

TO Air Quality Permit File: OP-26-00534
Fayette Thermal, LLC / Fayette Thermal Steam Plant

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DATE April 25, 2013

RE Review of Application for State Only Operating Permit
Fayette Thermal, LLC / Fayette Thermal Steam Plant
Luzerne Township, Fayette County
APS #557522; AUTH #598316; PF# 563618

Background:

Two identical, coal-fired, circulating fluidized bed (CFB) boilers, each with a maximum heat input of 20.7 MMBtu/hr were installed at the Fayette Thermal, LLC facility located in Luzerne Township, Fayette County under PA-26-00534A, issued on July 23, 2001. Particulate emissions from the CFBs are controlled by pulsejet cleaned fabric filters. SO₂ emissions are controlled by limestone injected into the fluid bed. NO_x emissions are controlled by low combustion temperatures in the fluidized bed. Flue gas recirculation, mentioned later, was added during 2004 to further reduce NO_x by reducing the O₂ concentration in the bed. Natural gas is used to start the CFB boilers. The cogeneration steam plant fires coal refuse along with run of mine coal and is under contract to supply steam for heating and cooling to the adjacent Fayette State Correctional Institute (SCI). The steam plant also has three 9.9 MMBtu/hr, natural gas-fired boilers which generally operate as backups to the CFB units. The plant also contains three silos with fabric filter bin vents to store sand and limestone for the CFB boilers, as well as the generated ash. Finally, the plant has material handling equipment to load the silos, a coal storage pile, and feed coal and coal refuse to the CFBs. Under special conditions, coal from the coal pile may be loaded onto trucks and shipped from Fayette Thermal to a sister facility known as the Greensburg Thermal Steam Plant.

The two CFB boilers are Spinheat Ltd., Model ICFB-15000 coal/waste coal-fired units. Each unit burns a maximum of 1.2 tons coal per hour with a maximum heat input of 20.7 MMBtu per hour and is capable of producing 15,000 pounds of steam at 450 psig. Startup is accomplished using natural gas, which may also be used to continuously fire the units. The coal specification calls for 8,500 to 12,500 Btu per pound of coal refuse with a maximum sulfur content of 1.2% and a maximum ash content of 20%. The three backup, 9.9 MMBtu per hour,

Fayette Thermal, LLC
 Fayette Thermal Steam Plant
 Operating Permit #SOOP-26-00534

natural gas-fired boilers were manufactured by Miura and are Model EX-300-SG.

In the initial Plan Approval PA-26-00534A, operation of each of the three natural gas-fired boilers was limited to 1,350 hours per year. However, the company found that during periods of low demand for steam, it was preferable to use the natural gas boilers rather than the CFB units. On May 25, 2003, Fayette Thermal submitted an application for modification of the Plan Approval to remove the limit on hours of operation of the three natural gas-fired boilers. This modification to Plan Approval PA-26-00534A was authorized by the Department on August 12, 2003.

The initial stack test of a coal fired unit, CFB Unit #2, to determine compliance with the emission limitations set forth in PA-26-00534A, was conducted on March 3, 2004. Emission limitations set forth in PA-26-00534A were based on information provided by the applicant as part of the plan approval application. The test was conducted under low load conditions (~75% of capacity) and the tested emission rates for NO_x were markedly higher than the emission limit. Emission rates for SO₂, and CO were also higher than the allowable limits. Subsequent fuel testing revealed that the nitrogen content of the fuel was at least double (1.4% vs. 0.7%) the expected amount.

On April 26, 2004 Fayette Thermal, LLC submitted a request to modify the emission limitations for the CFB's. However, since the March 3, 2004 test was done at low load, the applicant was asked to repeat the test at full load. The modification was placed on hold until the second test was completed and the results analyzed.

During the summer of 2004, FGR with an estimated flue gas recirculation rate of 7-10% by volume was installed on each CFB unit to reduce NO_x emissions. Stack testing with Boiler #1 at full load, was conducted on September 28, 2004. Results of this testing and the initial and revised emission limits for the CFB boilers are shown in Table 1.

Table 1
CFB Boiler #1, Fayette Thermal Steam Plant
September 28, 2004 Stack Testing
Luzerne Township, Fayette County

Pollutant	Stack Test Results	Initial Emission Limit	Revised Emission Limit
	Lb/MMBtu	Lb/MMBtu	Lb/MMBtu
CO	0.181	0.10	0.22
NO _x	0.594	0.20	0.70
SO ₂	0.357	0.25	0.40

The facility was previously considered a minor emission source. Without additional changes, the revised emission limits would also have increased annual emissions of NO_x from the plant to greater than 100 tons per year, making the Fayette Thermal Steam Plant a major source. Therefore, a permit limitation on the annual number of hours of CFB operation was also

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

included in the plan approval modification. This restriction limits the sum of hours of operation of each of the CFB boilers to 12,600 hours during each consecutive 12-month period. The modification in emission limits and the operational limitation changed the status of Fayette Thermal to a synthetic minor source.

The most recent stack test on the CFB boilers was performed on September 28, 2004. This test on CFB Boiler #1 only, demonstrated that emissions of particulate, NO_x, CO, and SO₂ are in compliance with the limits specified in Plan Approval PA-26-00534A, which are also the limits in the recommended Operating Permit. The Fayette Thermal Steam Plant was inspected on April 15, 2011 and it was confirmed that the equipment whose construction was authorized had been installed, and was operating in conformance with the Plan Approval. Plan Approval PA-26-00534A was inactivated on August 9, 2005.

The application for a State Only Operating Permit was submitted to the Department on June 30, 2005. It was reviewed and determined to be administratively complete. A letter stating this determination was sent to the company on August 15, 2005. On November 28, 2011, the application was amended by a letter requesting that the CFB boilers be authorized to also burn biomass as a fuel. Biomass would be an addition to the current coal/coal refuse fuel. The change is identical to a modification of Plan Approval (PA-65-00966A) that has previously been completed on an identical CFB boiler, operated by a sister company known as Greensburg Thermal, LLC, and located at the SCI-Greensburg in Hempfield Township, Westmoreland County. This application for an operating permit is the subject of the review document.

Fayette Thermal, LLC
 Fayette Thermal Steam Plant
 Operating Permit #SOOP-26-00534

Emissions and Control:

The potential to emit criteria pollutants from the sources at the Fayette Thermal Steam Plant is shown below:

Table 2
Fayette Thermal, LLC - Fayette Thermal Steam Plant (SOOP-26-00534)
Facility Criteria Pollutant Emissions

Source		PM ₁₀		SO ₂		CO		NO _x		VOC	
		Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr	Lb/Hr	Ton/Yr
032	Miura Natural Gas Boilers (#1, #2, and #3) (Each 9.90 MMBtu/hr Maximum Heat Input.)	0.23 ²	1.00 ²	0.02 ²	0.08 ²	2.52 ²	11.04 ²	1.50 ²	6.57 ²	0.16 ²	0.72 ²
033	Spinheat CFB Boiler #2 (20.70 MMBtu/hr Maximum Heat Input.)	0.30 ³	0.95 ³	8.28 ¹	26.08 ¹	4.55 ¹	14.35 ¹	14.49 ¹	45.64 ¹	0.04 ²	0.13 ²
034	Spinheat CFB Boiler #1 (20.70 MMBtu/hr Maximum Heat Input.)	0.30 ³	0.95 ³	8.28 ¹	26.08 ¹	4.55 ¹	14.35 ¹	14.49 ¹	45.64 ¹	0.04 ²	0.13 ²
101	Three Storage Silos (Flyash, Sand, & Limestone)	0.00 ²	0.00 ²								
102	Material Handling Equipment	0.00 ²	0.00 ²								
103	Combined Fugitive Emissions	0.00 ²	0.00 ²								
Total		0.83	2.89	16.58	52.24	11.63	39.73	30.48	97.86	0.24	0.97

¹ Based on emission limit.

² Based on EPA AP-42.

³ Based on manufacturer estimate.

The CFB boilers at the Fayette Thermal Steam Plant are also a source of a total of 5.4 pounds per year of lead emissions, another criteria air pollutant. Emission of criteria pollutants is below 50 tons per year of VOC, and also below 100 tons per year of all other criteria pollutants. Therefore, the facility is considered a minor source of criteria pollutant emissions. However, since this was accomplished by limiting the annual total hours of operation of the CFB boilers (Source IDs 033 and 034), the Fayette Thermal Steam Plant is considered a synthetic minor facility for criteria emissions.

Fayette Thermal, LLC
 Fayette Thermal Steam Plant
 Operating Permit #SOOP-26-00534

Hazardous Air Pollutant (HAP) emissions are shown below in Table 3:

Table 3
Fayette Thermal, LLC - Fayette Thermal Steam Plant (SOOP-26-00534)
Facility Hazardous Air Pollutant (HAP) Emissions

Pollutant	Source Id 032		Source Id 033		Source Id 034		Facility	
	Miura NG Boilers #1, #2, and #3		Spinheat CFB Boiler #2		Spinheat CFB Boiler #1		HAP emissions	
	lb/hour	ton/year	lb/hour	ton/year	lb/hour	ton/year	lb/hour	ton/year
HCl			0.33	1.04	0.33	1.04	0.66	2.09
HF			0.05	0.16	0.05	0.16	0.10	0.33
Cyanide			0.0026	0.0082	0.0026	0.0082	0.01	0.02
Benzene	6.2E-05	2.7E-04	0.0013	0.0042	0.0013	0.0042	0.00	0.01
Selenium			0.0013	0.0042	0.0013	0.0042	0.00	0.01
Mercury	7.7E-06	3.4E-05	8.6E-05	2.7E-04	8.6E-05	2.7E-04	1.8E-4	5.8E-4
Other HAPs	5.6E-02	0.25	0.0061	0.019	0.0061	0.0193	0.07	0.28
Sum of all HAPs	5.6E-02	0.25	0.39	1.24	0.39	1.24	0.84	2.73

All values based on EPA AP-42.

Emissions of mercury from the facility are a maximum of 1.15 pounds per year. It is expected that the fabric filters provide additional control of mercury emissions, but this control could not be quantified and not used in the determination. The Fayette Thermal Steam Plant is considered an area source, since emissions of any single HAP is less than 10 tons per year and the sum of emissions of all HAPs combined, is less than 25 tons per year.

Fayette Thermal, LLC
 Fayette Thermal Steam Plant
 Operating Permit #SOOP-26-00534

Finally, the potential of the facility to emit greenhouse gases was also evaluated. Results of this evaluation are shown in Table 4:

Table 4
Fayette Thermal, LLC - Fayette Thermal Steam Plant (SOOP-26-00534)
Facility Potential to Emit Greenhouse Gases

Source	Greenhouse Gas							
	CO ₂		CH ₄		N ₂ O		Total CO ₂ e	
	Lb/Hr	Ton/Yr	Lb/ Hr	Ton/ Yr	Lb/ Hr	Ton/ Yr	Lb/Hr	Ton/Yr
032- Miura Natural Gas Boilers (#1, #2, and #3)	3,564	15,610	0.068	0.30	0.019	0.083	3,571	15,642
033- Spinheat CFB Boiler #2	5,703	17,964	0.062	0.20	3.6	11	6,827	21,505
034- Spinheat CFB Boiler #1	5,703	17,964	0.062	0.20	3.6	11	6,827	21,505
101-Three Storage Silos (Flyash, Sand, & Limestone)								
102- Material Handling Equipment								
103- Combined Fugitive Emissions								
Total	12,594	51,538	0.19	0.69	7.3	23	17,226	58,653

All values based on emission factors from EPA AP-42.
 1 ton CO₂ = 1 ton CO₂e, 1 ton CH₄ = 21 ton CO₂e, 1 ton N₂O = 210 tons CO₂e

The Fayette Thermal Steam Plant does not have the potential to emit 100,000 tons per year of CO₂e emissions. Therefore, the facility is considered a minor source of greenhouse gas emissions.

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

Operation of the sum of the operating hours of the two CFB boilers is limited to 12,600 hours per year. Sand, limestone and ash are stored in silos equipped with bin vent collectors. The bin vent units are single compartment, positive pressure, cartridge collectors.

Particulate emissions from each CFB are controlled by a 10,200 acfm Aeropulse Environmental, Inc. fabric collector, Model PR-144-10-H-Y. The collector operates under negative pressure and consists of a single compartment containing 144 Ryton filter bags. Bag dimensions are 10 feet long with a 6 inch diameter for a maximum air-to-cloth ratio of 4.5 to 1. The Ryton bags are rated to withstand temperatures of up to 450 degrees F, with normal operating temperatures expected to vary between 300 and 375 degrees F. Temperature of the fabric collector is continuously monitored and a temperature alarm is in place. The bags are cleaned by reverse air jets initiated by a timer with pressure drop override. The applicant estimated the control efficiency of the unit to be 99.8% and the particulate emission rate to be less than 0.007 grains/dscf.

Sulfur dioxide emissions from the CFBs are controlled by injecting limestone into the fluidized bed. Limestone consumption by each CFB boiler is expected to be 125 to 200 pounds per hour based on a Ca/S ratio of 3 to 1. Sulfur dioxide emissions are limited to less than 0.4 lbs/MMBtu heat input. NO_x emissions from the CFB are controlled by staged combustion, over fire air, and flue gas recirculation. NO_x emissions are limited to less than 0.7 lbs/MMBtu heat input. CO emissions from the CFB are limited to less than 0.22 lbs/MMBtu heat input.

An annual emissions report is be required by March 1 each year, for the previous calendar year. Emission estimates are based on fuel supplier certifications, fuel use, and stack test results. Stack testing is required to determine compliance with emission limitations for particulate matter, SO₂, NO_x, and CO to determine the emission rate.

Regulatory Analysis:

I. NSPS

a. **40 CFR Part 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.** - Subpart Dc is applicable to facilities with steam generating units constructed after June 9, 1989 with a minimum heat input capacity of 10 MMBTU/hour, and a maximum heat input capacity of 100 MMBTU/hour. The two CFB boilers (Source IDs 032 and 033) at the Fayette Thermal Steam Plant were constructed after 1989 and have a maximum heat input capacity of 20.7 MMBtu/hr, which is greater than 10 MMBTU/hour and less than 100 MMBTU/hour. Accordingly, the two CFB boilers (Source IDs 032 and 033) at the Fayette Thermal Steam Plant are subject to the requirements of 40 CFR Part 60, Subpart Dc. The Miura natural gas-fired boilers have a maximum heat input capacity of 9.9 MMBtu per hour and are too small to have requirements under this subpart.

Under 40 CFR Section 60.42c(a), the CFB boilers are required to emit no SO₂ greater than 10% of the uncontrolled emission rate, or meet a SO₂ emission rate limit of 1.2 lb/MMBtu heat. This requirement for SO₂ emissions is met by the maximum of 0.40 lb/MMBtu heat input limit established under BAT. Since neither the CFB and natural gas-fired backup boiler have an individual heat input capacity greater than 30 MMBtu per hour, Subpart Dc has no particulate standards under § 60.43c.

Per 40 CFR Section 60.42c(h), compliance with SO₂ emission limits for each coal-fired unit with heat input capacities between 10 and 30 MMBtu/hr may be determined based on a certification from the fuel supplier as described under 60.48c(f)(3) and continuous monitoring of SO₂ emissions is not required.

Per 40 CFR Section 60.48c(f)(3), the fuel supplier certification shall include the following information:

- (i) Name of supplier.
- (ii) Location of coal when sample was collected for analysis.
- (iii) Results of coal analysis including sulfur, moisture, ash and heat contents.
- (iv) Methods used to determine properties of the coal.

Per 40 CFR Section 60.48c, the Owner/Operator shall meet the following reporting and record keeping requirements:

- (d) Quarterly reports of fuel supplier certification.

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

- (f) As noted above.
- (g) Maintain daily records of the amount of fuel combusted.

II. MACT

a. **40 CFR Part 63 Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers.** – Combustion boilers which produce steam or hot water and are located at area sources of HAP emissions have requirements under this subpart, with certain exceptions. § 63.11195(a) states that “boilers that are specifically listed as, or included in the definition of , an affected source in another standard(s) under this part” (Part 63) “are not subject to this subpart (Subpart JJJJJJ) and to any requirements in this subpart.” (Subpart JJJJJJ) The two boilers, CFB Boilers No. 1 and 2, at Fayette Thermal, are not subject to the requirements of any other subpart under Part 63. Therefore, they are subject to the applicable requirements of this rule. Under § 63.11195(e) gas fired boilers are not subject to the requirements of Subpart JJJJJJ. The Miura boilers (Source Id 32) are exempt from this subpart since they are natural gas-fired. Therefore, only the CFB Boilers (Source IDs 033 and 034) have applicable requirements under this subpart.

It is planned that the CFB Boiler will meet the requirements to be considered in the biomass subcategory under § 63.11237. This section defines the subcategories of boilers for Subpart JJJJJJ. Definitions of the coal and biomass subcategory are tied to each other. The definition of a boiler in the coal subcategory under this section is “any boiler that burns any solid fossil fuel and no more than 15 percent biomass on an annual heat input basis.” The definition of a boiler in the biomass subcategory is “any boiler that burns any biomass and is not in the coal subcategory.” According to Mary Johnson of EPA OAQPS, boilers that have 12-months of prior operation in the biomass subcategory at the time of the compliance demonstration, which is required before, or on September 21, 2014, will be considered to be in the biomass subcategory, initially. It is planned that this will be true of the CFB boilers. Otherwise, the CFB boilers would be considered to be in the coal subcategory. The draft Operating Permit includes requirements for operation, monitoring, and demonstrating compliance for the CFB boilers under both scenarios, with the units considered in the coal subcategory as the alternate scenario.

III. Air Programs

a. **Best Available Retrofit Technology (BART)**

The Regional Haze regulation in 40 CFR § 51.308(e) required state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

impairment at a Class I area. The BART requirements apply to units that collectively have the potential to emit 250 tons per year of one or more of a visibility-impairing pollutant and were in existence on August 7, 1977, but were not in operation before August 7, 1962. Since the emission processes at the Fayette Thermal Steam Plant were constructed after 1977 and emissions of any visibility impairing pollutant are less than 250 tons per year, BART is not an applicable requirement for the plant.

b. NO_x Allowance Program/CAIR/PA CAIR/CSAPR

The units subject to these programs are any stationary, fossil-fuel-fired boiler or stationary, fossil-fuel-fired combustion turbine serving since the later of November 15, 1990, or the startup of the unit's combustion chamber, with a generator with a nameplate capacity of more than 25MWe producing electricity for sale (§ 96.204(a)(1)), or any unit that is not covered under § 96.204(a)(1) and has a maximum design heat input greater than 250 MMBtu/hr.(§ 96.(a)(2))

The CFB boilers at Fayette Thermal have a maximum heat input capacity of 20.7 MMBtu/hr and do not produce electricity. Therefore no units at Fayette Thermal have applicable requirements under these programs.

c. 40 CFR Parts 72, 73, 75, 77 – Acid Rain Program – The definition of sources for which the Acid Rain Program is applicable is covered in 40 CFR § 72.6. The definitions of applicability are similar to those for CAIR.

Again, the CFB boilers at Fayette Thermal have a maximum heat input capacity of 20.7 MMBtu/hr and do not produce electricity. Therefore no units at Fayette Thermal have applicable requirements under this program.

d. 40 CFR Part 98, Mandatory Greenhouse Gas Reporting - This part was promulgated on October 30, 2009. Per 40 CFR Section § 98.2(a), the Greenhouse Gas (GHG) reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to the owners and operators of any facility that is located in the United States and that meets the requirements of either paragraph (a)(1), (a)(2), or (a)(3) of this section. It requires sources with actual emissions of 25,000 CO₂e or greater, to report GHG emissions under the rule. Maximum emissions of CO₂e from Fayette Thermal are 58,653 tons per year. Therefore, this rule is applicable to the Fayette Thermal Steam Plant.

However, public comments to the Greenhouse Gas Mandatory Reporting Rule (GHG MRR) questioned the requirements of this rule to meet current definitions of “applicable requirement” at 40 CFR 70.2 and 71.2. The commentators requested that USEPA confirm their interpretation of the regulations. The EPA provided the following response: “As currently written, the definition of “applicable requirement” in 40 CFR 70.2 and 71.2 does not include a monitoring rule such as today’s action, which is promulgated under CAA sections 114(a)(1) and 208.” The preamble of the final version of the GHG MRR, located at 74 Fed Reg 209, pp.

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

56287-56288, states that the GHG MRR is not considered an “applicable requirement” under the Title V Operating Permit program. Therefore, this Subpart, while an obligation for the Fayette Thermal Steam Plant, is not considered an applicable requirement for this Operating Permit.

The Greenhouse Gas Tailoring Rule was issued in May 2010. This rule establishes a process for conducting Prevention of Significant Deterioration (PSD) reviews, including Best Available Control Technology (BACT) determinations for control of greenhouse gases (GHG) when a new source or a modification to an existing source results in emissions of GHGs in excess of certain thresholds. Since May, 2010, there have not been any modifications to the Fayette Thermal facility that triggered a GHG PSD review.

IV. Pennsylvania Air Pollution Control Regulations

The Pennsylvania Department of Environmental Protection (PADEP) is authorized to enforce rules for the control of air pollution. The following State Air Pollution Control regulations were evaluated for their applicability to proposed operating permit:

a. **25 Pa Code § 123.1 (Prohibition of Certain Fugitive Emissions)** - Operation of this facility will have applicable emission generating activities from the use of plant roads which are limited under this regulation and daily inspections ensure compliance.

b. **25 Pa Code § 123.2 (Fugitive Particulate Matter)** - The operation of this proposed facility will have applicable emission generating activities which are limited under this regulation and daily inspections insure compliance.

c. **25 Pa Code § 123.11 (Combustion Units)** – Combustion units are defined in §121.1 as stationary equipment used to burn fuel primarily for the purpose of producing power or heat by indirect heat transfer. This definition includes external combustion sources, but excludes internal combustion sources since they operate by direct heat transfer. The three Miura natural gas-fired boilers (Source ID 031) and the two CFB boilers (Source IDs 032 and 033) are combustion units.

The particulate emission limitation of 0.4 pounds per MMBtu described in Part (a)(1) of this section applies to all five boilers (Source IDs 031, 032, and 033) at Fayette Thermal. Compliance with this limit is based on filterable particulate only. The Miura boilers are fired by natural gas and are unlikely to exceed this emission limit. The particulate emission limit for these units is not listed in the draft permit. This limit is applicable for the CFB boilers and is listed as a condition for these units.

d. **25 Pa Code § 123.13 (Processes)** – Stack emissions from processes which are not combustion units at the Fayette Thermal are subject to this regulation, which limits emission of particulate. In the regulation, certain emission processes have limitations based on rate of material throughput. None of the specific emission processes which have emission limitations based on the material throughput exist at Fayette Thermal. Therefore, the emission limitations in §123.13(c) apply to any non-combustion sources with stack emissions at Fayette Thermal. The

only non-combustion processes which have stack emissions are the three storage silos (Source Id 101). For §123.13(c)(1)(i) to apply, the process cannot have a gas flow rate greater than 150,000 standard dry cubic feet per minute (SDCFM). Therefore, the particulate emission limitation for each of these three silos is 0.04 grains/SDCF.

e. **25 Pa Code § 123.21 (General)** – This regulation prohibits the concentration of oxides of sulfur in flue gas to 500 ppm, expressed as SO₂, and is applicable to processes which are not subject to any other provision in Article § 123.21-123.25. Since all five boilers at Fayette Thermal are combustion sources, they are limited by § 123.22 (Combustion Units). Therefore, this limit is not applicable to any source at Fayette Thermal and it should not have been included in Plan Approval PA-26-00534A. The § 123.21 restriction in the Plan Approval for the CFB units is not included in the draft Operating Permit.

f. **25 Pa Code § 123.22 (Combustion Units)** – The Fayette Thermal Steam Plant is not located in an air basin. This section limits SO₂ emissions from the five boilers at the station to 4.0 pounds SO₂ per MMBtu. The Miura boilers combust commercial natural gas, and are physically unable to exceed this limit. For the CFB boilers, the BAT requirement to limit emissions of SO₂ from 0.4 pounds SO₂ per MMBtu makes this requirement redundant. However, it must still be included in the draft Operating Permit. It is contained in the streamlined condition which states the limit determined under BAT.

g. **25 Pa Code § 123.25 (Monitoring Requirements)** – Under Paragraph (2), this section requires fossil fuel steam generators of greater than 250 million Btus per hour of heat input which have installed sulfur dioxide pollutant control equipment to operate continuous SO₂ monitoring systems that meet the minimum data availability requirements in Chapter 139 Subchapter C. While the CFB boilers at Fayette Thermal are fossil fuel steam generators, their heat input capacity is less than 250 million Btus per hour. Therefore, Fayette Thermal has no requirements under this section.

h. **25 Pa Code § 123.31 (Odor Emissions)** – The facility is subject to this regulation, and daily inspections demonstrate compliance.

i. **25 Pa Code § 123.41 (Limitations — Visible Emissions)** – The facility is subject to this regulation which limits visible emissions to 3 minutes at 20% opacity any hour and never exceed 60%. Daily inspections demonstrate compliance with this condition.

j. **25 Pa Code § 123.42 (Exceptions — Visible Emissions)** - These exceptions are applicable to the limitations in paragraph 123.41 and the opacity limitation established under §123.41, and is applicable to sources at Fayette Thermal.

k. **25 Pa Code § 123.46 (Exceptions — Monitoring Requirements)** – This section is applicable to steam generators which have a maximum heat input of 250 MMBtu per hour or greater. No boiler at Fayette Thermal has a maximum heat input capacity of 250 MMBtu per hour or greater. Therefore, this condition is not applicable to Fayette Thermal.

l. **25 Pa Code Chapter § 127.441 (Operating permit terms and conditions)** – Operators of the Fayette Thermal Steam Plant will fulfill the following requirements:

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

A. The permittee shall maintain comprehensive, accurate records which, at a minimum, shall include:

- (i) The number of hours per month that each piece of equipment operated.
- (ii) The amount of fuel used per month in each piece of equipment.

B. The owner/operator shall keep records of all product delivery.

C. The permittee shall conduct daily inspections of the facility and keep records of these observations and measurement.

D. The owner/operator shall keep records of maintenance of production and pollution control equipment.

E. These records shall be kept on site for a period of five years and be made available to the Department upon request.

m. **25 Pa Code Chapter § 129.14 (Open Burning Operations)** – The Fayette Thermal Steam Plant is not located in an air basin. This section allows open burning outside of air basins at the facility, provided certain requirements are met. Therefore this condition has applicable requirements for Fayette Thermal.

n. **25 Pa Code Chapter § 139.103 (Opacity Monitoring Requirements)** – This section contains requirements for data collected from Continuous Opacity Monitors (COMs). Fayette Thermal has no requirement to operate COMS and therefore this condition is not applicable to the facility.

V. Plan Approval

Emission limitations and other conditions from Plan Approval PA-26-00534A were carried forward into this operating permit with some deletions, changes and additions. The applicability of specific standards that have become effective since the issuance of this Plan Approval has been evaluated and the applicable requirements included in the proposed operating permit. 40 CFR Part 63 Subpart JJJJJ – National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers has been promulgated since the issuance of the Plan Approval and applicable portions have been included in the draft Operating Permit.

Requirements for actions to meet the conditions of the Plan Approval that have been completed and have no ongoing requirements have not been included in the proposed Operating Permit. These include conditions related to construction, and initial startup. Also, a limitation related to the maximum allowable SO₂ concentration in emitted flue gas (§ 123.21) in the Plan Approval is not included in the draft Operating Permit, since it is not applicable to any source which emits SO₂ at Fayette Thermal.

Fayette Thermal, LLC
Fayette Thermal Steam Plant
Operating Permit #SOOP-26-00534

Per Title 25 PA Code Section 127.1, all new sources are required to control the emission of air pollutants to the maximum extent consistent with the best available technology (BAT) as determined by the Department. At the time of acceptance of the initial Plan Approval application, this source met the definition of a new source as defined by Title 25 PA Code Section 121.1 and BAT for the CFB boilers was determined during the processing of Plan Approval PA-26-00534A. Emission control is satisfied by limestone injection, fabric filtration, and FGR.

Fayette Thermal, LLC
 Fayette Thermal Steam Plant
 Operating Permit #SOOP-26-00534

Conclusions and Recommendations:

Ken Woodruff, consultant for Fayette Thermal, LLC, and Bill Jester, Air Quality Inspector of DEP for the facility, have reviewed a copy of the draft permit.

Fayette Thermal, LLC has proposed, in this application, to operate a steam generation plant in Luzerne Township, Fayette County. I recommend the issuance of an Operating Permit for this application, subject to the conditions of the draft Operating Permit.

Permit Authorized by this Authorization					
Quantity	Facility Name	PF ID:	563618		
1	Fayette Thermal, LLC (OP-26-00534)	APS ID:	557522	Auth. ID:	598316
Short Descr.	Operating Permit for a steam generating plant				
Permits Inactivated by this Authorization					
Permit #					
PA-26-00534A	Fayette Thermal, LLC	APS ID:	549774	Auth. ID	588030

Determine Emissions from Fayette Thermal

I. Criteria Emissions

Emission Factors

	PM10	SO2	CO	NOx	VOC
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32 MIURA NATURAL GAS BOILERS (3)
(OP Application contained TPY.)

0.007687222 lb/MMBtu	0.000615 lb/MMBtu	0.084866934 lb/MMBtu	0.050505 lb/MMBtu	0.005535 lb/MMBtu
7.7 lb/MMCF	0.61 lb/MMCF	85 lb/MMCF	51 lb/MMCF	5.5 lb/MMCF

33 SPINHEAT CFB BOILER #2
(OP Application contained EF)

0.4 lb/MMBtu	0.4 lb/MMBtu	0.22 lb/MMBtu	0.7 lb/MMBtu	0.001923 lb/MMBtu
Pa. Code	BAT	BAT	BAT	AP-42

0.05 lb/Ton Coal (from AP-42)

(Operation Limit for 2 boilers.)
(Operation Limit for 1 boilers.)

12600 hr/yr
6300 hr/yr

For Coal:

26 MMBtu/Ton Coal (from AP-42)

101 THREE STORAGE SILOS (FLYASH, SAND, & LIMESTONE)

Assume two emission points for each material.

Drop Equation

$$E = k * 0.0032 * ((U/2.2)^{1.3}) / ((M/2)^{1.4})$$

Coal consumed by 1 boiler. assume 10000 BTU/lbm
2070 lb coal/hr
1.035 ton/hr

E = emission factor (lb ton processed)
k = particle size multiplier (dimensionless)

U = mean wind speed, meters per second (m/s) (miles per hour [mph])

M = material moisture content (%)

Pittsburgh, PA

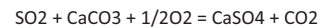
8 mph

Coal consumed by 2 boilers. 2.07 ton/hr

Flyash assume 20.00% in coal
0.41 ton/hr

Limestone assume 10 SR
assume 1.20% sulfur in coal

	Silt	k	M %	U mph	E lb/ton	Emissions PM10 lb/hr	
Coal		2.2%	0.35	4.5	8	1.9495E-05	4.03547E-05
Sand		2.6%	0.35	7.4	8	1.1483E-05	8.92066E-06
Flyash		80%	0.35	27	8	5.7701E-05	2.3888E-05
Limestone		1.0%	0.35	0.2	8	0.00069272	0.000538153



S mw 32
CaCO3 mw 100.08

Sulfur throughput 0.02484 ton/hr

Limestone throughput 0.776871 ton/hr

Sand assume = to limestone 0.776871 ton/hr

Table 2

Source ID	Process	Capacity	PM10		SO2		CO		NOx		VOC	
		MMBtu/hr	Lb/ Hr	Ton/ Yr	Lb/Hr	Ton/Yr	Lb/ Hr	Ton/Yr	Lb/ Hr	Ton/Hr	Lb/ Hr	Ton/ Yr
032	MIURA NATURAL GAS BOILERS (3)	9.90	0.23	1.00	0.02	0.08	2.52	11.04	1.50	6.57	0.16	0.72
033	SPINHEAT CFB BOILER #2	20.70	0.30	0.95	8.28	26.08	4.55	14.35	14.49	45.64	0.04	0.13
034	SPINHEAT CFB BOILER #1	20.70	0.30	0.95	8.28	26.08	4.55	14.35	14.49	45.64	0.04	0.13
101	THREE STORAGE SILOS (FLYASH, SAND, & LIMESTONE)		0.00	0.00								
102	COAL HANDLING EQUIPMENT		0.00	0.00								
103	COMBINED FUGITIVE EMISSIONS		0.00	0.00								
Total			0.83	2.89	16.58	52.24	11.63	39.73	30.48	97.86	0.24	0.97

Lead Emissions

Lead 4.20E-04 lb/ton
 Annual Lead emissions per CFB unit 2.74E+00 lb/year

	Throughput	Emission Factor		
		CO2	CH4	N2O
MIURA NATURAL GAS BOILERS (3)	0.0099 MMCF NG/hr (1 boiler)	120000	2.3	0.64
SPINHEAT CFB BOILER #2	1.035 tons coal/hr	5510	0.06	3.5
SPINHEAT CFB BOILER #1	1.035 tons coal/hr	5510	0.06	3.5

CO2e 21 CH4 CO2e
 CO2e 310 N2O CO2e

Table 4
Fayette Thermal, LLC - Fayette Thermal Steam Plant (SOOP-26-00534)
Facility Potential to Emit Greenhouse Gases

Source	Greenhouse Gas							
	CO ₂		CH ₄		N ₂ O		Total CO ₂ e	
	Lb/Hr	Ton/Yr	Lb/ Hr	Ton/ Yr	Lb/ Hr	Ton/ Yr	Lb/Hr	Ton/Yr
032- Miura Natural Gas Boilers (#1, #2, and #3) ¹	3,564	15,610	0.068	0.30	0.019	0.083	3,571	15,642
033- Spinheat CFB Boiler #2	5,703	17,964	0.062	0.20	3.6	11.41	6,827	21,505
034- Spinheat CFB Boiler #1	5,703	17,964	0.062	0.20	3.6	11.41	6,827	21,505
101-Three Storage Silos (Flyash, Sand, & Limestone)								
102- Coal Handling Equipment								
103- Combined Fugitive Emissions								
Total	14,970	51,538	0.19	0.69	7.3	22.91	17,226	58,653

53,210 metric tonnes

Determine emission of HAPs from Fayette Thermal

I. Coal fired boilers

A. Organic HAP Emissions

(from AP-42, Table 1.1-14, "Emission Factors for Various Organic Compounds from Controlled Coal Combustion")

	lb/ton
Acetaldehyde	5.70E-04
Acetophenone	1.50E-05
Acrolein	2.90E-04
Benzene	1.30E-03
Benzyl chloride	7.00E-04
Bis(2-ethylhexyl)phthalate (DEHP)	7.30E-05
Bromoform	3.90E-05
Carbon disulfide	1.30E-04
2-Chloroacetophenone	7.00E-06
Chlorobenzene	2.20E-05
Chloroform	5.90E-05
Cumene	5.30E-06
Cyanide	2.50E-03
2,4-Dinitrotoluene	2.80E-07
Dimethyl sulfate	4.80E-05
Ethyl benzene	9.40E-05
Ethyl benzene	4.20E-05
Ethylene dichloride	4.00E-05
Ethylene dibromide	1.20E-06
Formaldehyde	2.40E-04
Hexane	6.70E-05
Isophorone	5.80E-04
Methyl bromide	1.60E-04
Methyl chloride	5.30E-04
Methyl ethyl ketone	3.90E-04
Methyl hydrazine	1.70E-04
Methyl methacrylate	2.00E-05

Total	8.09E-03

B. Trace Metal HAP Emissions

(from AP-42, Table 1.1-18, "Emission Factors for Trace Metals from Controlled Coal Combustion")

	lb/ton
Antimony	1.80E-05
Arsenic	4.10E-04
Beryllium	2.10E-05
Cadmium	5.10E-05
Chromium	2.60E-04
Cobalt	1.00E-04
Manganese	4.90E-04
Mercury	8.30E-05
Nickel	2.80E-04
Selenium	1.30E-03

Total 3.01E-03

C. Acid Gas HAP Emissions

The PA documentation made no mention of HCl & HF emissions from the biomass boilers.

Assume that removal of HCl by the systems is one decade greater than removal of SO2.

Assume that removal of HCl by the systems is equal to removal of SO2.

1. Uncontrolled acid gas emissions from coal combustion.

(from AP-42, Table 1.1-15, "Emission Factors for HCl and HF from Coal Combustion")

	lb/ton	
HCl		1.2
HF		0.15

Total		1.35

2. SO2 control by the CFB boiler systems

Minimum SO2 generated	1.2 lb SO2/MMBtu
Maximum SO2 emitted	0.4 lb SO2/MMBtu
 SO2 control	 66.67%

3. Determine control of HCl and HF

- a. %HCl control = %SO2 + 0.1*%SO2= 73.33%
- b. %HF control = %SO2= 66.67%

4. Determine controlled Emission Factor for HCl and HF

- a. HCl controlled Emission Factor 0.32 lb/ton
- b. HF controlled Emission Factor 0.050 lb/ton

5. All HAP emissions from single CFB boiler

	lb/ton coal	lb/hour	ton/year
HCl	0.32	0.33	1.04328
HF	0.050	0.052	0.1630125
Cyanide	2.50E-03	0.0026	0.00815063

Benzene	1.30E-03	0.0013	0.00423833
Selenium	1.30E-03	0.0013	0.00423833
Benzyl chloride	7.00E-04	0.0007245	0.00228218
Isophorone	5.80E-04	0.0006003	0.00189095
Acetaldehyde	5.70E-04	0.00058995	0.00185834
Methyl chloride	5.30E-04	0.00054855	0.00172793
Manganese	4.90E-04	0.00050715	0.00159752
Arsenic	4.10E-04	0.00042435	0.0013367
Methyl ethyl ketone	3.90E-04	0.00040365	0.0012715
Acrolein	2.90E-04	0.00030015	0.00094547
Nickel	2.80E-04	0.0002898	0.00091287
Chromium	2.60E-04	0.0002691	0.00084767
Formaldehyde	2.40E-04	0.0002484	0.00078246
Methyl hydrazine	1.70E-04	0.00017595	0.00055424
Methyl bromide	1.60E-04	0.0001656	0.00052164
Carbon disulfide	1.30E-04	0.00013455	0.00042383
Cobalt	1.00E-04	0.0001035	0.00032603
Ethyl benzene	9.40E-05	0.00009729	0.00030646
Mercury	8.30E-05	0.000085905	0.0002706
Bis(2-ethylhexyl)phthalate (DEHP)	7.30E-05	0.000075555	0.000238
Hexane	6.70E-05	0.000069345	0.00021844
Chloroform	5.90E-05	0.000061065	0.00019235
Cadmium	5.10E-05	0.000052785	0.00016627
Dimethyl sulfate	4.80E-05	0.00004968	0.00015649
Ethyl benzene	4.20E-05	0.00004347	0.00013693
Ethylene dichloride	4.00E-05	0.0000414	0.00013041
Bromoform	3.90E-05	0.000040365	0.00012715
Chlorobenzene	2.20E-05	0.00002277	7.1726E-05
Beryllium	2.10E-05	0.000021735	6.8465E-05
Methyl methacrylate	2.00E-05	0.0000207	6.5205E-05
Antimony	1.80E-05	0.00001863	5.8685E-05
Acetophenone	1.50E-05	0.000015525	4.8904E-05
2-Chloroacetophenone	7.00E-06	0.000007245	2.2822E-05
Cumene	5.30E-06	5.4855E-06	1.7279E-05
Ethylene dibromide	1.20E-06	0.000001242	3.9123E-06
2,4-Dinitrotoluene	2.80E-07	2.898E-07	9.1287E-07
Total	0.38	0.39	1.24

HAPs from single CFB boiler

	lb/ton coal	lb/hour	ton/year
HCl	0.32	0.33	1.04
HF	0.050	0.052	0.16
Cyanide	2.50E-03	0.0026	0.0082
Benzene	1.30E-03	0.0013	0.0042
Selenium	1.30E-03	0.0013	0.0042
Other HAPs	6.01E-03	0.0062	0.020
Total	0.38	0.39	1.24

II. Mira NG-fired boilers

A. Organic HAP Emissions

(from AP-42, Table 1.4-3, "Emission Factors for Speciated Organic Compounds from NG Combustion")

	lb/MMCF NG
91-57-6 2-Methylnaphthalene	2.40E-05
71-43-2 Benzene	2.10E-03
25321-22-6 Dichlorobenzene	1.20E-03
206-44-0 Fluoranthene	3.00E-06
86-73-7 Fluorine	2.80E-06
50-00-0 Formaldehyde	7.50E-02
110-54-3 Hexane	1.80E+00
91-20-3 Naphthalene	6.10E-04
85-01-8 Phenanthrene	1.70E-05
129-00-0 Pyrene	5.00E-06
108-88-3 Toluene	3.40E-03

B. Trace Metal HAP Emissions

(from AP-42, Table 1.4-4, "Emission Factors for Speciated Organic Compounds from NG Combustion")

7440-38-2 Arsenic	2.00E-04
7440-39-3 Barium	4.40E-03
7440-43-9 Cadmium	1.10E-03
7440-47-3 Chromium	1.40E-03
7440-48-4 Cobalt	8.40E-05
7439-96-5 Manganese	3.80E-04
7439-97-6 Mercury	2.60E-04
7440-02-0 Nickel	2.10E-03
7440-62-2 Vanadium	2.30E-03

C. All HAP emissions from single Mira NG boiler

	lb/MMCF NG	lb/hour	ton/year
2-Methylnaphthalene	2.40E-05	2.38E-07	1.04E-06
Benzene	2.10E-03	2.08E-05	9.11E-05
Dichlorobenzene	1.20E-03	1.19E-05	5.20E-05
Fluoranthene	3.00E-06	2.97E-08	1.30E-07
Fluorine	2.80E-06	2.77E-08	1.21E-07
Formaldehyde	7.50E-02	7.43E-04	3.25E-03
Hexane	1.80E+00	1.78E-02	7.81E-02
Naphthalene	6.10E-04	6.04E-06	2.65E-05
Phenanthrene	1.70E-05	1.68E-07	7.37E-07
Pyrene	5.00E-06	4.95E-08	2.17E-07
Toluene	3.40E-03	3.37E-05	1.47E-04

Arsenic	2.00E-04	1.98E-06	8.67E-06
Barium	4.40E-03	4.36E-05	1.91E-04
Cadmium	1.10E-03	1.09E-05	4.77E-05
Chromium	1.40E-03	1.39E-05	6.07E-05
Cobalt	8.40E-05	8.32E-07	3.64E-06
Manganese	3.80E-04	3.76E-06	1.65E-05
Mercury	2.60E-04	2.57E-06	1.13E-05
Nickel	2.10E-03	2.08E-05	9.11E-05
Vanadium	2.30E-03	2.28E-05	9.97E-05
Total	1.89E+00	0.018756	0.08215

Table 2

Source Id	032		033		034		Facility	
	Miura NG Boilers #1, #2, and #3		Spinheat CFB Boiler #2		Spinheat CFB Boiler #1		HAP emissions	
Pollutant	lb/hour	ton/year	lb/hour	ton/year	lb/hour	ton/year	lb/hour	ton/year
HCl			0.33	1.04	0.33	1.04	0.66	2.09
HF			0.05	0.16	0.05	0.16	0.10	0.33
Cyanide			0.0026	0.0082	0.0026	0.0082	0.01	0.02
Benzene	6.2E-05	2.7E-04	0.0013	0.0042	0.0013	0.0042	0.00	0.01
Selenium			0.0013	0.0042	0.0013	0.0042	0.00	0.01
Mercury	7.7E-06	3.4E-05	8.6E-05	2.7E-04	8.6E-05	2.7E-04	1.8E-04	5.8E-04
Other HAPs	5.6E-02	0.25	0.0061	0.019	0.0061	0.0193	0.07	0.28
Sum of all HAPs	5.6E-02	0.25	0.39	1.24	0.39	1.24	0.84	2.73

1.15