Points	Coal Handling	Total PTE Reduction
CO	162.42	n/a	n/a	n/a	162.42
NO <sub>x</sub>	203.02	n/a	n/a	n/a	203.02

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PM <sub>2.5</sub>	4.56	0.26	0.02	0.01	4.85
PM <sub>10</sub>	4.56	0.26	0.01	0.01	4.84
PM	32.32	0.26	0.01	0.01	32.60
SO <sub>2</sub>	1,221.37	n/a	n/a	n/a	1,221.37
VOC	1.89	n/a	n/a	n/a	1.89
HAPs	75.56	n/a	n/a	n/a	75.56

The net change in PTE considering the addition of B603 and the removal of B602 is given in the following table.

**Table 4: Net Change in Neal Plant Annual PTE (TPY)**

Pollutant	B603	B602	Net PTE Change
CO	69.83	(162.42)	(92.59)
NO <sub>x</sub>	35.00	(203.02)	(168.02)
PM <sub>2.5</sub>	2.66	(4.85)	(2.19)
PM <sub>10</sub>	2.66	(4.84)	(2.18)
PM	2.66	(32.60)	(29.94)
SO <sub>2</sub>	0.21	(1,221.37)	(1,221.16)
VOC	1.93	(1.89)	0.04
HAPs	0.66	(75.56)	(74.90)

## REGULATORY APPLICABILITY

Boiler 603 is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR10, 45CSR13, and 40CFR60, Subpart Dc. Each applicable rule, and those rules with questionable applicability, will be discussed in detail below.

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

Boiler B603 has been determined to meet the definition of a “fuel burning unit” under 45CSR2 and is, therefore, subject to the applicable requirements therein. Each substantive 45CSR2 requirement is discussed below.

### *45CSR2 Opacity Standard - Section 3.1*

Pursuant to 45CSR2, Section 3.1, B603 is subject to an opacity limit of 10%. Proper maintenance and operation of the boiler (and the required use of only natural gas) should keep the opacity of the units well below 10% during normal operations.

### *45CSR2 Weight Emission Standard - Section 4.1.b*

The allowable filterable particulate matter (PM) emission rate for Boiler B603, identified as a Type “b” fuel burning unit, per 45CSR2, Section 4.1.a, is the product of 0.09 and the total design heat input of the boiler in million Btu per hour. The maximum design heat input (short-term) of B603 is 96.72 mmBtu/Hr. Using the above equation, the 45CSR2 facility-wide PM emission limit of the boilers will be 8.70 lb/hr. The maximum potential hourly PM emissions from B603 is estimated to be 0.74 lb/hr (including condensables). This emission rate is 8.5% of the 45CSR2 limit.

### *45CSR2 Control of Fugitive Particulate Matter- Section 5*

Section 5 of 45CSR2 requires a fugitive particulate matter control system for any source of fugitive particulate matter associated with the fuel burning units. Using natural gas as the fuel of B603 will result in no potential for fugitive emissions.

### *45CSR2 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8*

Section 8 of Rule 2 requires testing for initial compliance with the limits therein, monitoring for continued compliance, and keeping records of that compliance. The TMR&R requirements are clarified under 45CSR2A and discussed below.

### *45CSR2A Applicability - Section 3*

Pursuant to §45-2A-3, as an individual applicable “fuel burning unit” under 45CSR2 with an MDHI less than 100 mmBtu/hr, Boiler B603 is not subject to the Testing and MRR Requirements under 45CSR2A.

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

45CSR10 has requirements limiting SO<sub>2</sub> emissions from “fuel burning units,” limiting in-stack SO<sub>2</sub> concentrations of “manufacturing processes,” and limiting H<sub>2</sub>S concentrations in process gas streams. Boiler B603 is defined as a “fuel burning unit” and subject to the applicable requirements discussed below.

### *45CSR10 Fuel Burning Units - Section 3*

The allowable SO<sub>2</sub> emission rate for B603, identified as a Type “b” fuel burning unit in a Priority III Region, per 45CSR10, Section 3.3(f), is the product of 3.2 and the total design heat input of the boiler in million Btu per hour. The maximum design heat input (short-term) of B603 is 96.72

mmBtu/hr. Using the above equation, the 45CSR10 SO<sub>2</sub> emission limit of the boiler would be 309.50 lb/hr. The maximum potential hourly SO<sub>2</sub> emissions from the boiler is estimated to be 0.06 lb/hr. This emission rate is less than one percent of the 45CSR10 limit.

### ***45CSR10 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8***

Section 8 of Rule 10 requires a test for initial compliance with the limits therein, monitoring for continued compliance, and record-keeping of that compliance. The TMR&R requirements are clarified under 45CSR10A and discussed below.

### ***45CSR10A Applicability - Section 3***

Pursuant to §45-10A-3.1(b), as B603 will only “combust natural gas, wood or distillate oil, alone or in combination,” it is not subject to the Testing and MRR Requirements under 45CSR10A.

### **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**

As noted above in the description of the modification, this action is to permanently permit the previously temporary boiler B603 and to remove the coal-fired boiler B602 and associated storage/handling equipment. The net PTE change of these changes is a reduction in all pollutants except for VOCs; for which there is a small increase. Normally, this scenario would qualify for a Class 2 Administrative Update (A/U) to the existing permit under the DAQ’s Potential-to-Potential netting policy. However, as the requirements of the existing temporary permit (R13-2819T) need to be integrated into another permit, the scope of the permitting action was deemed to be beyond that which would qualify for a Class 2 A/U. Therefore, a full modification was required for this modification.

### **45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration - NON APPLICABILITY**

Sunoco’s Neal Plant is located in Wayne County - which is currently designated as in “non-attainment” with 1997 PM<sub>2.5</sub> standards - and is defined as a “major stationary source” under 45CSR14 for at least one attainment pollutant. Under the 2008 PM<sub>2.5</sub> NSR Implementation Rule, SO<sub>2</sub> is defined as “pre-cursor” to PM<sub>2.5</sub>. The potential major source applicability of increases of these pollutants is discussed below. With respect to the increases of the remaining criteria pollutants, the potential-to-emit (PTE) of the previously temporary, now permanent, Boiler B603 are below the “significant” (as defined under §45-14-2.74a) thresholds that would define the modification at an existing major stationary source as “major” under the WV Prevention of Significant Deterioration (PSD) program administered under 45CSR14. This is shown in tabular form under Table 5 below:

**Table 5: PSD Applicability Attainment Pollutants**

Pollutant	Annual PTE	45CSR14 Significant Rates <sup>(1)</sup>	PSD Applicable?
CO	69.83	100 TPY	No
NO <sub>x</sub>	35.00	40 TPY	No
PM <sub>10</sub>	2.66	15 TPY	No
PM	2.66	25 TPY	No
VOC	1.93	40 TPY	No

(1) As defined under §45-14-2.74a.

It is important to note that B603 would, at an annual capacity factor of 100%, exceed 40 TPY of NO<sub>x</sub>. This classifies Boiler B603 as a synthetic minor.

#### **45CSR19: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution Which Cause or Contribute to Non-Attainment - NON APPLICABILITY**

Sunoco's Neal Plant is located in Wayne County - which is currently designated as in "non-attainment" with 1997 PM<sub>2.5</sub> standards - and is potentially defined as a "major stationary source" under 45CSR14 for PM<sub>2.5</sub> and SO<sub>2</sub>. Under the 2008 PM<sub>2.5</sub> NSR Implementation Rule, SO<sub>2</sub> is defined as "pre-cursor" to PM<sub>2.5</sub>. Included in the rule was a requirement that states with a SIP-approved program for administering the major NSR program would use 40 CFR Part 51, Appendix S until such time as they received SIP-approval of an updated rule incorporating PM<sub>2.5</sub> requirements. Pursuant the requirements under Appendix S, a "major modification" is defined as a modification at an existing major stationary source that results (in the case of a new unit, as Boiler B603 is being evaluated) in a PTE increase in excess of the values defined as "significant" under Appendix S. With respect to PM<sub>2.5</sub> and SO<sub>2</sub>, the PTE of Boiler B603 was below the thresholds that would define the modification as major under Appendix S. This is shown in tabular form under Table 6 below:

**Table 6: Appendix S Applicability Non-Attainment Pollutants**

Pollutant	Annual PTE	45CSR14 Significant Rates <sup>(1)</sup>	Major NSR Applicable?
PM <sub>2.5</sub>	2.66	10 TPY	No
SO <sub>2</sub>	0.21	40 TPY	No

(1) As defined under 40 CFR 51, Appendix A: II(A)(10).

#### **45CSR30: Requirements for Operating Permits**

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The Ashland Neal Plant, defined under Title V as a "major source," was issued a Title V permit on January 3, 2006. Changes authorized by the proposed permit must also be incorporated into the facility's Title V operating

permit. Commencement of the operations authorized by this permit (which is the operation of the plant) shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

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

Subpart Dc generally applies to boilers with a maximum design heat input (MDHI) between 10 and 100 mmBtu/hr and meet the definition of a “steam generating unit.” Boiler B603 (96.72 mmBtu/hr) is subject to Subpart Dc under the applicability requirements of §60.40c(a). Subpart Dc does not have any emission standards for boilers that combust natural gas. However, Sunoco is required to meet the reporting and record-keeping requirements under §60.48c for B603.

#### **40 CFR 63, Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters - NON APPLICABILITY**

On January 13, 2003, EPA published in the Federal Register 40 CFR 63, Subpart DDDDD, which contained requirements pertaining to Boilers and Process Heaters. Subpart DDDDD was subsequently litigated and the US Court of Appeals for the District of Columbia vacated the rule and remanded it back to EPA. On April 29, 2010, EPA proposed a new Subpart DDDDD that addressed the court’s concerns. EPA is required to take final action on Subpart DDDDD by December 16, 2010.

In preparation of Subpart DDDDD becoming final - which is expected to only substantively affect major sources of Hazardous Air Pollutants (HAPs) - Sunoco has decided to permanently take out of service the coal-fired boiler (as discussed above). This action will, according to Sunoco, make them a minor source of HAPs. They are expected to apply for a federally enforceable facility-wide HAP limit codifying this facility designation in a permit application submitted in Summer 2010.

### **TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS**

This section provides an analysis for those regulated pollutants that may be emitted from Boiler B603 and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO<sub>x</sub>), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM<sub>10</sub>), Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>). 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 and programs designed to limit their emissions and public exposure. These programs include federal source-specific HAP limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR

63 (MACT). Potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of Hazardous Air Pollutants (HAPs) given under Section 112(b)(1) of the Clean Air Act. Using emission factors from AP-42, Tables 1.4-2, 1.4-3, and 1.4-4, Sunoco included a HAP emissions estimate for B603 under Attachment N of the permit application. The only HAPs estimated to be emitted in excess of 20 pounds/year were Hexane and Formaldehyde at 1,260 and 53 pounds/year, respectively. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**Table 7: Potential HAPs - Carcinogenic Risk<sup>(1)</sup>**

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	B1: Probable Human Carcinogen
Hexane	VOC	No	Not Assessed

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. The regulatory applicability of any potential NESHAP or MACT to Boiler B603 was discussed above. For a complete discussion of the known health effects of each compound refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

## AIR QUALITY IMPACT ANALYSIS

The proposed modification does not meet the definition of a “major modification” pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required.

## MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

Language was added to Requirement 4.4.4. requiring Sunoco to monitor and record the monthly and 12-month rolling total of natural gas usage of Boiler B603 to show compliance with the combustion limit under 4.1.9.1.

Requirement 4.1.9.3. of the permit requires Sunoco to meet all applicable requirements of 40 CFR 60, Subpart Dc. These include standard construction and start-up date notifications.

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## TESTING OF OPERATIONS

Under Requirement 4.3.7., Sunoco shall be required to conduct performance tests on Boiler B603 to determine compliance with the CO and NO<sub>x</sub> emission limits. These tests are required within one year of the date of issuance of the permit. As noted above, Boiler B603 is expected to be replaced before that time by another natural gas-fired boiler. However, as a enforceable back-stop against permanently permitting B603 without performance testing on the pollutants of concern, this testing language was added.

## CHANGES TO PERMIT R13-1830F

The substantive changes made to R13-1830F are:

- Under Table 1.0: Emission Units, Boiler B603 was added and the coal-fired Boiler B602 (and associated coal-handling equipment) was removed.
- Under Table 4.1.1., the Boiler B602 SO<sub>2</sub> emission limit was removed and the Boiler B603 emission limits were added.
- Requirement 4.1.8. was changed to language that requires Sunoco to “permanently remove from service” Boiler B602.
- Requirement 4.1.9 was replaced with operating requirements for Boiler B603.
- Performance testing language for Boiler B603 was added under Requirement 4.3.7.
- Boiler B603 was added to the existing boiler monitoring, compliance demonstration, reporting, and record-keeping requirements under 4.4.4.

## RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-1830G to Sunoco for the above discussed modification to the Neal Plant located near Kenova, Wayne County, WV.

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Joe Kessler, PE  
Engineer

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Date

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