Appendix F-2e

VISTAS Consultation with PA Bureau of Air Quality

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VISTAS Consultation with PA Bureau of Air Quality

Genon NE Mgmt Co/Keystone Sta (42005-3866111)

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Correspondence Record

Date	From	To	Description
June 22, 2020	VISTAS	PA Bureau of Air Quality	Request for Regional Haze Reasonable Progress Analyses for Pennsylvania Sources Impacting VISTAS Class I Areas
January 11, 2021	AECOM/ PA Bureau of Air Quality	VISTAS	Four Factor Analysis Regional Haze Rule Second Decadal Review - Keystone Generating Station Units 1 and 2, Rev. 1
February 11, 2021	AECOM/ PA Bureau of Air Quality	VISTAS	Four Factor Analysis Regional Haze Rule Second Decadal Review - Keystone Generating Station Units 1 and 2, Rev. 2

Visibility Improvement State and Tribal Association of the Southeast

June 22, 2020

Virendra Trivedi, Acting Director
Pennsylvania Bureau of Air Quality
PO Box 8468
Harrisburg, Pennsylvania 17105-8468

RE: Request for Regional Haze Reasonable Progress Analyses for Pennsylvania Sources Impacting VISTAS Class I Areas

Dear Mr. Trivedi:

The Regional Haze Regulation 40 CFR § 51.308(d) requires each state to "address regional haze in each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State which may be affected by emissions from within the State." 40 CFR § 51.308(f) requires states to submit a regional haze implementation plan revision by July 31, 2021. As part of the plan revision, states must establish a reasonable progress goal that provides for reasonable progress towards achieving natural visibility conditions for each mandatory Class I Federal area (Class I area) within their state. 40 CFR § 51.308(d)(1) requires that reasonable progress goals "must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period."

In establishing reasonable progress goals, states must consider the four factors specified in § 169A of the Federal Clean Air Act and in 40 CFR § 51.308(f)(2)(i). The four factors are: 1) the cost of compliance, 2) the time necessary for compliance, 3) the energy and non-air quality environmental impacts of compliance, and 4) the remaining useful life of any potentially affected sources. Consideration of these four factors is frequently referenced as the "four-factor analysis."

To assist its member states, the Visibility Improvement State and Tribal Association of the Southeast[1] (VISTAS) and its contractors conducted technical analyses to help states identify

[1] The VISTAS states are Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

sources that significantly impact visibility impairment for Class I areas within and outside of the VISTAS region. VISTAS initially used an Area of Influence (AoI) analysis to identify the areas and sources most likely contributing to poor visibility in Class I areas. This AoI analysis involved running the HYSPLIT Trajectory Model to determine the origin of the air parcels affecting visibility within each Class I area. This information was then spatially combined with emissions data to determine the pollutants, sectors, and individual sources that are most likely contributing to the visibility impairment at each Class I area. This information indicated that the pollutants and sector with the largest impact on visibility impairment were sulfur dioxide (SO_2) and nitrogen oxides (NO_x) from point sources. Next, VISTAS states used the results of the AoI analysis to identify sources to "tag" for PM (Particulate Matter) Source Apportionment Technology (PSAT) modeling. PSAT modeling uses "reactive tracers" to apportion particulate matter among different sources, source categories, and regions. PSAT was implemented with the Comprehensive Air Quality Model with extensions photochemical model (CAMx Model) to determine visibility impairment due to individual sources. PSAT results showed that in 2028 the majority of visibility impairment at VISTAS Class I areas will continue to be from point source SO_2 and NO_x emissions. Using the PSAT data, VISTAS states identified, for reasonable progress analysis, sources shown to have a sulfate or nitrate impact on one or more Class I areas greater than or equal to 1.00 percent of the total sulfate plus nitrate point source visibility impairment on the 20 percent most impaired days for each Class I area. This analysis has identified the following sources in Pennsylvania that meet this criterion:

- NRG Wholesale Gen/Seward Gen Sta (42063-3005111)
- Homer City Gen LP/Center TWP (42063-3005211)
- Genon NE Mgmt Co/Keystone Sta (42005-3866111)

Information regarding projected 2028 SO_2 and NO_x emissions and visibility impacts on VISTAS Class I areas is shown in the tables attached to this letter (Attachment 1).

As required in 40 CFR § 51.308(d)(1)(i)(A), VISTAS, on behalf of Georgia, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia, requests that Pennsylvania conduct, or require that the sources in question initiate, and share when completed, the results of a reasonable progress analysis for each noted source with VISTAS. This will be helpful to the VISTAS states as they begin the formal Federal Land Manager consultation process for their individual draft Regional Haze Plans in early 2021. So that the VISTAS states can include the results of your state's reasonable progress analyses in developing the long-term strategies for Class I areas in their states, we request that you submit this information to VISTAS no later than October 30, 2020. If any reasonable progress analyses cannot be completed by this date, please provide, no later than this date, notice of an attainable date for completion of the analysis. If you determine that a four-factor analysis is not warranted for one or more of the identified sources, please provide the rationale for this determination by the requested date.

In developing projected 2028 emissions for these sources, VISTAS utilized ERTAC_16.0 emissions projections and sought additional input from Pennsylvania in February 2020. Please review these projections to verify that they are reasonable. Should you be aware of significantly different emission projections for 2028 for any of the sources or pollutants, please provide revised estimates within thirty (30) days of the date of this letter. The applicable VISTAS states will review any revised emission estimates, determine if reasonable progress analyses are not needed to meet their regional haze obligations, and notify you accordingly.

Updated 2028 emission projections, if necessary, the results of your state's reasonable progress analyses for the requested sources, and any necessary ongoing communications should be sent via email to vistas@metro4-sesarm.org.

Should you have any questions concerning this request, please contact me through September 30, 2020, at 404-361-4000 or hornback@metro4-sesarm.org.

Sincerely,

John E. Hornback

John E. Hornback
Executive Director
Metro 4/SESARM/VISTAS

Attachment

Copies: Karen Hays, Georgia Air Protection Branch
Mike Abraczinskas, North Carolina Division of Air Quality
Rhonda Thompson, South Carolina Bureau of Air Quality
Michelle Walker Owenby, Tennessee Division of Air Pollution Control
Mike Dowd, Virginia Air and Renewable Energy Division
Laura Crowder, West Virginia Division of Air Quality
Marc Cone, Mid-Atlantic Regional Air Management Association
Paul Miller, Northeast States for Coordinated Air Use Management

Attachment 1: Projected 2028 SO_2 and NO_x Emissions and VISTAS Class I Area Impacts

Table 1. NRG Wholesale Gen/Seward Gen Sta (42063-3005111)
Modeled SO_2 = 6,813.9 tpy, Modeled NOx = 1,632.9 tpy

Impacted VISTAS Class I Area	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.172	0.003	15.375	1.12%	0.02%

Table 2. Homer City Gen LP/Center TWP (42063-3005211)
Modeled SO_2 = 9,274.9 tpy, Modeled NOx = 4,962.3 tpy

Impacted VISTAS Class I Areas	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.274	0.010	15.375	1.78%	0.06%
Swanquarter Wilderness Area	0.151	0.008	10.894	1.38%	0.07%

Table 3. Genon NE Mgmt Co/Keystone Sta (42005-3866111)
Modeled SO_2 = 21,066.4 tpy, Modeled NOx = 5,086.3 tpy

Impacted VISTAS Class I Areas	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.740	0.009	15.375	4.81%	0.06%
Swanquarter Wilderness Area	0.375	0.009	10.894	3.44%	0.09%
Cape Romain Wilderness	0.320	0.002	14.028	2.28%	0.01%
Linville Gorge Wilderness Area	0.235	0.000	12.884	1.82%	0.00%
James River Face Wilderness	0.217	0.005	14.404	1.51%	0.04%
Dolly Sods Wilderness	0.246	0.001	19.349	1.27%	0.00%
Shining Rock Wilderness Area	0.151	0.000	12.313	1.23%	0.00%
Great Smoky Mountains NP	0.166	0.001	13.916	1.19%	0.01%
Wolf Island Wilderness	0.149	0.002	12.957	1.15%	0.01%
Joyce Kilmer-Slickrock Wilderness	0.154	0.000	13.694	1.12%	0.00%
Cohutta Wilderness Area	0.137	0.002	13.229	1.04%	0.01%
Okefenokee Wilderness Area	0.137	0.002	13.400	1.02%	0.01%
Otter Creek Wilderness	0.190	0.001	19.077	1.00%	0.00%

Four Factor Analysis Regional Haze Rule Second Decadal Review

Keystone Generating Station
Units 1 and 2

AECOM Project number: 60634468-1

Original Submittal: July 29, 2020
Revised (Rev.01): January 11, 2021

Quality information

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Table of Contents

List of Tables

List of Figures

List of Appendices

1. Introduction

The Pennsylvania Department of Environmental Protection (PA DEP) Bureau of Air Quality notified the Keystone Generating Station (Keystone Station) that PA DEP is developing a State Implementation Plan (SIP) for the Second Decadal Review period of the federal Regional Haze Rule (42 USC §7491 – Visibility Protection for Federal Class I Areas). The Regional Haze Rule (RHR) requires state and federal agencies to work to improve visibility in U.S. National Parks and Wilderness Areas throughout the country (see 40 CFR §§ 81.401 through 81.437) with the ultimate goal of achieving "natural background" visibility in these Class I areas by the year 2064. Every ten years, agencies are required to evaluate their plans and consider whether additional emission reductions at certain major sources are warranted to continue realizing "reasonable progress" in visibility improvement. PA DEP identified the Keystone Station Units 1 and 2 as sources requiring an analysis for potential reductions of sulfur dioxide (SO_2) emissions and nitrogen oxides (NOx) emissions. Primary PM_{10} is another pollutant that may contribute to visibility impairment (although to a much lesser extent relative to SO_2 and NOx), but emissions of this pollutant are not required to be evaluated for this analysis – see Section 3 of this report for details.

As outlined in the RHR, this analysis, referred to as a "Four-Factor Analysis", needs to first identify all technically feasible control technologies for additional SO_2 and NOx emissions control. Each feasible control option then needs to be evaluated relative to the following four statutory factors:

1) Cost of implementing emission controls;
2) Time necessary to install such controls;
3) Energy and non-air quality impacts associated with installing controls; and
4) The remaining useful life of the facility.

In May 2020, the PA DEP requested Keystone Station to perform the subject analysis for Units 1 and 2, and submit their findings to the PA DEP. Appendix A provides a copy of the PA DEP's letter request. Keystone Station contracted AECOM to assist with the analysis. Although not required to be included in the analysis, states have the option to consider a fifth factor – evaluation of visibility benefits - in addition to the four statutory factors when making their reasonable progress determinations. This analysis includes the fifth factor (see Section 7) to provide additional information to PA DEP to assist in their consideration for the need of additional controls for visibility improvement.

The initial analysis was submitted to the PA DEP in July 2020. This revised (Rev. 01) analysis was prepared in response to comments from the PA DEP and other reviewers that were received by Keystone Station (and forwarded to AECOM) on August 18, 2020.

This report provides a description of the affected source (Section 2), a summary of the actions taken during First Decadal Review period of the RHR (Section 3), a summary of actual baseline emissions (Section 4), a discussion of existing emission controls (Section 5), and identification of potentially feasible control options and an assessment of each of the four statutory factors for these options (Section 6). Additionally, Section 7 provides a "fifth factor" analysis of the prospective visibility impacts to Class I areas of potential SO_2 controls for PA DEP's consideration. Finally, Section 8 presents a summary of this report's findings.

2. Source Description

Keystone Generating Station, which is located at 313 Keystone Dr, Shelocta, PA 15774, is licensed to operate under environmental permits issued to Keystone-Conemaugh Projects, LLC. The Station operates under PA DEP's Title V Operating Permit No. 03-00027 (Expiration date – March 31, 2025).

Keystone Station Unit 1 and Unit 2 are each identical bituminous coal-fired boilers with a steam turbine-driven electric generator that provide electricity to the regional electric grid. Manufactured by Combustion Engineering, Units 1 and 2 were commissioned in 1967 and 1968, respectively, and fire bituminous coal mined in Pennsylvania. The nominal maximum operating conditions for each boiler and generator are heat input of 8,717 MMBtu/hr and gross electrical output of 910 MW, respectively. No. 2 fuel oil is used as the boiler start-up fuel and for supplemental firing as needed.

Each boiler is equipped with the following emissions control devices: Low-NOx burners, selective catalytic reduction (SCR, installed in 2003) for NOx control, electrostatic precipitator (ESP) for particulate matter (PM) control, hydrated lime (sorbent) injection system for sulfuric acid mist (H_2SO_4) control, and a wet flue gas desulfurization (FGD, installed in 2009) system for SO_2 and additional PM control. These control devices also provide co-beneficial emissions control for a suite of other pollutants such as mercury and acid gas emissions. Process gases at each unit are routed through the emission control systems using induced draft (ID) booster fans. Process gases from each FGD system are discharged to the atmosphere through a single exhaust flue contained in one concrete stack (designated as S12 in the Title V permit).

Unit 1 and Unit 2 are subject to, and compliant with, the Cross-State Air Pollution Rule (CSAPR or Transport Rule) and the related requirements promulgated under 25 Pa. Code Chapter 139 and 40 CFR 75 - Continuous Emissions Monitoring. Keystone Station operates and maintains (i) certified continuous emission monitoring systems (CEMs) for NOx, SO_2 and carbon dioxide (CO_2) and (ii) a certified exhaust gas stream flow monitor at the exhaust duct. Certified emissions, heat input and gross electrical load data are submitted quarterly to the PA DEP and U.S. Environmental Protection Agency (EPA).

Units 1 and 2 are also subject to, and compliant with, the following EPA and PA DEP regulations:

- 2010 SO_2 National Ambient Air Quality Standard (NAAQS) – a compliance modeling study completed by AECOM for the Indiana, PA designated non-attainment area demonstrated that current SO_2 emission impacts from the Keystone Station's units are compliant with the NAAQS
- PA DEP RACT II Rule – Units 1 and 2 demonstrate compliance with the presumptive NOx RACT limits for coal-fired electric generating boilers equipped with SCR
- Coal- and Oil-Fired Electric Utility Steam Generating Units (EGU) National Emission Standards for Hazardous Air Pollutants (NESHAP) Rule, also known as the Mercury Air Toxics Standards (MATS) Rule. Under the MATS Rule, Units 1 and 2:
    - Have attained Low-Emitting EGU (LEE) status for non-mercury metals using filterable PM as the surrogate pollutant;
    - Have attained LEE status for acid gas (HCl) standard; and,
    - Monitor mercury emissions using a sorbent trap sampler (nominal weekly sampling period).

In summary, contemporary emission control devices are already installed, operated and maintained at Units 1 and 2, and these devices provide for effective control of criteria and hazardous air pollutants.

3. First Regional Haze Planning Period Reasonable Progress Determination

During the First Decadal Review period of the RHR (i.e., 40 CFR 51 Subparts 308 and 309), Units 1 and 2 were subject to Best Available Retrofit Technology (BART) review because they had been placed into service within the rule-specified BART applicability window (between August 7, 1962 and August 7, 1977) and satisfied the other eligibility criteria. BART requirements for SO_2 and NOx emissions were satisfied by compliance with U.S. EPA's Clean Air Interstate Rule (CAIR), now superseded by the more stringent CSAPR, per U.S. EPA who ruled that CAIR achieved greater reasonable progress than BART for SO_2 and NOx emissions at BART-eligible electric generating units located in CAIR-affected states. A BART analysis (dispersion modeling study) for primary PM_{10} emissions was completed by AECOM and submitted to the PA DEP in January 2007, and that study concluded that visibility impacts from primary PM_{10} emissions from the Units 1 and 2 were imperceptible at the nearest Class I areas (Shenandoah National Park, Dolly Sods and Otter Creek Wilderness Areas). The Keystone Station has since further reduced its actual SO_2 and NOx emissions, as described in the next section.

4. Source Emissions

Actual emissions for Units 1 and 2 are summarized in **Table 4-1**. At the Keystone Station, actual emissions of SO_2 have been reduced between 2006-2008 (indicative of the baseline emissions prior to implementation of the regional haze program) and 2019 by more than 89% and emissions of NOx have been reduced by 48% over the same period. The emission reductions are indicative of the reductions achieved since commencement of the regional haze program and are attributable to installation of a wet flue gas desulfurization (FGD) system in 2009, the use of SCR and compliance with PA DEP's RACT II rule, compliance with other environmental programs such as CSAPR and the SO_2 NAAQS implementation, and to a lesser extent, the reduced level of utilization of these units.

AECOM understands that the PA DEP requested NOx and SO_2 four-factor analyses for Units 1 and 2 based, in part, on a metric used by the National Park Service (NPS) for evaluating potential impacts to visibility at the nearby Class I Areas (Dolly Sods and Otter Creek Wilderness and Shenandoah National Park). The metric is equal to the source annual emissions (tons) divided by distance between the source and the Class I Area (km). The NPS selected a ratio of 1.0 or greater as the threshold for identifying sources that could affect visibility conditions in the Class I Areas. While the metric may be appropriate as a screening tool, it does not consider the direction of the prevailing winds from the source to the Class I Areas (**Figure 7-1** presents the location of the Keystone Generating Station in relation to nearby Class I Areas). For Keystone Generating Station, wind direction data were generated using five years (2009 - 2013) of wind speed / wind direction data at the Johnstown, PA airport. As depicted in the resultant wind rose presented in **Figure 4-1**, winds from the north and north-northwest (i.e., from the Keystone Generating Station toward the nearby Class I areas to the south) are very infrequent, which suggests that emissions from Units 1 and 2 rarely impact visibility conditions in those Class I areas.

Figure 4-1 Johnstown Airport 5-Year (2009 -2013) Wind Rose

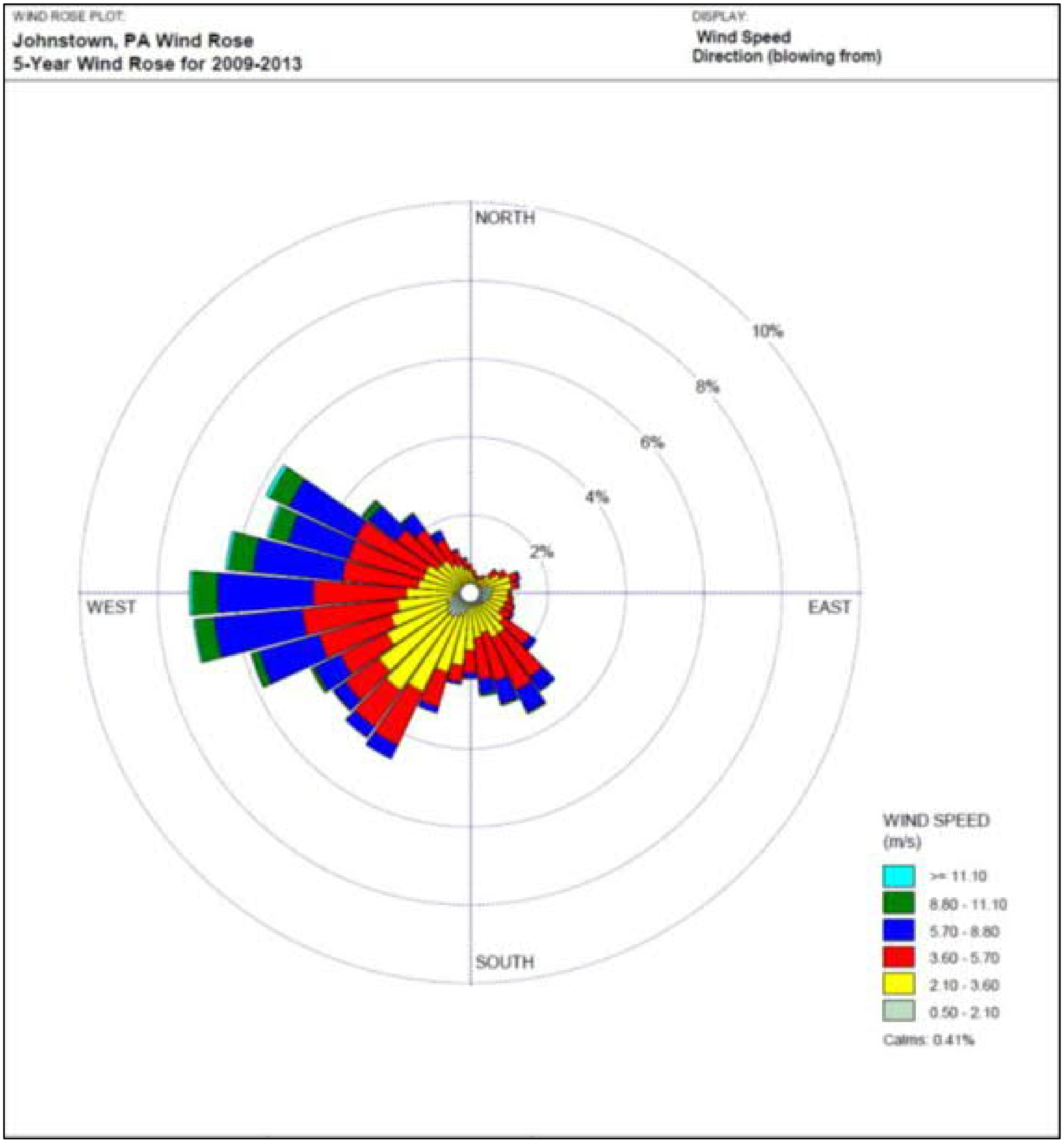


Table 4-1 Keystone Generating Station – Unit 1 and Unit 2 Actual Annual Operation and Emissions

Time Period	Unit	Annual Operating Hours (a)	Power Output (a)	Capacity Factor based on MW (b)	Annual Fuel Use (a)	SO_2 Emissions (a)		NO_x Emissions (a)		NO_x Emissions when flue gas temperature at SCR inlet ≥ 600°F (c)
		(hr/yr)	(MW)	%	(MMBtu/yr)	(ton/yr)	(lb/MMBtu)	(ton/yr)	(lb/MMBtu)	(lb/MMBtu)
2006 through 2008	1	8,101	6,993,291	88%	62,799,882	89,735	2.86	7,137	0.227	*Not applicable*
	2	8,023	6,823,606	86%	60,103,001	85,408	2.84	6,466	0.215	*Not applicable*
	Average	8,062	6,908,448	87%	61,451,441	87,571	2.85	6,801	0.221	*Not applicable*
	Total					175,143	--	13,603	--	--
2019	1	8,185	6,498,402	82%	61,842,784	11,868	0.384	3,937	0.127	0.104
	2	6,884	5,377,298	67%	50,498,750	7,939	0.314	3,203	0.127	0.103
	Average	7,534	5,937,850	74%	56,170,767	9,903	0.353	3,570	0.127	0.104
	Total					19,806	--	7,140	--	--
Emission Reduction						89%	--	48%	--	--

(a) USEPA Air Markets Program Data (https://ampd.epa.gov.ampd/).

(b) Rated capacity for each unit is 910 MW, gross.

(c) Per PA DEP RACT II Rule, presumptive NOx emission limits for a coal-fired EGU boiler with SCR is 0.12 lb/MMBtu when flue gas temperature at SCR inlet ≥ 600°F, 0.35 lb/MMBtu when flue gas temperature at SCR inlet is < 600°F (rolling 30-boiler operating day averaging period)[1]

[1] *25 Pa. Code §129.97(g)(1)(viii)* and *25 Pa. Code §§129.97(g)(1)(vi)(B)*

5. Existing Emission Controls

EPA's regional haze guidance[2] includes several criteria that, if applicable, would indicate that a source already has effective controls in place as result of a previous regional haze decision or other Clean Air Act (CAA) requirements and as such, it may be reasonable for the state to not select that source for further analysis.[3] In addition, EPA guidance for effectively controlled sources suggests that a full four-factor analysis would likely result in a conclusion that no additional controls are necessary.

5.1 SO_2 Control Measures

In addition to the certified CEMs noted in Section 2, Keystone Station operates and maintains diagnostic SO_2 and CO_2 CEMs at the inlets to the FGD absorbers. Data from these diagnostic CEMs are not reported to the agencies, but are rather used by Station Operations to gauge performance of the FGD and other systems. The inlet diagnostic CEMS are calibrated periodically, so the data are reliable. Using 2019 hourly-averaged data from the diagnostic (inlet) and certified (i.e., actual stack emissions) CEMs yields SO_2 control efficiencies of 90.7% and 92.7% for Units 1 and 2, respectively.

5.2 NOx Control Measures

The Keystone Station Units 1 and 2 use low-NOx burners and SCR systems to control NOx emissions. NOx emissions from Units 1 and 2 prior to the installation of the low-NOx burners (1995) were approximately 0.7 lb/MMBtu (see RACT 1993-1995 proposals submitted to the PA DEP). When operating conditions are sufficient to allow aqueous ammonia injection in the SCR (close to the threshold specified in the PA DEP RACT II Rule, see Table 4-1), average NOx emissions from Units 1 and 2 were 0.104 and 0.103 lb/MMBtu, respectively, in 2019, which equates to an overall NOx control efficiency of 85% achieved by the low NOx burners and SCRs. Therefore, based on the current actual NOx emission rate and control efficiency, the existing NOx controls are highly effective.

6. Emissions Control Options

This section presents an evaluation of potential emissions reduction options applicable to SO_2 and NOx emissions from Units 1 and 2. The evaluation starts with listing potential control options and determining if the option is technically infeasible. For those options considered technically feasible, an analysis will be conducted considering the four statutory factors: (1) costs of compliance; (2) the time necessary for compliance; (3) the energy and non-air quality environmental impacts of compliance; and (4) the remaining useful life of the emission unit. Following that evaluation are conclusions related to the feasibility and reasonability of implementing the remaining approaches.

6.1 Identification of Potentially Available SO_2 Emissions Reduction Options

There are multiple options for controlling the emissions of SO_2 from coal-fired EGUs. These options fall in three general categories:

– Wet Flue Gas Desulfurization (wet FGD),

[2] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019.
[3] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019 (Page 23).

– "Dry" FGD (e.g.; spray dryer absorber (SDA), circulating dry scrubbers (CDS), or novel integrated desulfurization (NID)), or

– Dry Sorbent Injection (DSI).

Among these, the most effective at controlling SO_2 emissions from coal-fired boilers is a wet FGD system. Units 1 and 2 at the Keystone Station already have wet limestone FGD, which is the top level of control in terms of overall efficiency.

The use of dibasic acid, an organic acid buffer, to increase SO_2 control was considered. A buffer increases SO_2 control by decreasing the drop in pH at the gas-liquid interface which occurs as SO_2 is absorbed. However, this option was rejected because it can inhibit mercury control. Increasing the limestone stoichiometric ratio (LSR, moles of Ca per moles of SO_2 absorbed) may provide a marginal improvement in SO_2 removal. However, the FGD system already operates at the preferred LSR needed for scrubber operation.

6.1.1 Costs of Compliance (Factor 1)

At the Station, SO_2 emissions are controlled by wet limestone FGD, and as such, SO_2 emissions are already well controlled (> 90 percent removal). Therefore, the potentially available control options to further reduce SO_2 emissions are limited to process improvements. Keystone Station has already implemented several process improvements designed to increase the efficacy of the wet FGD system during the past eleven years, which overlap with the first and second decadal review periods of the RHR. The process improvements included the following:

- Optimized the performance of the slurry recycle pumps for the FGD absorber to allow for consistent feed of limestone slurry to the spray banks;
- Optimized the performance of the limestone ball mill to allow for a finer grade of pulverized limestone, which in turn allows for a more consistent limestone slurry;
- Configured the distributed control system to automatically adjust process variables to ensure that absorber pH and limestone slurry density are maintained within the specified tolerances; and,
- Implemented a preventative maintenance plan to proactively address potential equipment issues related to FGD performance.

The regulatory drivers for the process improvements included the following:

- EPA's MATS Rule - compliance with this rule began in April 2015. FGD efficacy improvements were implemented during the years 2014 through 2020 to ensure compliance with the MATS mercury emissions limits. These improvements also resulted in co-beneficial reductions in SO_2 emissions as demonstrated in the summary table below. (The exhaust gas flues for Units 1 and 2 are in a single chimney, the flue gas streams merge upon discharge to the atmosphere.)
- EPA's 2010 SO_2 NAAQS compliance demonstration – A dispersion model analysis was performed to determine the Units 1 and 2 SO_2 emission limit required to demonstrate compliance with the 1-hour SO_2 NAAQS. For Keystone Station, the modeling exercise showed that the new SO_2 emission limit, which became applicable in October 2018 (during the second decadal review period for the RHR) is approximately 50 percent of the previous emission limit that was applicable when the FGD systems began operations in late 2009.
- Keystone Station also utilizes a dry sorbent (hydrated lime, calcium hydroxide) injection system at Units 1 and 2 to reduce sulfur trioxide / sulfuric acid mist emissions as necessary in order to maintain compliance with PA DEP exhaust gas opacity limits.

Keystone Station believes that the alkaline sorbent (injected before the FGD system) also provides for co-beneficial reductions in SO_2 emissions. In 2019, Keystone Station changed from using a standard hydrated lime product to an “enhanced” (higher porosity) hydrated lime product, which improved oxidized sulfur removal.

Annual SO_2 emissions (tons/year, lb/MMbtu and lb/MWh) for the past eleven years are shown in **Table 6-1** below.

Table 6-1 Annual SO_2 Emissions from Keystone Station Units 1 and 2

Unit IDs	Year	Gross Load (MW-h)	Heat Input (MMBtu)	SO_2 (tons)	SO_2 (lb/MMBtu)	SO_2 (lb/MWh)
1 & 2 Combined	2010	14,574,271	130,161,394	39,113	0.60	5.4
1 & 2 Combined	2011	11,998,124	110,717,647	46,441	0.84	7.7
1 & 2 Combined	2012	10,222,266	95,680,332	29,420	0.61	5.8
1 & 2 Combined	2013	13,285,780	120,607,139	26,397	0.44	4.0
1 & 2 Combined	2014	12,317,305	112,359,466	28,138	0.50	4.6
1 & 2 Combined	2015	10,255,389	97,146,022	24,447	0.50	4.8
1 & 2 Combined	2016	11,019,360	105,560,720	22,403	0.42	4.1
1 & 2 Combined	2017	12,672,885	118,766,848	23,250	0.39	3.7
1 & 2 Combined	2018	13,338,898	123,507,053	23,951	0.39	3.6
1 & 2 Combined	2019	11,875,700	112,341,534	19,806	0.35	3.3
1 & 2 Combined	2020*	7,931,484	77,364,300	13,011	0.34	3.3
* Preliminary data						

Keystone Station believes that the FGD efficacy improvements implemented during the past eleven years are sufficient to satisfy the PA DEP’s reasonable progress goals for visibility improvement during the second decadal review period, and that this outcome is consistent with EPA’s guidance that “reasoned decision-making is a core component of the regional haze program, and thus of states’ regional haze SIP submissions.”[4] Consequently, there are no new compliance costs to be considered.

6.1.2 Time Necessary for Compliance (Factor 2)

Wet limestone FGD, which is already used at the Station and has been optimized throughout its service life, is the top level of SO_2 control; therefore, no additional SO_2 emissions controls are being evaluated for this four-factor analysis. As such, no additional time is needed for compliance.

[4] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019 (Page 1).

6.1.3 Energy and Non-Air Quality Environmental Impacts (Factor 3)

Since a wet limestone FGD system already exists on Units 1 and 2 at the Station, the energy and non-air quality environmental impacts have already been taken into account.

6.1.4 Remaining Useful Life (Factor 4)

Units 1 and 2 were commissioned in 1967 and 1968, respectively. Although the units have achieved over 50 years of service, no specific retirement date has been set. Therefore, for Station planning purposes, the remaining useful life of these units is assumed to be at least 20 years.

6.2 Identification of Potentially Available NO_X Emissions Reduction Options

Several NO_X control options were considered as additions to the current SCR controls for application to the Keystone Generating Station including Selective Noncatalytic Reduction (SNCR), Powerspan ECO® system, rich reagent injection, natural gas reburn, coal reburn, NOxStar, water injection, LoTOX, PerNOxide, ROFA, and ROTAMIX. These technologies were evaluated for technical feasibility (availability and applicability to Units 1 and 2) based on a review of possible performance, engineering principals, and an assessment of commercial availability. The findings are listed in **Table 6-2**.

Table 6-2 NOx Control Technologies

NOx Control Option	Description
Rich reagent injection	Similar to SNCR. Only available for cyclone fired boilers.(1)
Natural gas reburn	Performance is affected by baseline NOx concentration; reburn zone temperature, residence time, and stoichiometry; overfire burnout zone temperature and residence time; and mixing of the reburn fuel with the bulk flue gas. Extensive testing required to make a meaningful prediction of performance.(1) Based on very limited, if any, applications, natural gas reburn is not expected to offer a significant emission reduction relative to other options such as an SNCR and SCR.
Coal reburn	Similar to natural gas reburn.
NOxStar	Uses an ammonia-based reagent and small amounts of hydrocarbon injected to the flue gas at the convective pass of the boiler to reduce NOx. Only one full scale demonstration project. An emerging technology that would require extensive design engineering and a long-term full scale demonstration to evaluate technical feasibility, cost, and performance.(1)
Water injection	To date, only bench scale testing on coal firing. Extensive design engineering and testing would be needed to determine scale-up potential, cost and performance.(1)
LoTOX	A low temperature oxidation system that uses ozone to convert NO and NO_2 to N_2O_5 for eventual removal by a wet scrubber. No known full-scale, coal-fired EGU applications.
PerNOxide	Uses hydrogen peroxide injected into the duct ahead of the air preheater. Has only been tested on a pilot scale. Extensive design engineering and testing would be needed to determine scale-up potential, cost and performance.(1)

NOx Control Option	Description
ROFA	Rotating opposed overfire air. CFD modelling required to determine performance but expected to be inferior to an SNCR or an SCR.
ROTAMIX	Similar to an SNCR (Proprietary SNCR technology)
(1) Coyote Station Unit 1, North Dakota Regional Haze Second Planning Period Four-Factor Analysis. Sargent & Lundy, May 8, 2019.	

All the above options were rejected for one or more of the following reasons:

1. No commercial availability,
2. Emission control performance of these options is inferior to an SCR, which is already being used on Units 1 and 2. EPA's top-down approach suggests that if the top level of control is chosen or as in this case, already installed on the units, no further analysis is required.

We are, however, presenting costs of tuning/upgrading the existing low-NOx burners to achieve a small NOx emissions reduction, as discussed in the subsequent sections.

6.2.1 Costs of Compliance (Factor 1)

For both Units 1 and 2, NOx emissions are controlled by low-NOx burners and SCR. The controlling NOx emission limits are those specified in the PA DEP RACT II Rule, which are as follows:

> *Presumptive NOx emission limits for a coal-fired EGU boiler with SCR is 0.12 lb/MMBtu when flue gas temperature at SCR inlet ≥ 600 deg. F, 0.35 lb/MMBtu when flue gas temperature at SCR inlet is < 600 deg. F (rolling 30-boiler operating day averaging period).*

In addition, the Keystone Generating Station received a letter from PA DEP on November 17, 2020 requesting submittal of a case-by-case NOx RACT analysis by April 1, 2021. A copy of this letter is included as **Appendix C** of this report. The Station expects the proposed NOx limits of this case-by-case analysis will be more stringent than the current NOx limits. The revised NOx limits are expected to become effective by January 1, 2023.

Performance of the SCR systems is affected by recent operating modes for the Station. The Station was originally designed for base load operation. However, due to a decrease in electrical demand by the regional grid operator (PJM) and increase in supply from (i) newly-constructed natural gas-fired EGUs (in response to abundant and low-cost natural gas that became available following development of advanced drilling practices in Pennsylvania) and, to a much lesser extent, (ii) renewable energy sources over the last few years, operations of Units 1 and 2 now typically cycle on a daily basis. This operation features higher or full load conditions during daylight hours on the business weekdays with high regional electric demand and often at loads in the 40% to 70% range or off-line at all other times. The performance of the SCR system is adversely affected by the low flue gas temperatures that occur at low loads. At loads below 70%, the flue gas temperature drops below 600°F. At 40% load, the flue gas temperature drops below 540°F. Injection of aqueous ammonia at these lower flue gas temperatures results in ammonium bisulfate formation, which deposits on the downstream air pre-heater and ESP, thus fouling these devices. This issue is the underlying basis for the bifurcated NOx emission limit scheme in the PA DEP RACT II Rule. Optimization of the existing SCR systems will be addressed as part of the forthcoming case-by-case NOx RACT analysis.

In order to present a complete and thorough four-factor analysis, the Station discussed with R-V Industries, Inc., additional NOx reduction options specifically around improving performance of low-NOx burners at the Conemaugh Station. Since the Conemaugh and Keystone Stations are sister facilities, equipment retrofit costs for the Conemaugh Station are reasonably applicable to the Keystone Station units as well.

R-V Industries stated that there is no available low-NOx tip that can be bolted onto the existing burners. Therefore, R-V Industries' approach, based on prior experience with tangentially-fired boilers of a similar size and design, was to install venturis in the windbox ductwork to resize the burner tips to help minimize excess air and NOx formation and optimize the overall air flow. The budgetary cost information from R-V Industries is presented in **Tables 6-3** and **6-4** and the cost-effectiveness is presented in **Table 6-5**.

The replacement burners can achieve a 17% NOx reduction (~ 0.22 lb/MMBtu NOx emission rate) when the minimum continuous operating temperature is less than 611°F (i.e., temperature below which ammonia injection into the SCR cannot commence).

Table 6-3 Low-NOx Burner Replacement/Tuning Capital Cost Estimate – Per Boiler

Cost Item	Computation Method	Factor	Cost	Notes
Direct Costs				
Purchased Equipment (PE)	Vendor Quote x factor	1.00	$1,901,250	Quote provided by R-V Industries, Inc.
Taxes	PE x factor	0	$0	PE exempt from 6% PA sales tax
Freight	PE x factor	0.05	$95,063	Table 2.4 of EPA's OAQPS Control Cost Manual, Sixth Edition, January 2002.
Total Purchased Equipment Costs (PEC)	Sum	----	$1,996,313	PE + Taxes + Freight
Direct Installation Costs	Conemaugh Station Estimate (applicable to Keystone Station as well)	----	$1,700,000	The budgetary estimate does not consider that all existing dampers on the current burners would need to be replaced, which is an extremely labor intensive effort that is not accounted for in the vendor quote. The listed cost (based on a comparable project) accounts for this omission.
Total Direct Costs (TDC)	Sum PEC + Installation Costs	----	$3,696,313	
Installation Costs, Indirect				
Engineering / supervision	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002
Construction / field expenses	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002

Cost Item	Computation Method	Factor	Cost	Notes
Construction fee	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002
Start-up	TDC x factor	0.01	$36,963	OAQPS Control Cost Manual, Sixth Edition, January 2002
Performance test	TDC x factor	0.01	$36,963	OAQPS Control Cost Manual, Sixth Edition, January 2002
Contingencies	TDC x factor	0.20	$739,263	Due to the uncertainties associated with the preliminary, budgetary nature of the cost information, a contingency of 20% is warranted.
Modeling and Optimization Studies	Conemaugh Station Estimate (applicable to Keystone Station as well)	----	$500,000	This budgetary estimate does not consider a critical analysis of potential changes in combustion zone conditions such as lower temperatures, decreased combustion efficiency (related to decreased oxygen availability and resultant increase in carbon monoxide) and increase in corrosion potential around the furnace walls. The listed cost (based on a comparable project) accounts for this omission.
Loss of Revenue Associated with Special Outage Required to Install Equipment	Lost generation x factor	25.00	$10,710,000	Factor = Estimated generation revenue price ($/MWh), 28 day outage, 850 MW generation capacity, 75% annual capacity factor
Total Indirect Costs (TIC)	Sum	----	$13,132,083	
Total Capital Investment (TCI)	**Sum TDC + TIC**	**----**	**$16,828,395**	**TDC + TIC**

Table 6-4 Low-NOx Burner Replacement/Tuning Annual Cost Estimate

Cost Item	Computation Method	Factor	Cost	Notes
Direct Operating Costs				
Operating Labor - Operator (OL)	---	---	---	No additional OL costs expected
Operating Labor - Supervision	---	---	---	No additional Supervisory Labor costs expected
Maintenance Labor (ML)	---	---	---	No additional ML costs expected
Maintenance Materials	---	---	---	No additional Maintenance Material costs expected
Total Direct Operating Costs (DOC)	Sum		$0	

Cost Item	Computation Method	Factor	Cost	Notes
Indirect Operating Costs				
Overhead	(OL + ML) x factor	0.80	$0	No change from current conditions; i.e., Overhead is included in the current overhead cost of the existing burners
Property Taxes	TCI x factor	0.01	$168,284	OAQPS Control Cost Manual, Sixth Edition, January 2001
Insurance	TCI x factor	0.01	$168,284	OAQPS Control Cost Manual, Sixth Edition, January 2002
Administration	TCI x factor	0.02	$336,568	OAQPS Control Cost Manual, Sixth Edition, January 2002
Capital Recovery (1)	TCI x factor	0.0944	$1,588,481	Factor per Equation 2.8a of EPA's OAQPS Control Cost Manual, Sixth Edition, 2002. (20 year life and 7% interest rate).
Total Indirect Operating Costs (IOC)	Sum	----	$2,261,617	
Total Annualized Cost (TAC)	**Sum DOC+ IOC**	**----**	**$2,261,617**	**Per unit**

(1) Based on information available from the Station, the firm-specific nominal interest rate for the Keystone Station is at least 7%. A 7% interest rate has been set by the United States Office of Management and Budget (OMB) and is described in the January 2002 EPA Air Pollution Control Cost Manual. Over the years, 7% has been used as a consistent basis for evaluating emission control options for BACT, RACT and BART analyses. As shown in Table 23 on Page 70 in PA DEP's June 2018 Technical Support Document for General Operating Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (GP-5A) and the General Plan Approval and General Operating Permit for Natural Gas Compression Stations, Processing Plants, and Transmission Stations (GP-5), PA DEP also supports use of an interest rate of 7%.

Table 6-5 Low-NOx Burner Replacement/Tuning Cost-Effectiveness ($/ton NOx Removed)

Unit No.	NOx Before Control (1) (tons/yr)	NOx After Control (2) (tons/yr)	Total Annualized Cost (3) ($/yr)	Cost Effectiveness ($ / ton NOx Removed)
1	3,937	3,780	$2,261,617	$14,405
2	3,203	3,079	$2,261,617	$18,239
Average				**$16,322**

(1) Based on CY2019 actual annual emissions. See Table 4-1.
(2) Based on available emissions and operating data for CY2019, the LNB upgrades are expected to reduce emissions by 157 tons/year for Unit 1 and 124 tons/year for Unit 2.
(3) See Table 6-4 for calculation of annual costs.

As shown in **Table 6-5**, the cost of installation of per ton of NOx removed is excessive at an average of $16,300/ton of NOx removed.

6.2.2 Time Necessary for Compliance (Factor 2)

Considering the extent, cost and duration of the outage associated with the low-NOx burner tune-up project, if determined to be required, the Station expects that this project would not be able to be completed for at least five years following an approval to proceed (plans for major capital projects and major outages at the Station are prepared with five-year forecasts). Permitting can take up to nine months (to ensure that appropriate federally enforceable operating limits and conditions are established in the Plan Approval / construction permit as issued by the PA DEP) with an additional twelve months required for completion of the modeling study, final design, purchase and implementation. As noted above, optimization of the existing SCR systems will be addressed as part of the forthcoming case-by-case NOx RACT analysis, and the revised NOx limits are expected to become effective by January 1, 2023 (within two years).

6.2.3 Energy and Non-Air Quality Environmental Impacts (Factor 3)

There are no unacceptable energy or non-air quality environmental impacts associated with operation of the existing or the upgraded low-NOx burners and SCR systems on Units 1 and 2 at the Keystone Generating Station.

6.2.4 Remaining Useful Life (Factor 4)

EPA's 2019 regional haze guidance states that the remaining useful life is the number of years that the "new control equipment" is expected to be in service. Therefore, for in-service dates in the 2025 to 2028 range, a 20-year useful life means that the coal-fired EGU on which the control is installed, is expected to be operating in the 2045 to 2048-time frame. A 30-year useful life means that the EGU is expected to be in operation in the 2055 to 2058-time frame. Although the projected life of a new control system may be 30 years, the remaining useful life of an existing EGU may be less than 30 years due to its current age and the current economic dispatch competition from other sources of electricity (nuclear, combined-cycle natural gas and renewable energy).

During the first regional haze planning period, a 20-year useful life was accepted as a default by the EPA. This has proven to be overly optimistic as approximately 30% of the coal-fired generation capacity in the U.S. has been retired in the 10-year period since 2009. Additional retirements have been announced and are expected to continue (e.g., see the following link: https://www.genon.com/genon-news/genon-holdings-inc-announces-retirement-of-morgantown-coal-units) due to competition from natural gas-fired EGUs, renewable energy and other environmental and non-environmental factors.

Units 1 and 2 were commissioned in 1967 and 1968, respectively and as mentioned previously, no specific retirement date has been set for either of them. Therefore, for Station planning purposes, the remaining useful life of these units is assumed to be 20 years.

7. Additional 5th Factor Consideration - Visibility Impacts

The goal of the RHR is to improve the visibility in Class I areas. Accordingly, when evaluating possible emissions reduction projects or programs, it is appropriate to consider the degree to which individual control projects might contribute towards that goal. Although states have a statutory requirement to consider the "4 factors" addressed in the earlier portion of this report, EPA's guidance[5] also allows inclusion of a "5th factor" which involves consideration of visibility impacts of candidate control options. This section addresses the visibility impacts of current operations as well as the impact of the marginal SO_2 control offered by operating a fourth level of spray pumps. As explained below, because the visibility impacts attributable to the Keystone Station are low, further controls and/or lower emission limits, even if technically and economically feasible, would not yield material visibility benefits at any of the regional Class I areas because the Station's Units 1 and 2's current emissions have a very low visibility impact.

7.1 EPA Guidance Regarding Considerations of Visibility Impacts

The EPA issued "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" in August 2019. This guidance allows a state, as part of its consideration of emission controls, to include a "5th factor" consideration of visibility impacts of candidate control options.

On pages 36 and 37 of this guidance, the EPA notes that concerning the underlying regulation for ascertaining reasonable further progress, the regulation:

> *"assumes that the state will consider visibility benefits as part of the analysis. Section 51.308(f)(2)(i) of the Regional Haze Rule requires consideration of the four factors listed in CAA section 169A(g)(1) and does not mention visibility benefits. However, neither the CAA nor the Rule suggest that only the listed factors may be considered. Because the goal of the regional haze program is to improve visibility, it is reasonable for a state to consider whether and by how much an emission control measure would help achieve that goal." . . .*
> *". . . EPA interprets the CAA and the Regional Haze Rule to allow a state reasonable discretion to consider the anticipated visibility benefits of an emission control measure along with the other factors when determining whether a measure is necessary to make reasonable progress."*

Consequently, an expectation of a very low impact to Class I visibility impairment from control of certain facility pollutants is appropriate for consideration when evaluating the need for further control of these emissions for Regional Haze Reasonable Progress.

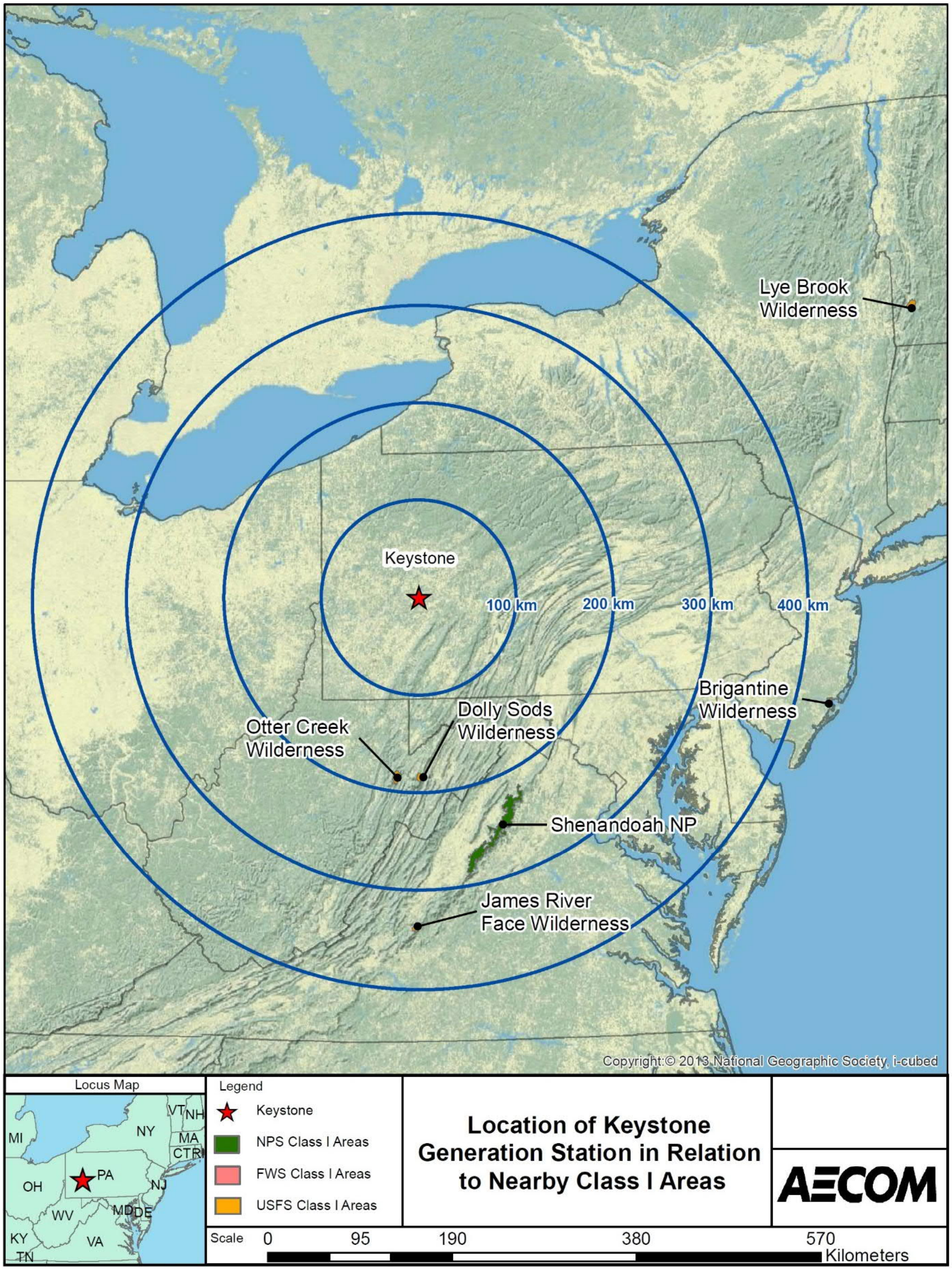
EPA's 2019 RHR guidance does not specifically state what would constitute an insignificant visibility impact, but the preamble to the 1999 RHR (64 FR 35730) does specify a "no degradation" visibility change if the impact is less than 0.1 deciview. In addition, MANE-VU determined in the first decadal review that a visibility improvement less than 0.1 deciview individual impact does not warrant consideration of additional controls[6]. This amount of visibility change (for the worst 20% haze days) is on the order of 1% or less of the 2028 glidepath target, so it constitutes a very low value. It should be noted that the 0.1 deciview benchmark is not in and of itself an "off-ramp" for disqualifying the candidate control options being considered. States need to review the already-installed emissions controls, the feasibility, effectiveness and cost of an additional control option, as well as its visibility impact together in order to arrive at a decision.

[5] US EPA; "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" in August 2019. Available at https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf.
[6] 77 FR 17367 (March 26, 2012).

7.2 Class I Areas Near Keystone Generating Station

Class I areas in the eastern United States near Pennsylvania are shown in **Figure 7-1**. The closest Class I areas are Dolly Sods and Otter Creek Wilderness Areas in West Virginia and Shenandoah National Park in Virginia. Other Class I areas within 400 km include Brigantine Wilderness Area (New Jersey) and James River Face Wilderness Area (Virginia).

Figure 7-1 Class I Areas in the Vicinity of Keystone Generating Station



7.3 MANE-VU CALPUFF Modeling

Pennsylvania is one of the states within the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Regional Planning Organization. In 2016, MANE-VU conducted visibility modeling using 2015 Electrical Generating Unit (EGU) to determine visibility impacts of emission sources at Class I areas within MANE-VU. This modeling was conducted with the CALPUFF model, which was used for visibility modeling for the first decadal review.

Specific aspects of the MANE-VU modeling that are worth noting are as follows:

- 2011 and 2015 emissions were considered (emission reductions since 2011 and 2015 are not accounted for, making this analysis significantly dated and questionable for accuracy)
- 95th percentile emission rates were assumed to occur continuously (this approach can significantly overstate actual emissions, even for the outdated inventory used)
- CALPUFF was applied for distances from sources to Class I areas far exceeding the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 advisory[7] that use of CALPUFF for distances beyond 200 km could introduce significant overprediction biases in the results.
- CALPUFF is a screening model that has been delisted as an EPA-preferred long-range transport model (Appendix W updates in 2017, as proposed in 2015). It is puzzling why MANE-VU relied upon this screening model for determining sources that are asked to conduct four-factor analyses; no other Regional Planning Organizations have used CALPUFF modeling for the Second Decadal Review.
- CALPUFF evaluations[8] indicate large overpredictions of nitrate haze, especially in winter, due the dated formulation used in the model. The default MESOPUFF-II formulation has limitations for winter applications, where it results in overpredictions approaching a factor range of 4-6 in the evaluations noted in the reference.
- The statistic reported from the CALPUFF modeling was the highest day's impact, which is a significant departure from the 8th highest day for the first decadal review and the average of the 20% most impaired days for the second decadal review.

Due to widespread use of photochemical grid models such as CAMx by every other Regional Planning Organization in the country, the next sub-section discusses available CAMx modeling for some Pennsylvania EGUs (including the Keystone Generating Station) conducted by the southeastern states Regional Planning Organization, VISTAS / SESARM.

7.4 VISTAS CAMx Modeling Analysis

The impact to Class I area visibility of current Station emissions and hypothetical reductions to SO_2 and NOx emissions can be determined by analyzing the results of visibility modeling conducted by the VISTAS / SESARM[9] Regional Planning Organization that included emissions for some Pennsylvania power plants including the Keystone Generating Station. The VISTAS modeling was conducted by Alpine Geophysics and utilized advanced CAMx modeling including modeling particulate matter simulations and source apportionment studies. Determinations of the haze contributions of specified large sources was accomplished by "tagging" the selected sources for determining their contribution to impairment at each Class I area of interest. The tagged sources included the Keystone Generating Station. The results of VISTAS modeling

[7] IWAQM Phase 2 report, Appendix D. Available at http://www.epa.gov/scram001/7thconf/calpuff/phase2.pdf.
[8] Joseph Scire presentation at the EPA 10th Modeling Conference, available at https://www3.epa.gov/scram001/10thmodconf/presentations/3-5-CALPUFF_Improvements_Final.pdf.
[9] "VISTAS" is an acronym for Visibility Improvement -State and Tribal Association of the Southeast and "SESARM" stands for Southeastern States Air Resource Managers, Inc. Their web site for Regional Haze Rule modeling results is https://www.metro4-sesarm.org/content/vistas-regional-haze-program.

analysis of Keystone Station's total emissions can be used, with emissions scaling, to estimate the visibility impacts of Keystone Station Units 1 and 2's current (2019) actual emissions.

Visibility impairment is commonly expressed using two parameters to characterize the visibility impairment:

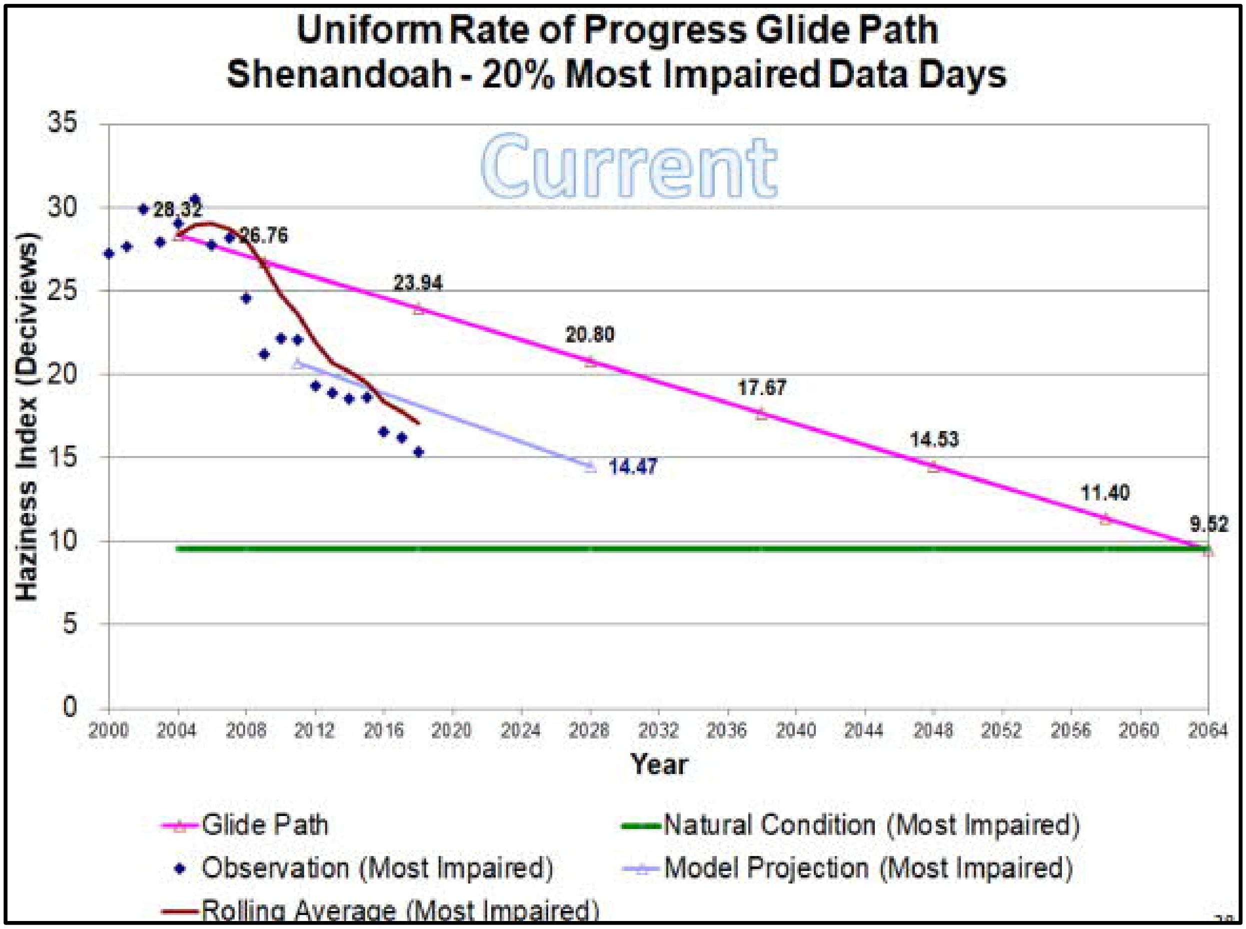
- **Light Extinction (b_{ext})** is the reduction in light due to scattering and absorption as it passes through the atmosphere. Light extinction is directly proportional to pollutant particulate and aerosol concentrations in the air and is expressed in units of inverse megameters or Mm-1.

- **Deciview (DV)** is a unitless metric of haze which is proportional to the logarithm of the light extinction. Deciview correlates to a person's perception of a visibility change, with a change of 1 deciview being barely perceptible. The "no degradation" value of 0.1 DV stated in the 1999 Regional Haze Rule is only 10% of this perceptibility threshold.

Both metrics are helpful in understanding changes to visibility impairment, but while the deciview is the best parameter to relate the significance of a perceived visibility change, modeling produces results in the form of light extinction using the new IMPROVE equation that converts particulate concentrations to visibility impairment. A chart shown in **Figure 7-2** is taken from the VISTAS Regional Haze modeling project update (webinar) updated on September 10, 2020 (after being originally presented on May 20, 2020). It shows, in units of deciview, the actual visibility measurements and projected modeling results of visibility for most impaired days at the Shenandoah National Park.

Figure 7-2 shows that actual visibility measurements (the diamonds) confirm a strong trend of improved visibility in the past 10 years from about 27 DV to about 16 DV. This rate of actual improvement is much faster than the RHR target to maintain a "uniform rate of progress" or "glide path" (the pink line), which could be revised to a less-steep revised glide path to account for internationally-caused haze. However, VISTAS believes that since the Class I areas in this region are so far ahead of projections, that refinement is not necessary at this time. Additionally, VISTAS modeling of the expected emissions reductions in the coming years (on-the-books / on-the-way controls) projects (the blue line) that visibility should continue to significantly improve, reaching approximately 14.47 DV by the next RHR milestone year of 2028. This chart shows that visibility in this Class I area is currently running at least 20 years ahead of the RHR targets and is expected to continue to do so. VISTAS modeling of other regional Class I areas shows very similar trends and are all far ahead of their glide path targets. Therefore, no additional emissions reductions at any regional facilities, beyond those already planned, are needed to continue to meet the RHR interim goals.

Figure 7-2 Visibility Trends at Shenandoah National Park



7.5 Visibility Impact of Keystone Station's Units 1 and 2 SO_2 and NOx Emissions

The VISTAS modeling used 2011 annual emissions for the tagged stations to develop the units' projected 2028 emissions, and these values can be scaled to current representative emissions for the Keystone Generating Station. PA DEP has stipulated that 2019 emissions should be considered as representative for this analysis. The adjusted 2028 emissions modeled for Keystone were 21,066 tons of SO_2 and 5,086 tons of NOx. The representative current emissions (2019) for the Keystone Generating Station were 19,806 ton of SO_2 and 7,140 tons of NOx. Keystone Station's current best estimate is that Unit 1 and 2's 2019 actual emissions are a reasonable projection of their 2028 emissions. With linear scaling, this results in a modeled impact at the Shenandoah National Park and other nearby Class I areas based upon the VISTAS modeling as shown in **Table 7-1**.

Table 7-1 Haze Impact from Keystone Generating Station's Total 2019 Emissions of SO_2 and NOx at Class I Areas Within 400 km

Class I Areas Nearest to the Keystone Generating Station	Total Haze Impact from 2019 SO_2 Emissions from the Keystone Generating Station		Total Haze Impact from 2019 NOx Emissions from the Keystone Generating Station	
	Mm^{-1}	DV *	Mm^{-1}	DV *
Shenandoah National Park	**0.696**	**0.083**	0.013	0.002
Brigantine Wilderness Area	0.342	0.041	**0.055**	**0.007**
Dolly Sods Wilderness Area	0.232	0.028	0.001	0.000
Otter Creek Wilderness Area	0.179	0.021	0.001	0.000
James River Face Wilderness Area	0.204	0.025	0.008	0.001

** Potential Improvement in DV is listed for the 20% most impaired days for each Class I area. Conversion between deciviews and extinction is based upon the 2028 glidepath goal extinction as a reference point.*

The VISTAS CAMx modeling results for tagged individual source visibility impacts are expressed as light extinction, in units of inverse megameters. Another visibility metric is deciviews, which can be determined from extinction through a logarithmic relationship, as noted in an EPA 2003 reference[10] for tracking progress under the Regional Haze Rule. That reference indicates (in Section 3.9) that a change of 1 deciview is equivalent to about a 10% change in extinction coefficient, and Internet tools such as that available at http://vista.cira.colostate.edu/Improve/haze-metrics-converter/ can easily do the conversion. Recent guidance from EPA, issued in 2018, is "Technical Guidance on Tracking Visibility Progress for the Second Implementation Period of the Regional Haze Program"[11]. This guidance indicates that the total anthropogenic impairment:

"is the difference (the 'delta deciviews') between the total deciview value that exists (or is projected to exist) and the deciview value that would have existed if there were only natural sources causing reduced visibility. This is the metric that EPA recommends be used. We recommend that states use Equation 2 to calculate anthropogenic visibility impairment:

Δ dv (anthropogenic visibility impairment) = dv (total) – dv (natural) (Eqn. 2),

where dv (total) is the overall deciview value for a day, and dv (natural) is the natural portion of the deciview value for a day.

We are considering the question: What is the difference in anthropogenic visibility impairment due to a proposed emission control? To determine this, one would use above equation twice to take the difference of two Δdv (anthropogenic visibility impairment) values. In so doing, the term dv (natural) cancels out. To determine the difference caused by a proposed control action, we conservatively use the 2028 extinction goal to determine the conversion of extinction to deciviews. With a 2028 extinction goal of approximately 80 Mm^{-1}, the conversion between a difference of 1 Mm-1 (relative to the 2028 goal of 80 Mm^{-1}) would be about 0.12 delta-dv.

Table 7-1 shows that total actual 2019 emissions of SO_2 from the Keystone Generating Station contributed only 0.696 Mm^{-1} light extinction at the Shenandoah National Park Class I area, based upon 2019 actual emissions of 19,806 tons. This equates to a deciview value of 0.083 DV, which is a 0.58% contribution to total impairment – an insignificant portion of the 2028 projected ~14.47 DV visibility at the Shenandoah National Park. As indicated previously, EPA has indicated that a DV change of less than 0.1 DV can be considered "no-degradation." Therefore, current SO_2 emissions from Units 1 and 2 do not significantly contribute to visibility degradation at Shenandoah National Park. Likewise, the Station's current NOx emissions' visibility impact (0.007 DV at Brigantine Wilderness) is well below the no degradation threshold of 0.1 DV and less than 0.04% of the 2028 projected visibility at the Brigantine Wilderness Area

[10] https://www3.epa.gov/ttnamti1/files/ambient/visible/tracking.pdf.
[11] Available at https://www.epa.gov/sites/production/files/2018-12/documents/technical_guidance_tracking_visibility_progress.pdf.

(18.4 DV). Therefore, any projects that reduce NOx emissions at the Station would have a potential visibility improvement far less than the no-degradation threshold.

8. Conclusion

Emissions of SO_2 and NOx from Units 1 and 2 at the Station are already well controlled by wet FGD and SCR. Substantial SO_2 and NOx emission reductions have already been achieved with the existing emission controls. Since the 2006-2008 period, annual SO_2 emissions have been reduced by 89% and NOx emissions have been reduced by 48%. Improvements in visibility at the nearest Class I areas are well ahead of the uniform rate of progress glide path.

The existing wet FGD and SCR are the best available emission control options and no other technically feasible, more efficient controls have been identified. The combination of the FGD and SCR also provides for effective emissions control for the MATS Rule pollutants (acid gases, mercury and other non-mercury metals) and particulate matter. Replacement/tuning of the existing low-NOx burners was evaluated and the cost effectiveness of this control measure is excessive at $16,300/ton NOx removed. Additionally, recent VISTAS visibility modeling conducted using advanced photochemical grid modeling suggests that visibility impacts of the Station's 2019 NOx emissions are less than one-tenth of the threshold designated as a "no degradation" visibility change. Lastly, the Station will be submitting a case-by-case NOx RACT analysis to the PA DEP by April 21, 2021 which is expected to result in more stringent NOx limits.

Therefore, for Keystone Generating Station's Units 1 and 2, no additional controls are needed in order for PA DEP to meet their reasonable progress goal for the Second Decadal Review.

Appendix A

PA DEP Four-Factor Analysis Request Letter

May 26, 2020

Mr. Nate Rozic
Keystone Power, LLC/ Keystone Station
175 Cornell Road, Suite 1
Blairsville, PA 15717-8076

RE: Keystone Station Four-Factor Analysis for Regional Haze

Dear Mr. Rozic:

On January 10, 2017, the U.S. Environmental Protection Agency (EPA) finalized revisions to State Implementation Plan (SIP) requirements for the protection of visibility in mandatory Class I Federal areas under Sections 169A and 169B of the Clean Air Act (CAA). These revisions to the 1999 Regional Haze Rule (RHR) are applicable to the second and subsequent implementation periods, and requires states to submit a revised SIP to EPA by July 31, 2021.

The Pennsylvania Department of Environmental Protection (DEP or Department) is currently in the process of developing a Regional Haze SIP for the second planning period, which covers the years 2018 through 2028. Although there are no Class I Federal areas in Pennsylvania, emissions from Pennsylvania sources affect those in other nearby states (i.e. Acadia National Park (ME), Brigantine Wilderness Area (NJ), Dolly Sods Wilderness Area (WV), and Shenandoah National Park (VA), etc.).

In the first regional haze planning period (2001-2018), Best Available Retrofit Technology (BART) was statutorily required to address reasonable progress and a deciview threshold. For this second planning period (2018-2028) and subsequent planning periods, there is no BART or deciview threshold requirements, rather the CAA and RHR requires reasonable progress through an analysis of four factors laid out in Section 169A(g)(1) of the CAA:

1. The cost of compliance;
2. The time necessary for compliance;
3. The energy and nonair quality environmental impacts of compliance; and
4. The remaining useful life of any existing source subject to such requirements.

EPA guidance specifies that since regional haze results from a multitude of sources over a broad geographic area, progress may require addressing many relatively small contributions to impairment. Thus, a measure may be necessary for reasonable progress even if that measure in isolation does not result in perceptible visibility improvement.

Pennsylvania is part of the Mid-Atlantic Northeast Visibility Union (MANE-VU[1]), in which the members work collaboratively to develop emission control strategies to address visibility impairment. On August 25, 2017, MANE-VU issued a statement, referred to as the 2017 MANE-VU "Ask", in which six emission management strategies were proposed in order to meet the 2028 reasonable progress goals for regional haze. While many strategies were directed at states to adopt, one strategy requires input from five Pennsylvania facilities with electric generating units, due to modeling that showed potential visibility impacts of 3.0 Mm^{-1} (inverse megameters) or greater to one or more MANE-VU Class I areas. This analysis listed Keystone Station as a facility required to conduct a four-factor analysis.

In addition to the facilities identified by MANE-VU, the National Park Service (NPS; a Federal Land Manager with the opportunity to consult and comment on state's Regional Haze work) screened emission sources that may impact Class I Federal areas in national parks, using an emissions over distance (Q/d) analysis.[2] The NPS provided DEP with a list of forty Pennsylvania facilities that impact Shenandoah National Park in Virginia with a Q/d > 1.0. The Department noted that reasonable progress can be achieved by focusing on facilities with an above average impact. DEP set a threshold by calculating the average Q/d value of the forty Pennsylvania facilities impacting Shenandoah National Park, which equaled 12.79. Facilities with a Q/d > 12.79 average emissions impact are required to conduct a four-factor analysis. Keystone Station was identified as a source of emissions with a Q/d value of 124.4, which exceeds the threshold of 12.79.

Therefore, DEP requests that you prepare a four-factor analysis for sulfur dioxide (SO_2) and oxides of nitrogen (NOx) for subject sources at your facility (see attachment). The Department will review your analysis as part of its determination of what emission control measures may be necessary as part of determining reasonable progress. DEP will then submit the analysis to EPA in support of the Regional Haze SIP for the second planning period.

DEP has provided an attachment with resources and links to assist in your analysis. DEP understands the time and resources that go into conducting a four-factor analysis and suggests that your analysis be concise, yet thoroughly documented. Please submit the analysis via email to Bryan Oshinski at boshinski@pa.gov and Robert Cook at rwcook@pa.gov by July 31, 2020.

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[1] MANE-VU includes the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and the District of Columbia, as well as tribal members Penobscot Indian Nation and St. Regis Mohawk Tribe.

[2] In the Q/d analysis, Q is defined as annual emissions of oxides of nitrogen (NOx) and sulfur dioxide (SO_2) in tons, divided by kilometers between a source and the nearest national park.

Should you have questions, or if current circumstances require additional time, please contact Bryan Oshinski, Air Quality Program Specialist of the Air Resource Management Division, by e-mail at boshinski@pa.gov or by telephone at 717.783.8949 or Robert Cook, Air Quality Engineering Specialist of the Bureau of Air Quality's Permitting Division, by email at rwcook@pa.gov or by telephone at 717.772.3974.

Sincerely,

Viren Trivedi
Acting Director

Enclosure

cc: Mr. Kirit Dalal
Mr. Randy Bordner
Mr. Nash Bhatt
Mr. Bryan Oshinski
Mr. Robert Cook
Mr. Eric Gustafson

Appendix B

Summary of VISTAS Visibility Modeling Results

Table B-1 Estimated Haze based on Current Emissions from Units 1 and 2 at the Keystone Station

	Keystone Adjusted 2028 Emissions Modeled		2019 Keystone Emissions	
	SO2 (tpy):	21,066	SO2 (tpy):	19,806
	NOX (tpy):	5,086	NOX (tpy):	7,140
Extinction for 20% Worst Haze Days				
Class I Area	Total Modeled Sulfate Extinction Mm-1	Total Modeled Nitrate Extinction Mm-1	Scaled Modeled Impacts Results: Sulfate Extinction Mm-1	Scaled Modeled Impacts Results: Nitrate Extinction Mm-1
Shenandoah NP	0.7400	0.0093	0.6957	0.0130
Brigantine WA	0.3637	0.0394	0.3419	0.0554
Dolly Sods WA	0.2464	0.0008	0.2317	0.0011
Otter Creek WA	0.1902	0.0008	0.1788	0.0011
James River Face WA	0.2172	0.0054	0.2042	0.0076

Data from ATTACHMENT_A_PSAT_TAG_RESULTS_adjusted_08-11-2020.xlsx.

Projected 2028 Visibility at Current Emissions Levels

Class I Areas Nearest to Keystone Generating Station	Total Haze Impact from 2019 SO_2 Emissions		Total Haze Impact from 2019 NOx Emissions	
	Mm^{-1}	DV	Mm^{-1}	DV
Shenandoah National Park	0.696	0.083	0.013	0.002
Brigantine Wilderness Area	0.342	0.041	0.055	0.007
Dolly Sods Wilderness Area	0.232	0.028	0.001	0.000
Otter Creek Wilderness Area	0.179	0.021	0.001	0.000
James River Face Wilderness Area	0.204	0.025	0.008	0.001
0.12 DV per Mm^{-1} (See explanation in report)				

Appendix C

PA DEP Request for a Case-by-Case RACT Analysis

Keystone Generating Station
313 Keystone Drive
Shelocta, PA 15774

November 25, 2020

Via Email Delivery – egustafson@pa.gov
Mr. Eric A. Gustafson
Regional Air Quality Program Manager
Pennsylvania Department of Environmental Protection
Northwest Regional Office
230 Chestnut Street
Meadville, PA 16335

Re: Keystone Generating Station – Title V Operating Permit No. 03-00027 Acknowledgement of Department's Request for Case-by-Case RACT Analysis for Two Existing Coal-Fired Combustion Units Equipped with Selective Catalytic Reduction (SCR) System

Dear Mr. Gustafson:

Keystone Station is in receipt of the attached letter, which includes the following request:

> *Please confirm in writing, within 10 days of receipt of this correspondence, that your facility will submit complete case-by-case RACT II determinations for existing coal-fired combustion units which are equipped with SCR to DEP, along with a significant operating permit modification application, on or before April 1, 2021.*

Keystone Station is planning to submit the above-mentioned determination and application on or before April 1, 2021. It is our understanding that once the determination is approved, the applicable requirements will be captured in an updated Title V operating permit and will both supersede the existing RACT II Rule requirements and satisfy the Department's forthcoming RACT III Rule requirements.

If you have questions or concerns regarding this letter, then please contact me at (724) 354-5475 or nrozic@keyconops.com.

Very truly yours,

Nathan J. Rozic
Environmental Specialist – Keystone Generating Station

Cc: Joseph Kushner, Strategy & Compliance Manager – Keystone and Conemaugh Stations

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

November 17, 2020

Nathan J. Rozic – Environmental Specialist mailto:nrozic@keyconops.com
Keystone Conemaugh Project LLC
175 Cornell RD STE 1
Blairsville, PA 15717

Re: RACT II regulation Implementation, §§ 129.96 to 129.100
Keystone Station
Title V Permit No: 03-00027
Plumcreek Township, Armstrong County

Dear Mr. Nathan J. Rozic:

On August 27, 2020, the U.S. Third Circuit Court of Appeals issued an opinion in *Sierra Club v. EPA*, 3d. Cir. No. 19-2562 ("Sierra Club") vacating and remanding three aspects of the U.S. Environmental Protection Agency's (EPA) May 19, 2019 approval of DEP's 2016 reasonably available control technology (RACT II) Rule to reduce ozone pollution from coal-fired power plants (84 FR 20274). Sierra Club challenged EPA's approval of the RACT II Rule's oxides of nitrogen emission limit for coal-fired power plants with selective catalytic reduction (SCR) pollution controls; the inlet operating temperature threshold for power plants to operate SCR pollution controls; and operating temperature data recordkeeping and reporting requirements. The Court found EPA's approval of these three provisions of the RACT II Rule to be arbitrary and capricious, because they were not supported by the administrative record. As a result, the Court vacated EPA's approval of these three provisions and remanded them back to the agency for further action. The vacated portion of the RACT II Rule affects your facility.

As a result of the Court's decision in Sierra Club, DEP is required to address RACT II requirements for existing coal-fired combustion units with SCR systems. DEP has determined that the best method to do this is through requiring the owner or operator of each unit affected by the Court's decision to submit case-by-case RACT II determinations that satisfy 25 Pa. Code § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) requirements. Case-by-case RACT determinations must be developed in accordance with the procedures in §129.92(a)(1)—(5) and (b), which includes a top-down analysis. DEP will review the proposed case-by-case determinations and incorporate the final determinations and associated conditions into your facility's Title V operating permit in accordance with 25 Pa. Code § 127.542 (relating to revising an operating permit for cause). The RACT determinations incorporated into the Title V operating permit will then be submitted to EPA as a state implementation plan revision.

Please confirm in writing, within 10 days of receipt of this correspondence, that your facility will submit complete case-by-case RACT II determinations for existing coal-fired combustion units which are equipped with SCR to DEP, along with a significant operating permit modification application, on or before April 1, 2021. If you are planning to modify any existing equipment or install a control device as a result of your RACT II determination, please contact us regarding the need to submit a plan approval application. Please note that DEP is waiving permit fees for review of the significant operating permit modification application.

If you have any questions, please contact me at 814-656-1346 or egustafson@pa.gov.

Sincerely,

Eric A. Gustafson

Eric A. Gustafson
Program Manager
Northwest Region Air Quality Program

cc: Mark Hammond, Bureau Director
Hbg. – Permits
File

Four Factor Analysis
Regional Haze Rule
Second Decadal Review

Keystone Generating Station
Units 1 and 2

AECOM Project number: 60634468-1

Original Submittal: July 29, 2020
Revised (Rev.01): January 11, 2021
Revised (Rev.02): February 11, 2021

Quality information

Prepared by	Prepared by	Checked by	Approved by
Robert R. Hall Senior Air Quality Engineer	Robert J. Paine Associate Vice President	Seemantini Deshpande Project Manager	Seemantini Deshpande Project Manager

Prepared for:

Keystone Generating Station
313 Keystone Dr, Shelocta, PA 15774

Prepared by:

Robert R. Hall
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Table of Contents

List of Tables

List of Figures

List of Appendices

1. Introduction

The Pennsylvania Department of Environmental Protection (PA DEP) Bureau of Air Quality notified the Keystone Generating Station (Keystone Station) that PA DEP is developing a State Implementation Plan (SIP) for the Second Decadal Review period of the federal Regional Haze Rule (42 USC §7491 – Visibility Protection for Federal Class I Areas). The Regional Haze Rule (RHR) requires state and federal agencies to work to improve visibility in U.S. National Parks and Wilderness Areas throughout the country (see 40 CFR §§ 81.401 through 81.437) with the ultimate goal of achieving "natural background" visibility in these Class I areas by the year 2064. Every ten years, agencies are required to evaluate their plans and consider whether additional emission reductions at certain major sources are warranted to continue realizing "reasonable progress" in visibility improvement. PA DEP identified the Keystone Station Units 1 and 2 as sources requiring an analysis for potential reductions of sulfur dioxide (SO_2) emissions and nitrogen oxides (NOx) emissions. Primary PM_{10} is another pollutant that may contribute to visibility impairment (although to a much lesser extent relative to SO_2 and NOx), but emissions of this pollutant are not required to be evaluated for this analysis – see Section 3 of this report for details.

As outlined in the RHR, this analysis, referred to as a "Four-Factor Analysis", needs to first identify all technically feasible control technologies for additional SO_2 and NOx emissions control. Each feasible control option then needs to be evaluated relative to the following four statutory factors:

1) Cost of implementing emission controls;
2) Time necessary to install such controls;
3) Energy and non-air quality impacts associated with installing controls; and
4) The remaining useful life of the facility.

In May 2020, the PA DEP requested Keystone Station to perform the subject analysis for Units 1 and 2, and submit their findings to the PA DEP. Appendix A provides a copy of the PA DEP's letter request. Keystone Station contracted AECOM to assist with the analysis. Although not required to be included in the analysis, states have the option to consider a fifth factor – evaluation of visibility benefits - in addition to the four statutory factors when making their reasonable progress determinations. This analysis includes the fifth factor (see Section 7) to provide additional information to PA DEP to assist in their consideration for the need of additional controls for visibility improvement.

The initial analysis was submitted to the PA DEP in July 2020. The first revised (Rev. 01) analysis was prepared in response to comments from the PA DEP and other reviewers that were received by Keystone Station (and forwarded to AECOM) on August 18, 2020. The second revised (Rev. 02) analysis was prepared in response to comments from the PA DEP that were received by the Keystone Station in January 2021 following PA DEP's review of the Rev. 01 analysis.

This report provides a description of the affected source (Section 2), a summary of the actions taken during First Decadal Review period of the RHR (Section 3), a summary of actual baseline emissions (Section 4), a discussion of existing emission controls (Section 5), and identification of potentially feasible control options and an assessment of each of the four statutory factors for these options (Section 6). Additionally, Section 7 provides a "fifth factor" analysis of the prospective visibility impacts to Class I areas of potential SO_2 controls for PA DEP's consideration. Finally, Section 8 presents a summary of this report's findings.

2. Source Description

Keystone Generating Station, which is located at 313 Keystone Dr, Shelocta, PA 15774, is licensed to operate under environmental permits issued to Keystone-Conemaugh Projects, LLC. The Station operates under PA DEP's Title V Operating Permit No. 03-00027 (Expiration date – March 31, 2025).

Keystone Station Unit 1 and Unit 2 are each identical bituminous coal-fired boilers with a steam turbine-driven electric generator that provide electricity to the regional electric grid. Manufactured by Combustion Engineering, Units 1 and 2 were commissioned in 1967 and 1968, respectively, and fire bituminous coal mined in Pennsylvania. The nominal maximum operating conditions for each boiler and generator are heat input of 8,717 MMBtu/hr and gross electrical output of 910 MW, respectively. No. 2 fuel oil is used as the boiler start-up fuel and for supplemental firing as needed.

Each boiler is equipped with the following emissions control devices: Low-NOx burners, selective catalytic reduction (SCR, installed in 2003) for NOx control, electrostatic precipitator (ESP) for particulate matter (PM) control, hydrated lime (sorbent) injection system for sulfuric acid mist (H_2SO_4) control, and a wet flue gas desulfurization (FGD, installed in 2009) system for SO_2 and additional PM control. These control devices also provide co-beneficial emissions control for a suite of other pollutants such as mercury and acid gas emissions. Process gases at each unit are routed through the emission control systems using induced draft (ID) booster fans. Process gases from each FGD system are discharged to the atmosphere through a single exhaust flue contained in one concrete stack (designated as S12 in the Title V permit).

Unit 1 and Unit 2 are subject to, and compliant with, the Cross-State Air Pollution Rule (CSAPR or Transport Rule) and the related requirements promulgated under 25 Pa. Code Chapter 139 and 40 CFR 75 - Continuous Emissions Monitoring. Keystone Station operates and maintains (i) certified continuous emission monitoring systems (CEMs) for NOx, SO_2 and carbon dioxide (CO_2) and (ii) a certified exhaust gas stream flow monitor at the exhaust duct. Certified emissions, heat input and gross electrical load data are submitted quarterly to the PA DEP and U.S. Environmental Protection Agency (EPA).

Units 1 and 2 are also subject to, and compliant with, the following EPA and PA DEP regulations:

- 2010 SO_2 National Ambient Air Quality Standard (NAAQS) – a compliance modeling study completed by AECOM for the Indiana, PA designated non-attainment area demonstrated that current SO_2 emission impacts from the Keystone Station's units are compliant with the NAAQS
- PA DEP RACT II Rule – Units 1 and 2 demonstrate compliance with the presumptive NOx RACT limits for coal-fired electric generating boilers equipped with SCR
- Coal- and Oil-Fired Electric Utility Steam Generating Units (EGU) National Emission Standards for Hazardous Air Pollutants (NESHAP) Rule, also known as the Mercury Air Toxics Standards (MATS) Rule. Under the MATS Rule, Units 1 and 2:
  - Have attained Low-Emitting EGU (LEE) status for non-mercury metals using filterable PM as the surrogate pollutant;
  - Have attained LEE status for acid gas (HCl) standard; and,
  - Monitor mercury emissions using a sorbent trap sampler (nominal weekly sampling period).

In summary, contemporary emission control devices are already installed, operated and maintained at Units 1 and 2, and these devices provide for effective control of criteria and hazardous air pollutants.

3. First Regional Haze Planning Period Reasonable Progress Determination

During the First Decadal Review period of the RHR (i.e., 40 CFR 51 Subparts 308 and 309), Units 1 and 2 were subject to Best Available Retrofit Technology (BART) review because they had been placed into service within the rule-specified BART applicability window (between August 7, 1962 and August 7, 1977) and satisfied the other eligibility criteria. BART requirements for SO_2 and NOx emissions were satisfied by compliance with U.S. EPA's Clean Air Interstate Rule (CAIR), now superseded by the more stringent CSAPR, per U.S. EPA who ruled that CAIR achieved greater reasonable progress than BART for SO_2 and NOx emissions at BART-eligible electric generating units located in CAIR-affected states. A BART analysis (dispersion modeling study) for primary PM_{10} emissions was completed by AECOM and submitted to the PA DEP in January 2007, and that study concluded that visibility impacts from primary PM_{10} emissions from the Units 1 and 2 were imperceptible at the nearest Class I areas (Shenandoah National Park, Dolly Sods and Otter Creek Wilderness Areas). The Keystone Station has since further reduced its actual SO_2 and NOx emissions, as described in the next section.

4. Source Emissions

Actual emissions for Units 1 and 2 are summarized in **Table 4-1**. At the Keystone Station, actual emissions of SO_2 have been reduced between 2006-2008 (indicative of the baseline emissions prior to implementation of the regional haze program) and 2019 by more than 89% and emissions of NOx have been reduced by 48% over the same period. The emission reductions are indicative of the reductions achieved since commencement of the regional haze program and are attributable to installation of a wet flue gas desulfurization (FGD) system in 2009, the use of SCR and compliance with PA DEP's RACT II rule, compliance with other environmental programs such as CSAPR and the SO_2 NAAQS implementation, and to a lesser extent, the reduced level of utilization of these units.

AECOM understands that the PA DEP requested NOx and SO_2 four-factor analyses for Units 1 and 2 based, in part, on a metric used by the National Park Service (NPS) for evaluating potential impacts to visibility at the nearby Class I Areas (Dolly Sods and Otter Creek Wilderness and Shenandoah National Park). The metric is equal to the source annual emissions (tons) divided by distance between the source and the Class I Area (km). The NPS selected a ratio of 1.0 or greater as the threshold for identifying sources that could affect visibility conditions in the Class I Areas. While the metric may be appropriate as a screening tool, it does not consider the direction of the prevailing winds from the source to the Class I Areas (**Figure 7-1** presents the location of the Keystone Generating Station in relation to nearby Class I Areas). For Keystone Generating Station, wind direction data were generated using five years (2009 - 2013) of wind speed / wind direction data at the Johnstown, PA airport. As depicted in the resultant wind rose presented in **Figure 4-1**, winds from the north and north-northwest (i.e., from the Keystone Generating Station toward the nearby Class I areas to the south) are very infrequent, which suggests that emissions from Units 1 and 2 rarely impact visibility conditions in those Class I areas.

Figure 4-1 Johnstown Airport 5-Year (2009 -2013) Wind Rose

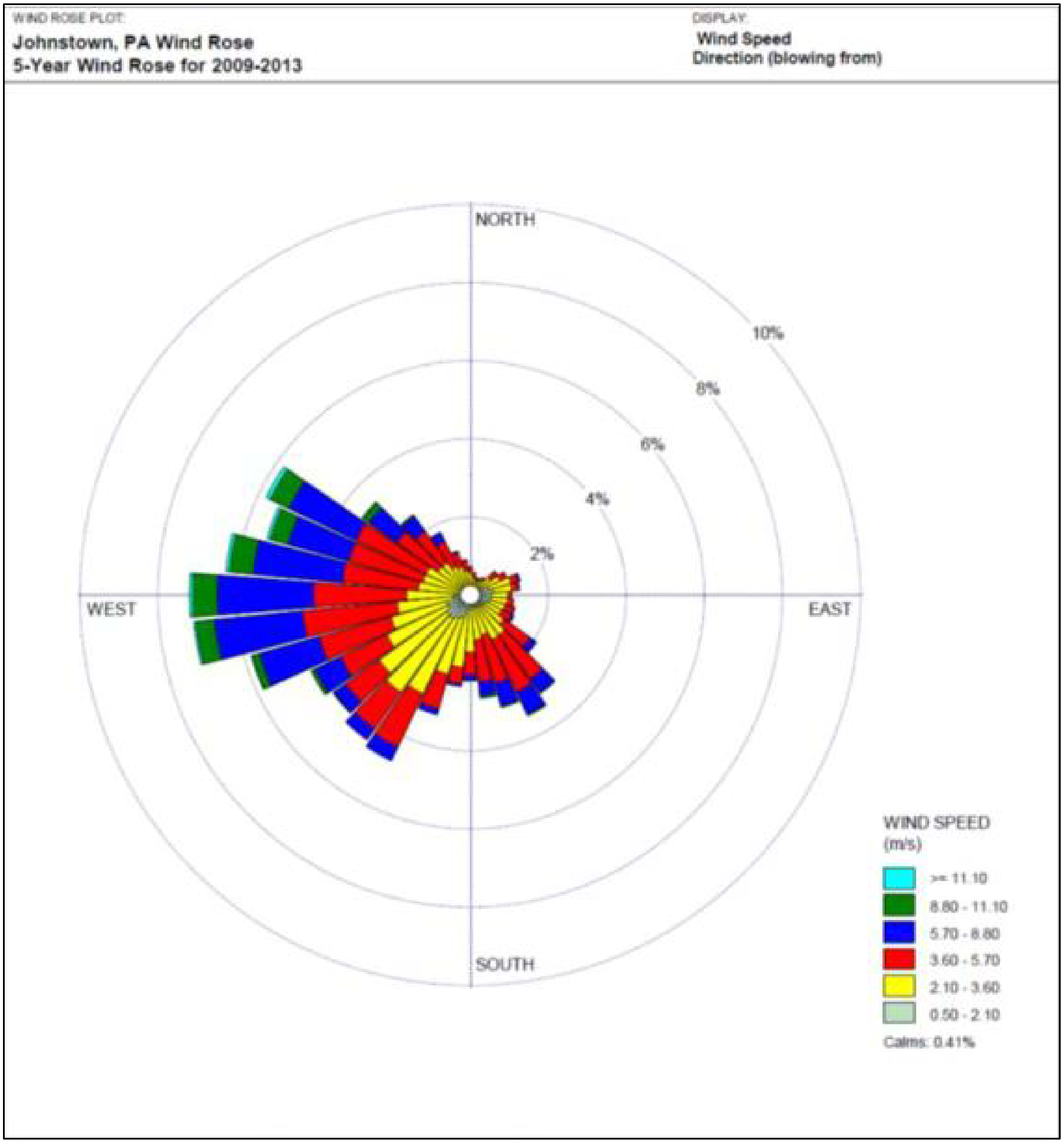


Table 4-1 Keystone Generating Station – Unit 1 and Unit 2 Actual Annual Operation and Emissions

Time Period	Unit	Annual Operating Hours[a]	Power Output [a]	Capacity Factor based on MW [b]	Annual Fuel Use [a]	SO_2 Emissions [a]		NO_x Emissions [a]		NO_x Emissions when flue gas temperature at SCR inlet ≥ 600°F [c]
		(hr/yr)	(MW)	%	(MMBtu/yr)	(ton/yr)	(lb/MMBtu)	(ton/yr)	(lb/MMBtu)	(lb/MMBtu)
2006 through 2008	1	8,101	6,993,291	88%	62,799,882	89,735	2.86	7,137	0.227	*Not applicable*
	2	8,023	6,823,606	86%	60,103,001	85,408	2.84	6,466	0.215	*Not applicable*
	Average	8,062	6,908,448	87%	61,451,441	87,571	2.85	6,801	0.221	*Not applicable*
	Total					175,143	--	13,603	--	--
2019	1	8,185	6,498,402	82%	61,842,784	11,868	0.384	3,937	0.127	0.104
	2	6,884	5,377,298	67%	50,498,750	7,939	0.314	3,203	0.127	0.103
	Average	7,534	5,937,850	74%	56,170,767	9,903	0.353	3,570	0.127	0.104
	Total					19,806	--	7,140	--	--
Emission Reduction						89%	--	48%	--	--

(a) USEPA Air Markets Program Data (https://ampd.epa.gov.ampd/).

(b) Rated capacity for each unit is 910 MW, gross.

(c) Per PA DEP RACT II Rule, presumptive NOx emission limits for a coal-fired EGU boiler with SCR is 0.12 lb/MMBtu when flue gas temperature at SCR inlet ≥ 600°F, 0.35 lb/MMBtu when flue gas temperature at SCR inlet is < 600°F (rolling 30-boiler operating day averaging period)[1]

[1] *25 Pa. Code §129.97(g)(1)(viii)* and *25 Pa. Code §§129.97(g)(1)(vi)(B)*

5. Existing Emission Controls

EPA's regional haze guidance[2] includes several criteria that, if applicable, would indicate that a source already has effective controls in place as result of a previous regional haze decision or other Clean Air Act (CAA) requirements and as such, it may be reasonable for the state to not select that source for further analysis.[3] In addition, EPA guidance for effectively controlled sources suggests that a full four-factor analysis would likely result in a conclusion that no additional controls are necessary.

5.1 SO_2 Control Measures

In addition to the certified CEMs noted in Section 2, Keystone Station operates and maintains diagnostic SO_2 and CO_2 CEMs at the inlets to the FGD absorbers. Data from these diagnostic CEMs are not reported to the agencies, but are rather used by Station Operations to gauge performance of the FGD and other systems. The inlet diagnostic CEMS are calibrated periodically, so the data are reliable. Using 2019 hourly-averaged data from the diagnostic (inlet) and certified (i.e., actual stack emissions) CEMs yields SO_2 control efficiencies of 90.7% and 92.7% for Units 1 and 2, respectively.

5.2 NOx Control Measures

The Keystone Station Units 1 and 2 use low-NOx burners and SCR systems to control NOx emissions. NOx emissions from Units 1 and 2 prior to the installation of the low-NOx burners (1995) were approximately 0.7 lb/MMBtu (see RACT 1993-1995 proposals submitted to the PA DEP). When operating conditions are sufficient to allow aqueous ammonia injection in the SCR (close to the threshold specified in the PA DEP RACT II Rule, see Table 4-1), average NOx emissions from Units 1 and 2 were 0.104 and 0.103 lb/MMBtu, respectively, in 2019, which equates to an overall NOx control efficiency of 85% achieved by the low NOx burners and SCRs. Therefore, based on the current actual NOx emission rate and control efficiency, the existing NOx controls are highly effective.

6. Emissions Control Options

This section presents an evaluation of potential emissions reduction options applicable to SO_2 and NOx emissions from Units 1 and 2. The evaluation starts with listing potential control options and determining if the option is technically infeasible. For those options considered technically feasible, an analysis will be conducted considering the four statutory factors: (1) costs of compliance; (2) the time necessary for compliance; (3) the energy and non-air quality environmental impacts of compliance; and (4) the remaining useful life of the emission unit. Following that evaluation are conclusions related to the feasibility and reasonability of implementing the remaining approaches.

6.1 Identification of Potentially Available SO_2 Emissions Reduction Options

There are multiple options for controlling the emissions of SO_2 from coal-fired EGUs. These options fall in three general categories:

- Wet Flue Gas Desulfurization (wet FGD),

[2] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019.
[3] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019 (Page 23).

- "Dry" FGD (e.g.; spray dryer absorber (SDA), circulating dry scrubbers (CDS), or novel integrated desulfurization (NID)), or
- Dry Sorbent Injection (DSI).

Among these, the most effective at controlling SO_2 emissions from coal-fired boilers is a wet FGD system. Units 1 and 2 at the Keystone Station already have wet limestone FGD, which is the top level of control in terms of overall efficiency.

The use of dibasic acid, an organic acid buffer, to increase SO_2 control was considered. A buffer increases SO_2 control by decreasing the drop in pH at the gas-liquid interface which occurs as SO_2 is absorbed. However, this option was rejected because it can inhibit mercury control. Increasing the limestone stoichiometric ratio (LSR, moles of Ca per moles of SO_2 absorbed) may provide a marginal improvement in SO_2 removal. However, the FGD system already operates at the preferred LSR needed for scrubber operation.

At the Keystone Station, the wet FGD system (spray towers) has five recycle pumps that can provide five spray levels of limestone slurry injection. Currently, the Station typically operates three spray levels with the remaining two reserved for backup or occasional use in order to maintain target emission rates of SO_2 and other pollutants (e.g., Hg). Operating a fourth recycle pump/spray level increases the liquid to gas ratio, thus resulting in a small improvement in SO_2 control efficiency.

6.1.1 Costs of Compliance (Factor 1)

At the Station, SO_2 emissions are controlled by wet limestone FGD, and as such, SO_2 emissions are already well controlled (> 90 percent removal). Therefore, the potentially available control options to further reduce SO_2 emissions are limited to process improvements and regular operation of a fourth FGD spray pump/level. Keystone Station has already implemented several process improvements designed to increase the efficacy of the wet FGD system during the past eleven years, which overlap with the first and second decadal review periods of the RHR. The process improvements included the following:

- Optimized the performance of the slurry recycle pumps for the FGD absorber to allow for consistent feed of limestone slurry to the spray banks;
- Optimized the performance of the limestone ball mill to allow for a finer grade of pulverized limestone, which in turn allows for a more consistent limestone slurry;
- Configured the distributed control system to automatically adjust process variables to ensure that absorber pH and limestone slurry density are maintained within the specified tolerances; and,
- Implemented a preventative maintenance plan to proactively address potential equipment issues related to FGD performance.

The regulatory drivers for the process improvements included the following:

- EPA's MATS Rule - compliance with this rule began in April 2015. FGD efficacy improvements were implemented during the years 2014 through 2020 to ensure compliance with the MATS mercury emissions limits. These improvements also resulted in co-beneficial reductions in SO_2 emissions as demonstrated in the summary table below. (The exhaust gas flues for Units 1 and 2 are in a single chimney, the flue gas streams merge upon discharge to the atmosphere.)
- EPA's 2010 SO_2 NAAQS compliance demonstration – A dispersion model analysis was performed to determine the Units 1 and 2 SO_2 emission limit required to demonstrate compliance with the 1-hour SO_2 NAAQS. For Keystone Station, the

modeling exercise showed that the new SO_2 emission limit, which became applicable in October 2018 (during the second decadal review period for the RHR) is approximately 50 percent of the previous emission limit that was applicable when the FGD systems began operations in late 2009.

- Keystone Station also utilizes a dry sorbent (hydrated lime, calcium hydroxide) injection system at Units 1 and 2 to reduce sulfur trioxide / sulfuric acid mist emissions as necessary in order to maintain compliance with PA DEP exhaust gas opacity limits. Keystone Station believes that the alkaline sorbent (injected before the FGD system) also provides for co-beneficial reductions in SO_2 emissions. In 2019, Keystone Station changed from using a standard hydrated lime product to an "enhanced" (higher porosity) hydrated lime product, which improved oxidized sulfur removal.

To highlight the downward trend, annual SO_2 emissions (tons/year, lb/MMbtu and lb/MWh) for the past eleven years are shown in **Table 6-1** below.

Table 6-1 Annual SO_2 Emissions from Keystone Station Units 1 and 2

Unit IDs	Year	Gross Load (MW-h)	Heat Input (MMBtu)	SO_2 (tons)	SO_2 (lb/MMBtu)	SO_2 (lb/MWh)
1 & 2 Combined	2010	14,574,271	130,161,394	39,113	0.60	5.4
1 & 2 Combined	2011	11,998,124	110,717,647	46,441	0.84	7.7
1 & 2 Combined	2012	10,222,266	95,680,332	29,420	0.61	5.8
1 & 2 Combined	2013	13,285,780	120,607,139	26,397	0.44	4.0
1 & 2 Combined	2014	12,317,305	112,359,466	28,138	0.50	4.6
1 & 2 Combined	2015	10,255,389	97,146,022	24,447	0.50	4.8
1 & 2 Combined	2016	11,019,360	105,560,720	22,403	0.42	4.1
1 & 2 Combined	2017	12,672,885	118,766,848	23,250	0.39	3.7
1 & 2 Combined	2018	13,338,898	123,507,053	23,951	0.39	3.6
1 & 2 Combined	2019	11,875,700	112,341,534	19,806	0.35	3.3
1 & 2 Combined	2020*	7,931,484	77,364,300	13,011	0.34	3.3
* Preliminary data						

Keystone Station believes that the FGD efficacy improvements implemented during the past eleven years are sufficient to satisfy the PA DEP's reasonable progress goals for visibility improvement during the second decadal review period, and that this outcome is consistent with EPA's guidance that "reasoned decision-making is a core component of the regional haze program, and thus of states' regional haze SIP submissions."[4]

However, in order to be complete and thorough, we present the following discussion regarding the annual cost of regular operation of a fourth level of pumps at the existing wet FGD systems.

[4] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019 (Page 1).

During 2020, total SO_2 emissions for Units 1 and 2 were 13,011 tons/yr. A summary of hourly inlet and outlet SO_2 emission rates for Unit 1 for the period December 22, 2020 through January 6, 2021, based on continuous monitoring, demonstrates that the average SO_2 emission rate with three pumps in service is 0.365 lb/MMBtu and that with four pumps in service is 0.334 lb/MMBtu. In 2020, Unit 1 had an annual heat input of 38,621,586 MMBtu/year.

Operation of a fourth recycle is expected to increase SO_2 control efficiency to about 94.2% as opposed to the 93.6% with three pumps. An increase in SO_2 control efficiency to 94.2% will reduce annual emissions by 600 tons/year for Unit 1 (38,621,586 MMBtu/year x 0.365 lb/MMBtu - 38,621,586 MMBtu/year x 0.335 lb/MMBtu).

The following are the operating costs associated with regularly operating a fourth recycle pump:

- limestone cost;
- solid waste handling and disposal cost;
- Variable O&M costs; and,
- electricity to power the additional pump.

The increase in annual limestone cost would be about $21,710/yr based on an approximate limestone usage rate of 1.59 tons limestone per ton of SO_2 removed and a cost of $22.77 per ton limestone. Annual electricity costs for a fourth recycle pump would be about $198,072/yr based on the 2020 annual capacity factor of about 49% and an electricity cost of $26.7/MWh. The incremental variable operating and maintenance cost is $22,400. Including the modest savings in CSAPR allowance fee, the incremental annual cost for operating the fourth level of pumps on a regular basis would be about $247,300/yr and the cost effectiveness would be about $413 per ton of SO_2 controlled for Unit 1. Since Units 1 and 2 are identical, the same discussion is applicable to Unit 2 as well.

It should be noted that actual SO_2 emissions reduction (tons) with a fourth recycle pump in operation will vary depending upon operating loads, inlet SO_2 (coal sulfur content) and other factors.

6.1.2 Time Necessary for Compliance (Factor 2)

Wet limestone FGD, which is already used at the Station and has been optimized throughout its service life, is the top level of SO_2 control; therefore, no additional SO_2 emissions controls are being evaluated for this four-factor analysis. If determined to be required by the EPA-approved SIP, Keystone Station can begin operation of the FGD systems with four spray pumps/levels in regular service within six months of final SIP approval.

6.1.3 Energy and Non-Air Quality Environmental Impacts (Factor 3)

Since a wet limestone FGD system already exists on Units 1 and 2 at the Station, the energy and non-air quality environmental impacts have already been taken into account.

6.1.4 Remaining Useful Life (Factor 4)

Units 1 and 2 were commissioned in 1967 and 1968, respectively. Although the units have achieved over 50 years of service, no specific retirement date has been set. Therefore, for Station planning purposes, the remaining useful life of these units is assumed to be at least 20 years.

6.2 Identification of Potentially Available NO_X Emissions Reduction Options

Several NO_X control options were considered as additions to the current SCR controls for application to the Keystone Generating Station including Selective Noncatalytic Reduction (SNCR), Powerspan ECO® system, rich reagent injection, natural gas reburn, coal reburn, NOxStar, water injection, LoTOX, PerNOxide, ROFA, and ROTAMIX. These technologies were evaluated for technical feasibility (availability and applicability to Units 1 and 2) based on a review of possible performance, engineering principals, and an assessment of commercial availability. The findings are listed in **Table 6-2**.

Table 6-2 NOx Control Technologies

NOx Control Option	Description
Rich reagent injection	Similar to SNCR. Only available for cyclone fired boilers.(1)
Natural gas reburn	Performance is affected by baseline NOx concentration; reburn zone temperature, residence time, and stoichiometry; overfire burnout zone temperature and residence time; and mixing of the reburn fuel with the bulk flue gas. Extensive testing required to make a meaningful prediction of performance.(1) Based on very limited, if any, applications, natural gas reburn is not expected to offer a significant emission reduction relative to other options such as an SNCR and SCR.
Coal reburn	Similar to natural gas reburn.
NOxStar	Uses an ammonia-based reagent and small amounts of hydrocarbon injected to the flue gas at the convective pass of the boiler to reduce NOx. Only one full scale demonstration project. An emerging technology that would require extensive design engineering and a long-term full scale demonstration to evaluate technical feasibility, cost, and performance.(1)
Water injection	To date, only bench scale testing on coal firing. Extensive design engineering and testing would be needed to determine scale-up potential, cost and performance.(1)
LoTOX	A low temperature oxidation system that uses ozone to convert NO and NO_2 to N_2O_5 for eventual removal by a wet scrubber. No known full-scale, coal-fired EGU applications.
PerNOxide	Uses hydrogen peroxide injected into the duct ahead of the air preheater. Has only been tested on a pilot scale. Extensive design engineering and testing would be needed to determine scale-up potential, cost and performance.(1)
ROFA	Rotating opposed overfire air. CFD modelling required to determine performance but expected to be inferior to an SNCR or an SCR.
ROTAMIX	Similar to an SNCR (Proprietary SNCR technology)

(1) Coyote Station Unit 1, North Dakota Regional Haze Second Planning Period Four-Factor Analysis. Sargent & Lundy, May 8, 2019.

All the above options were rejected for one or more of the following reasons:

1. No commercial availability,
2. Emission control performance of these options is inferior to an SCR, which is already being used on Units 1 and 2. EPA's top-down approach suggests that if the top level of

control is chosen or as in this case, already installed on the units, no further analysis is required.

We are, however, presenting costs of tuning/upgrading the existing low-NOx burners to achieve a small NOx emissions reduction, as discussed in the subsequent sections.

6.2.1 Costs of Compliance (Factor 1)

For both Units 1 and 2, NOx emissions are controlled by low-NOx burners and SCR. The controlling NOx emission limits are those specified in the PA DEP RACT II Rule, which are as follows:

Presumptive NOx emission limits for a coal-fired EGU boiler with SCR is 0.12 lb/MMBtu when flue gas temperature at SCR inlet ≥ 600 deg. F, 0.35 lb/MMBtu when flue gas temperature at SCR inlet is < 600 deg. F (rolling 30-boiler operating day averaging period).

In addition, the Keystone Generating Station received a letter from PA DEP on November 17, 2020 requesting submittal of a case-by-case NOx RACT analysis by April 1, 2021. A copy of this letter is included as **Appendix C** of this report. The Station expects the proposed NOx limits of this case-by-case analysis will be more stringent than the current NOx limits. The revised NOx limits are expected to become effective by January 1, 2023.

Performance of the SCR systems is affected by recent operating modes for the Station. The Station was originally designed for base load operation. However, due to a decrease in electrical demand by the regional grid operator (PJM) and increase in supply from (i) newly-constructed natural gas-fired EGUs (in response to abundant and low-cost natural gas that became available following development of advanced drilling practices in Pennsylvania) and, to a much lesser extent, (ii) renewable energy sources over the last few years, operations of Units 1 and 2 now typically cycle on a daily basis. This operation features higher or full load conditions during daylight hours on the business weekdays with high regional electric demand and often at loads in the 40% to 70% range or off-line at all other times. The performance of the SCR system is adversely affected by the low flue gas temperatures that occur at low loads. At loads below 70%, the flue gas temperature drops below 600°F. At 40% load, the flue gas temperature drops below 540°F. Injection of aqueous ammonia at these lower flue gas temperatures results in ammonium bisulfate formation, which deposits on the downstream air pre-heater and ESP, thus fouling these devices. This issue is the underlying basis for the bifurcated NOx emission limit scheme in the PA DEP RACT II Rule. Optimization of the existing SCR systems will be addressed as part of the forthcoming case-by-case NOx RACT analysis.

In order to present a complete and thorough four-factor analysis, the Station discussed with R-V Industries, Inc., additional NOx reduction options specifically around improving performance of low-NOx burners at the Conemaugh Station. Since the Conemaugh and Keystone Stations are sister facilities, equipment retrofit costs for the Conemaugh Station are reasonably applicable to the Keystone Station units as well.

R-V Industries stated that there is no available low-NOx tip that can be bolted onto the existing burners. Therefore, R-V Industries' approach, based on prior experience with tangentially-fired boilers of a similar size and design, was to install venturis in the windbox ductwork to resize the burner tips to help minimize excess air and NOx formation and optimize the overall air flow. The budgetary cost information from R-V Industries is presented in **Tables 6-3** and **6-4** and the cost-effectiveness is presented in **Table 6-5**.

The replacement burners can achieve a 17% NOx reduction (~ 0.22 lb/MMBtu NOx emission rate) when the minimum continuous operating temperature is less than 611°F (i.e., temperature below which ammonia injection into the SCR cannot commence).

Table 6-3 Low-NOx Burner Replacement/Tuning Capital Cost Estimate – Per Boiler

Cost Item	Computation Method	Factor	Cost	Notes
Direct Costs				
Purchased Equipment (PE)	Vendor Quote x factor	1.00	$1,901,250	Quote provided by R-V Industries, Inc.
Taxes	PE x factor	0	$0	PE exempt from 6% PA sales tax
Freight	PE x factor	0.05	$95,063	Table 2.4 of EPA's OAQPS Control Cost Manual, Sixth Edition, January 2002.
Total Purchased Equipment Costs (PEC)	Sum	----	$1,996,313	PE + Taxes + Freight
Direct Installation Costs	Conemaugh Station Estimate (applicable to Keystone Station as well)	----	$1,700,000	The budgetary estimate does not consider that all existing dampers on the current burners would need to be replaced, which is an extremely labor intensive effort that is not accounted for in the vendor quote. The listed cost (based on a comparable project) accounts for this omission.
Total Direct Costs (TDC)	Sum PEC + Installation Costs	----	$3,696,313	
Installation Costs, Indirect				
Engineering / supervision	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002
Construction / field expenses	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002
Construction fee	TDC x factor	0.10	$369,631	OAQPS Control Cost Manual, Sixth Edition, January 2002
Start-up	TDC x factor	0.01	$36,963	OAQPS Control Cost Manual, Sixth Edition, January 2002
Performance test	TDC x factor	0.01	$36,963	OAQPS Control Cost Manual, Sixth Edition, January 2002
Contingencies	TDC x factor	0.20	$739,263	Due to the uncertainties associated with the preliminary, budgetary nature of the cost information, a contingency of 20% is warranted.

Cost Item	Computation Method	Factor	Cost	Notes
Modeling and Optimization Studies	Conemaugh Station Estimate (applicable to Keystone Station as well)	----	$500,000	This budgetary estimate does not consider a critical analysis of potential changes in combustion zone conditions such as lower temperatures, decreased combustion efficiency (related to decreased oxygen availability and resultant increase in carbon monoxide) and increase in corrosion potential around the furnace walls. The listed cost (based on a comparable project) accounts for this omission.
Loss of Revenue Associated with Special Outage Required to Install Equipment	Lost generation x factor	25.00	$10,710,000	Factor = Estimated generation revenue price ($/MWh), 28 day outage, 850 MW generation capacity, 75% annual capacity factor
Total Indirect Costs (TIC)	Sum	----	$13,132,083	
Total Capital Investment (TCI)	**Sum TDC + TIC**	**----**	**$16,828,395**	**TDC + TIC**

Table 6-4 Low-NOx Burner Replacement/Tuning Annual Cost Estimate

Cost Item	Computation Method	Factor	Cost	Notes
Direct Operating Costs				
Operating Labor - Operator (OL)	---	---	---	No additional OL costs expected
Operating Labor - Supervision	---	---	---	No additional Supervisory Labor costs expected
Maintenance Labor (ML)	---	---	---	No additional ML costs expected
Maintenance Materials	---	---	---	No additional Maintenance Material costs expected
Total Direct Operating Costs (DOC)	Sum		$0	
Indirect Operating Costs				
Overhead	(OL + ML) x factor	0.80	$0	No change from current conditions; i.e., Overhead is included in the current overhead cost of the existing burners
Property Taxes	TCI x factor	0.01	$168,284	OAQPS Control Cost Manual, Sixth Edition, January 2001

Cost Item	Computation Method	Factor	Cost	Notes
Insurance	TCI x factor	0.01	$168,284	OAQPS Control Cost Manual, Sixth Edition, January 2002
Administration	TCI x factor	0.02	$336,568	OAQPS Control Cost Manual, Sixth Edition, January 2002
Capital Recovery (1)	TCI x factor	0.0944	$1,588,481	Factor per Equation 2.8a of EPA's OAQPS Control Cost Manual, Sixth Edition, 2002. (20 year life and 7% interest rate).
Total Indirect Operating Costs (IOC)	Sum	----	$2,261,617	
Total Annualized Cost (TAC)	**Sum DOC+ IOC**	**----**	**$2,261,617**	**Per unit**

(1) Based on information available from the Station, the firm-specific nominal interest rate for the Keystone Station is at least 7%. A 7% interest rate has been set by the United States Office of Management and Budget (OMB) and is described in the January 2002 EPA Air Pollution Control Cost Manual. Over the years, 7% has been used as a consistent basis for evaluating emission control options for BACT, RACT and BART analyses. As shown in Table 23 on Page 70 in PA DEP's June 2018 Technical Support Document for General Operating Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (GP-5A) and the General Plan Approval and General Operating Permit for Natural Gas Compression Stations, Processing Plants, and Transmission Stations (GP-5), PA DEP also supports use of an interest rate of 7%.

Table 6-5 Low-NOx Burner Replacement/Tuning Cost-Effectiveness ($/ton NOx Removed)

Unit No.	NOx Before Control (1) (tons/yr)	NOx After Control (2) (tons/yr)	Total Annualized Cost (3) ($/yr)	Cost Effectiveness ($ / ton NOx Removed)
1	3,937	3,780	$2,261,617	$14,405
2	3,203	3,079	$2,261,617	$18,239
Average				**$16,322**

(1) Based on CY2019 actual annual emissions. See Table 4-1.
(2) Based on available emissions and operating data for CY2019, the LNB upgrades are expected to reduce emissions by 157 tons/year for Unit 1 and 124 tons/year for Unit 2.
(3) See Table 6-4 for calculation of annual costs.

As shown in **Table 6-5**, the cost of installation of per ton of NOx removed is excessive at an average of $16,300/ton of NOx removed.

6.2.2 Time Necessary for Compliance (Factor 2)

Considering the extent, cost and duration of the outage associated with the low-NOx burner tune-up project, if determined to be required, the Station expects that this project would not be able to be completed for at least five years following an approval to proceed (plans for major capital projects and major outages at the Station are prepared with five-year forecasts). Permitting can take up to nine months (to ensure that appropriate federally enforceable operating limits and conditions are established in the Plan Approval / construction permit as issued by the PA DEP) with an additional twelve months required for completion of the modeling study, final design, purchase and implementation. As noted above, optimization of the existing SCR systems will be addressed as part of the forthcoming case-by-case NOx RACT analysis, and the revised NOx limits are expected to become effective by January 1, 2023 (within two years).

6.2.3 Energy and Non-Air Quality Environmental Impacts (Factor 3)

There are no unacceptable energy or non-air quality environmental impacts associated with operation of the existing or the upgraded low-NOx burners and SCR systems on Units 1 and 2 at the Keystone Generating Station.

6.2.4 Remaining Useful Life (Factor 4)

EPA's 2019 regional haze guidance states that the remaining useful life is the number of years that the "new control equipment" is expected to be in service. Therefore, for in-service dates in the 2025 to 2028 range, a 20-year useful life means that the coal-fired EGU on which the control is installed, is expected to be operating in the 2045 to 2048-time frame. A 30-year useful life means that the EGU is expected to be in operation in the 2055 to 2058-time frame. Although the projected life of a new control system may be 30 years, the remaining useful life of an existing EGU may be less than 30 years due to its current age and the current economic dispatch competition from other sources of electricity (nuclear, combined-cycle natural gas and renewable energy).

During the first regional haze planning period, a 20-year useful life was accepted as a default by the EPA. This has proven to be overly optimistic as approximately 30% of the coal-fired generation capacity in the U.S. has been retired in the 10-year period since 2009. Additional retirements have been announced and are expected to continue (e.g., see the following link: https://www.genon.com/genon-news/genon-holdings-inc-announces-retirement-of-morgantown-coal-units) due to competition from natural gas-fired EGUs, renewable energy and other environmental and non-environmental factors.

Units 1 and 2 were commissioned in 1967 and 1968, respectively and as mentioned previously, no specific retirement date has been set for either of them. Therefore, for Station planning purposes, the remaining useful life of these units is assumed to be 20 years.

7. Additional 5th Factor Consideration - Visibility Impacts

The goal of the RHR is to improve the visibility in Class I areas. Accordingly, when evaluating possible emissions reduction projects or programs, it is appropriate to consider the degree to which individual control projects might contribute towards that goal. Although states have a statutory requirement to consider the "4 factors" addressed in the earlier portion of this report, EPA's guidance[5] also allows inclusion of a "5th factor" which involves consideration of visibility impacts of candidate control options. This section addresses the visibility impacts of current operations as well as the impact of the marginal SO_2 control offered by operating a fourth level of spray pumps. As explained below, because the visibility impacts attributable to the Keystone

[5] US EPA; "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" in August 2019. Available at https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf.

Station are low, further controls and/or lower emission limits, even if technically and economically feasible, would not yield material visibility benefits at any of the regional Class I areas because the Station's Units 1 and 2's current emissions have a very low visibility impact.

7.1 EPA Guidance Regarding Considerations of Visibility Impacts

The EPA issued "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" in August 2019. This guidance allows a state, as part of its consideration of emission controls, to include a "5th factor" consideration of visibility impacts of candidate control options.

On pages 36 and 37 of this guidance, the EPA notes that concerning the underlying regulation for ascertaining reasonable further progress, the regulation:

> *"assumes that the state will consider visibility benefits as part of the analysis. Section 51.308(f)(2)(i) of the Regional Haze Rule requires consideration of the four factors listed in CAA section 169A(g)(1) and does not mention visibility benefits. However, neither the CAA nor the Rule suggest that only the listed factors may be considered. Because the goal of the regional haze program is to improve visibility, it is reasonable for a state to consider whether and by how much an emission control measure would help achieve that goal." . . .*
> *". . . EPA interprets the CAA and the Regional Haze Rule to allow a state reasonable discretion to consider the anticipated visibility benefits of an emission control measure along with the other factors when determining whether a measure is necessary to make reasonable progress."*

Consequently, an expectation of a very low impact to Class I visibility impairment from control of certain facility pollutants is appropriate for consideration when evaluating the need for further control of these emissions for Regional Haze Reasonable Progress.

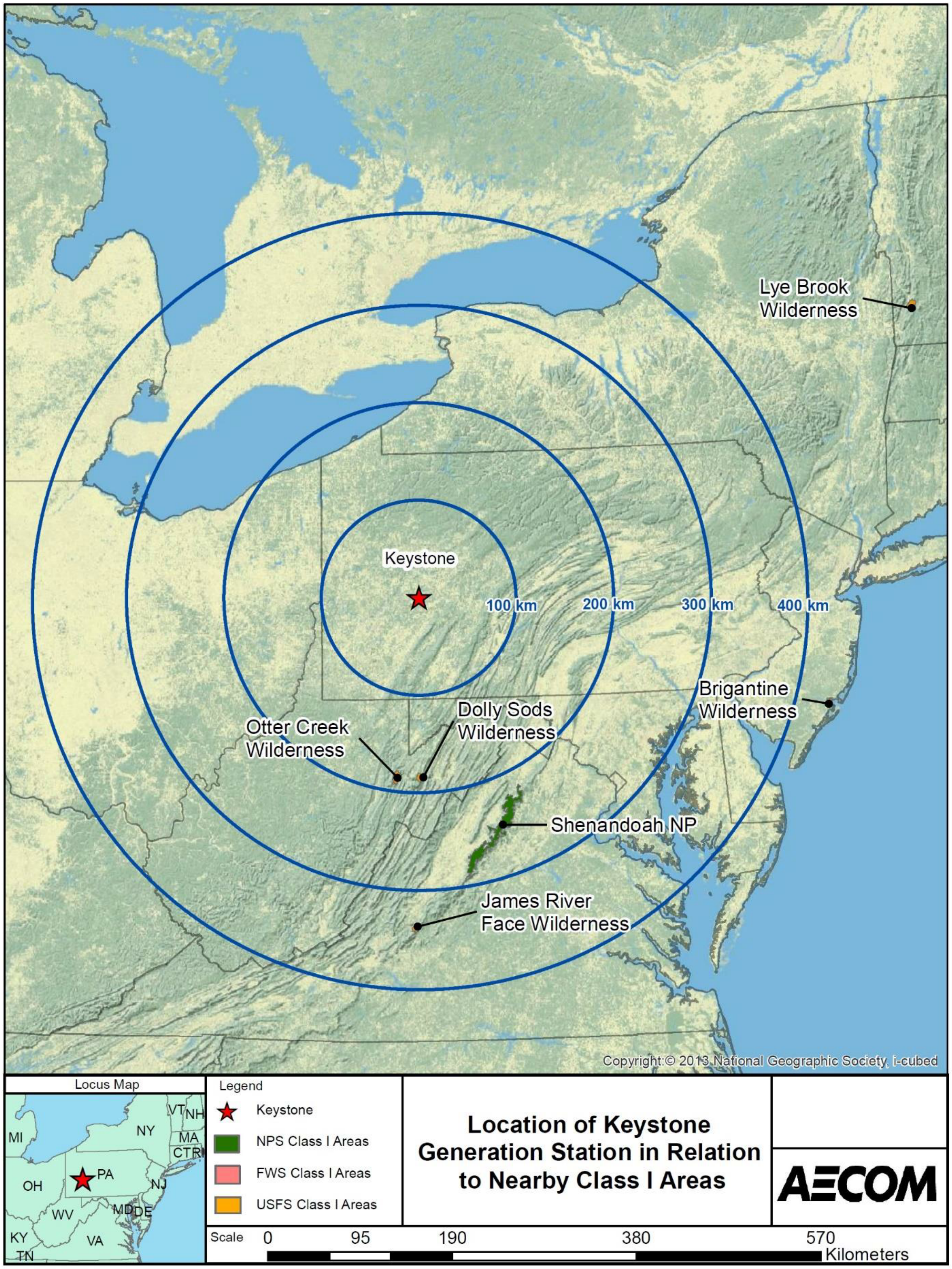
EPA's 2019 RHR guidance does not specifically state what would constitute an insignificant visibility impact, but the preamble to the 1999 RHR (64 FR 35730) does specify a "no degradation" visibility change if the impact is less than 0.1 deciview. In addition, MANE-VU determined in the first decadal review that a visibility improvement less than 0.1 deciview individual impact does not warrant consideration of additional controls[6]. This amount of visibility change (for the worst 20% haze days) is on the order of 1% or less of the 2028 glidepath target, so it constitutes a very low value. It should be noted that the 0.1 deciview benchmark is not in and of itself an "off-ramp" for disqualifying the candidate control options being considered. States need to review the already-installed emissions controls, the feasibility, effectiveness and cost of an additional control option, as well as its visibility impact together in order to arrive at a decision.

7.2 Class I Areas Near Keystone Generating Station

Class I areas in the eastern United States near Pennsylvania are shown in **Figure 7-1**. The closest Class I areas are Dolly Sods and Otter Creek Wilderness Areas in West Virginia and Shenandoah National Park in Virginia. Other Class I areas within 400 km include Brigantine Wilderness Area (New Jersey) and James River Face Wilderness Area (Virginia).

[6] 77 FR 17367 (March 26, 2012).

Figure 7-1 Class I Areas in the Vicinity of Keystone Generating Station



7.3 MANE-VU CALPUFF Modeling

Pennsylvania is one of the states within the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Regional Planning Organization. In 2016, MANE-VU conducted visibility modeling using 2015 Electrical Generating Unit (EGU) to determine visibility impacts of emission sources at Class I areas within MANE-VU. This modeling was conducted with the CALPUFF model, which was used for visibility modeling for the first decadal review.

Specific aspects of the MANE-VU modeling that are worth noting are as follows:

- 2011 and 2015 emissions were considered (emission reductions since 2011 and 2015 are not accounted for, making this analysis significantly dated and questionable for accuracy)
- 95th percentile emission rates were assumed to occur continuously (this approach can significantly overstate actual emissions, even for the outdated inventory used)
- CALPUFF was applied for distances from sources to Class I areas far exceeding the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 advisory[7] that use of CALPUFF for distances beyond 200 km could introduce significant overprediction biases in the results.
- CALPUFF is a screening model that has been delisted as an EPA-preferred long-range transport model (Appendix W updates in 2017, as proposed in 2015). It is puzzling why MANE-VU relied upon this screening model for determining sources that are asked to conduct four-factor analyses; no other Regional Planning Organizations have used CALPUFF modeling for the Second Decadal Review.
- CALPUFF evaluations[8] indicate large overpredictions of nitrate haze, especially in winter, due the dated formulation used in the model. The default MESOPUFF-II formulation has limitations for winter applications, where it results in overpredictions approaching a factor range of 4-6 in the evaluations noted in the reference.
- The statistic reported from the CALPUFF modeling was the highest day's impact, which is a significant departure from the 8th highest day for the first decadal review and the average of the 20% most impaired days for the second decadal review.

Due to widespread use of photochemical grid models such as CAMx by every other Regional Planning Organization in the country, the next sub-section discusses available CAMx modeling for some Pennsylvania EGUs (including the Keystone Generating Station) conducted by the southeastern states Regional Planning Organization, VISTAS / SESARM.

7.4 VISTAS CAMx Modeling Analysis

The impact to Class I area visibility of current Station emissions and hypothetical reductions to SO_2 and NOx emissions can be determined by analyzing the results of visibility modeling conducted by the VISTAS / SESARM[9] Regional Planning Organization that included emissions for some Pennsylvania power plants including the Keystone Generating Station. The VISTAS modeling was conducted by Alpine Geophysics and utilized advanced CAMx modeling including modeling particulate matter simulations and source apportionment studies. Determinations of the haze contributions of specified large sources was accomplished by "tagging" the selected sources for determining their contribution to impairment at each Class I area of interest. The tagged sources included the Keystone Generating Station. The results of VISTAS modeling

[7] IWAQM Phase 2 report, Appendix D. Available at http://www.epa.gov/scram001/7thconf/calpuff/phase2.pdf.
[8] Joseph Scire presentation at the EPA 10th Modeling Conference, available at https://www3.epa.gov/scram001/10thmodconf/presentations/3-5-CALPUFF_Improvements_Final.pdf.
[9] "VISTAS" is an acronym for Visibility Improvement -State and Tribal Association of the Southeast and "SESARM" stands for Southeastern States Air Resource Managers, Inc. Their web site for Regional Haze Rule modeling results is https://www.metro4-sesarm.org/content/vistas-regional-haze-program.

analysis of Keystone Station's total emissions can be used, with emissions scaling, to estimate the visibility impacts of Keystone Station Units 1 and 2's current (2019) actual emissions.

Visibility impairment is commonly expressed using two parameters to characterize the visibility impairment:

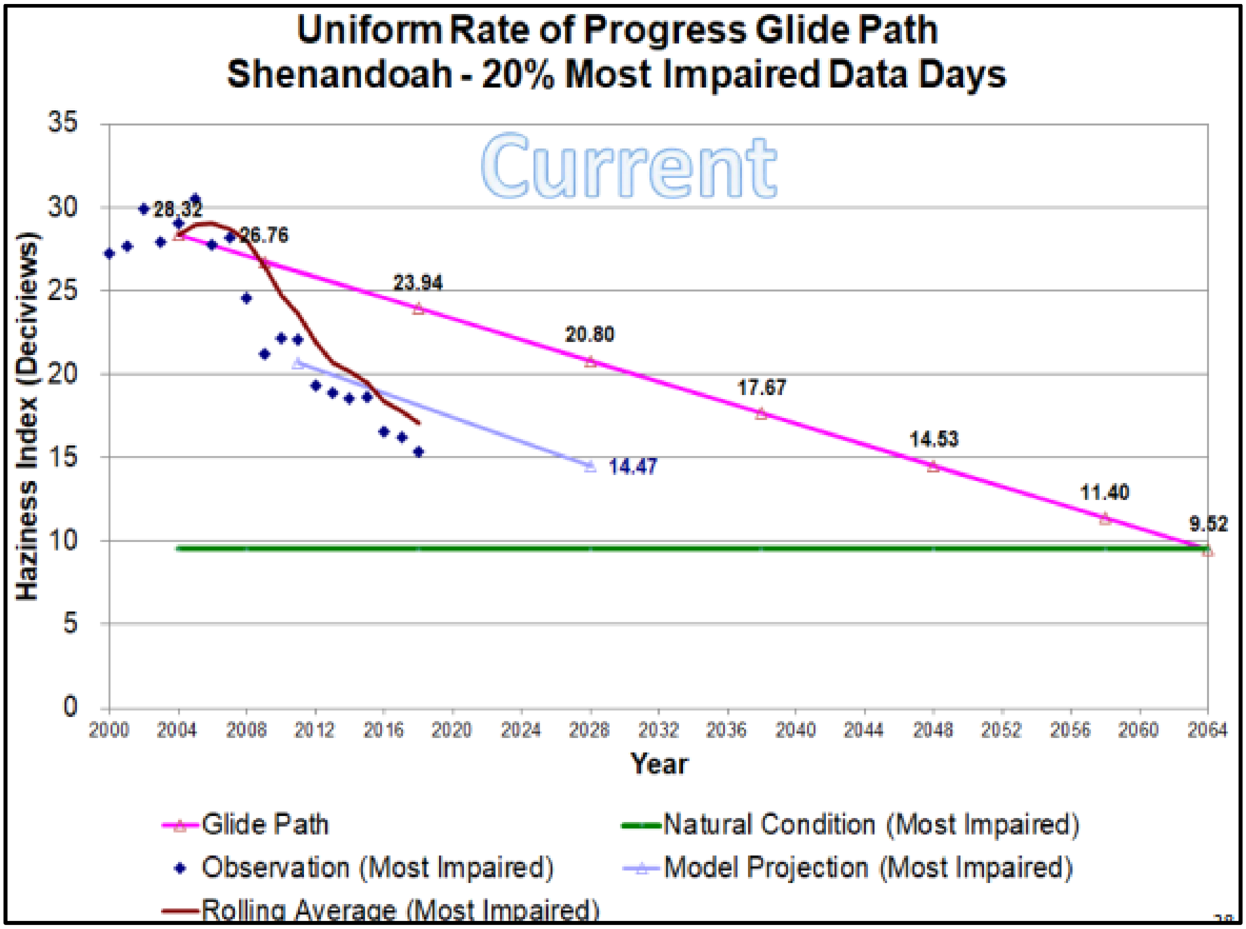
- **Light Extinction (b_{ext})** is the reduction in light due to scattering and absorption as it passes through the atmosphere. Light extinction is directly proportional to pollutant particulate and aerosol concentrations in the air and is expressed in units of inverse megameters or Mm-1.

- **Deciview (DV)** is a unitless metric of haze which is proportional to the logarithm of the light extinction. Deciview correlates to a person's perception of a visibility change, with a change of 1 deciview being barely perceptible. The "no degradation" value of 0.1 DV stated in the 1999 Regional Haze Rule is only 10% of this perceptibility threshold.

Both metrics are helpful in understanding changes to visibility impairment, but while the deciview is the best parameter to relate the significance of a perceived visibility change, modeling produces results in the form of light extinction using the new IMPROVE equation that converts particulate concentrations to visibility impairment. A chart shown in **Figure 7-2** is taken from the VISTAS Regional Haze modeling project update (webinar) updated on September 10, 2020 (after being originally presented on May 20, 2020). It shows, in units of deciview, the actual visibility measurements and projected modeling results of visibility for most impaired days at the Shenandoah National Park.

Figure 7-2 shows that actual visibility measurements (the diamonds) confirm a strong trend of improved visibility in the past 10 years from about 27 DV to about 16 DV. This rate of actual improvement is much faster than the RHR target to maintain a "uniform rate of progress" or "glide path" (the pink line), which could be revised to a less-steep revised glide path to account for internationally-caused haze. However, VISTAS believes that since the Class I areas in this region are so far ahead of projections, that refinement is not necessary at this time. Additionally, VISTAS modeling of the expected emissions reductions in the coming years (on-the-books / on-the-way controls) projects (the blue line) that visibility should continue to significantly improve, reaching approximately 14.47 DV by the next RHR milestone year of 2028. This chart shows that visibility in this Class I area is currently running at least 20 years ahead of the RHR targets and is expected to continue to do so. VISTAS modeling of other regional Class I areas shows very similar trends and are all far ahead of their glide path targets. Therefore, no additional emissions reductions at any regional facilities, beyond those already planned, are needed to continue to meet the RHR interim goals.

Figure 7-2 Visibility Trends at Shenandoah National Park



7.5 Visibility Impact of Keystone Station's Units 1 and 2 SO_2 and NOx Emissions

The VISTAS modeling used 2011 annual emissions for the tagged stations to develop the units' projected 2028 emissions, and these values can be scaled to current representative emissions for the Keystone Generating Station. PA DEP has stipulated that 2019 emissions should be considered as representative for this analysis. The adjusted 2028 emissions modeled for Keystone were 21,066 tons of SO_2 and 5,086 tons of NOx. The representative current emissions (2019) for the Keystone Generating Station were 19,806 ton of SO_2 and 7,140 tons of NOx. Keystone Station's current best estimate is that Unit 1 and 2's 2019 actual emissions are a reasonable projection of their 2028 emissions. With linear scaling, this results in a modeled impact at the Shenandoah National Park and other nearby Class I areas based upon the VISTAS modeling as shown in **Table 7-1**.

Table 7-1 Haze Impact from Keystone Generating Station's Total 2019 Emissions of SO_2 and NOx at Class I Areas Within 400 km

Class I Areas Nearest to the Keystone Generating Station	Total Haze Impact from 2019 SO_2 Emissions from the Keystone Generating Station		Total Haze Impact from 2019 NOx Emissions from the Keystone Generating Station	
	Mm^{-1}	**DV ***	**Mm^{-1}**	**DV ***
Shenandoah National Park	**0.696**	**0.083**	0.013	0.002
Brigantine Wilderness Area	0.342	0.041	**0.055**	**0.007**
Dolly Sods Wilderness Area	0.232	0.028	0.001	0.000
Otter Creek Wilderness Area	0.179	0.021	0.001	0.000
James River Face Wilderness Area	0.204	0.025	0.008	0.001

** Potential Improvement in DV is listed for the 20% most impaired days for each Class I area. Conversion between deciviews and extinction is based upon the 2028 glidepath goal extinction as a reference point.*

The VISTAS CAMx modeling results for tagged individual source visibility impacts are expressed as light extinction, in units of inverse megameters. Another visibility metric is deciviews, which can be determined from extinction through a logarithmic relationship, as noted in an EPA 2003 reference[10] for tracking progress under the Regional Haze Rule. That reference indicates (in Section 3.9) that a change of 1 deciview is equivalent to about a 10% change in extinction coefficient, and Internet tools such as that available at http://vista.cira.colostate.edu/Improve/haze-metrics-converter/ can easily do the conversion. Recent guidance from EPA, issued in 2018, is "Technical Guidance on Tracking Visibility Progress for the Second Implementation Period of the Regional Haze Program"[11]. This guidance indicates that the total anthropogenic impairment:

"is the difference (the 'delta deciviews') between the total deciview value that exists (or is projected to exist) and the deciview value that would have existed if there were only natural sources causing reduced visibility. This is the metric that EPA recommends be used. We recommend that states use Equation 2 to calculate anthropogenic visibility impairment:

Δ dv (anthropogenic visibility impairment) = dv (total) – dv (natural) (Eqn. 2),

where dv (total) is the overall deciview value for a day, and dv (natural) is the natural portion of the deciview value for a day.

We are considering the question: What is the difference in anthropogenic visibility impairment due to a proposed emission control? To determine this, one would use above equation twice to take the difference of two Δdv (anthropogenic visibility impairment) values. In so doing, the term dv (natural) cancels out. To determine the difference caused by a proposed control action, we conservatively use the 2028 extinction goal to determine the conversion of extinction to deciviews. With a 2028 extinction goal of approximately 80 Mm^{-1}, the conversion between a difference of 1 Mm-1 (relative to the 2028 goal of 80 Mm^{-1}) would be about 0.12 delta-dv.

Table 7-1 shows that total actual 2019 emissions of SO_2 from the Keystone Generating Station contributed only 0.696 Mm^{-1} light extinction at the Shenandoah National Park Class I area, based upon 2019 actual emissions of 19,806 tons. This equates to a deciview value of 0.083 DV, which is a 0.58% contribution to total impairment – an insignificant portion of the 2028 projected ~14.47 DV visibility at the Shenandoah National Park. As indicated previously, EPA has indicated that a DV change of less than 0.1 DV can be considered "no-degradation." Therefore, current SO_2 emissions from Units 1 and 2 do not significantly contribute to visibility degradation at Shenandoah National Park. Likewise, the Station's current NOx emissions' visibility impact (0.007 DV at Brigantine Wilderness) is well below the no degradation threshold of 0.1 DV and less than 0.04% of the 2028 projected visibility at the Brigantine Wilderness Area

[10] https://www3.epa.gov/ttnamti1/files/ambient/visible/tracking.pdf.
[11] Available at https://www.epa.gov/sites/production/files/2018-12/documents/technical_guidance_tracking_visibility_progress.pdf.

(18.4 DV). Therefore, any projects that reduce NOx emissions at the Station would have a potential visibility improvement far less than the no-degradation threshold.

8. Conclusion

Emissions of SO_2 and NOx from Units 1 and 2 at the Station are already well controlled by wet FGD and SCR. Substantial SO_2 and NOx emission reductions have already been achieved with the existing emission controls. Since the 2006-2008 period, annual SO_2 emissions have been reduced by 89% and NOx emissions have been reduced by 48%. Improvements in visibility at the nearest Class I areas are well ahead of the uniform rate of progress glide path.

The existing wet FGD and SCR are the best available emission control options and no other technically feasible, more efficient controls have been identified. The combination of the FGD and SCR also provides for effective emissions control for the MATS Rule pollutants (acid gases, mercury and other non-mercury metals) and particulate matter. Regular operation of a fourth level of pumps in the existing FGD systems had a cost effectiveness of $413/ton SO_2 removed.

Replacement/tuning of the existing low-NOx burners was also evaluated and the cost effectiveness of this control measure is excessive at $16,300/ton NOx removed. Additionally, recent VISTAS visibility modeling conducted using advanced photochemical grid modeling suggests that visibility impacts of the Station’s 2019 NOx emissions are less than one-tenth of the threshold designated as a “no degradation” visibility change. Lastly, the Station will be submitting a case-by-case NOx RACT analysis to the PA DEP by April 21, 2021 which is expected to result in more stringent NOx limits.

Therefore, for Keystone Generating Station’s Units 1 and 2, no additional controls are needed in order for PA DEP to meet their reasonable progress goal for the Second Decadal Review.

Appendix A

PA DEP Four-Factor Analysis Request Letter

pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

May 26, 2020

Mr. Nate Rozic
Keystone Power, LLC/ Keystone Station
175 Cornell Road, Suite 1
Blairsville, PA 15717-8076

RE: Keystone Station Four-Factor Analysis for Regional Haze

Dear Mr. Rozic:

On January 10, 2017, the U.S. Environmental Protection Agency (EPA) finalized revisions to State Implementation Plan (SIP) requirements for the protection of visibility in mandatory Class I Federal areas under Sections 169A and 169B of the Clean Air Act (CAA). These revisions to the 1999 Regional Haze Rule (RHR) are applicable to the second and subsequent implementation periods, and requires states to submit a revised SIP to EPA by July 31, 2021.

The Pennsylvania Department of Environmental Protection (DEP or Department) is currently in the process of developing a Regional Haze SIP for the second planning period, which covers the years 2018 through 2028. Although there are no Class I Federal areas in Pennsylvania, emissions from Pennsylvania sources affect those in other nearby states (i.e. Acadia National Park (ME), Brigantine Wilderness Area (NJ), Dolly Sods Wilderness Area (WV), and Shenandoah National Park (VA), etc.).

In the first regional haze planning period (2001-2018), Best Available Retrofit Technology (BART) was statutorily required to address reasonable progress and a deciview threshold. For this second planning period (2018-2028) and subsequent planning periods, there is no BART or deciview threshold requirements, rather the CAA and RHR requires reasonable progress through an analysis of four factors laid out in Section 169A(g)(1) of the CAA:

1. The cost of compliance;
2. The time necessary for compliance;
3. The energy and nonair quality environmental impacts of compliance; and
4. The remaining useful life of any existing source subject to such requirements.

EPA guidance specifies that since regional haze results from a multitude of sources over a broad geographic area, progress may require addressing many relatively small contributions to impairment. Thus, a measure may be necessary for reasonable progress even if that measure in isolation does not result in perceptible visibility improvement.

Pennsylvania is part of the Mid-Atlantic Northeast Visibility Union (MANE-VU[1]), in which the members work collaboratively to develop emission control strategies to address visibility impairment. On August 25, 2017, MANE-VU issued a statement, referred to as the 2017 MANE-VU "Ask", in which six emission management strategies were proposed in order to meet the 2028 reasonable progress goals for regional haze. While many strategies were directed at states to adopt, one strategy requires input from five Pennsylvania facilities with electric generating units, due to modeling that showed potential visibility impacts of 3.0 Mm^{-1} (inverse megameters) or greater to one or more MANE-VU Class I areas. This analysis listed Keystone Station as a facility required to conduct a four-factor analysis.

In addition to the facilities identified by MANE-VU, the National Park Service (NPS; a Federal Land Manager with the opportunity to consult and comment on state's Regional Haze work) screened emission sources that may impact Class I Federal areas in national parks, using an emissions over distance (Q/d) analysis.[2] The NPS provided DEP with a list of forty Pennsylvania facilities that impact Shenandoah National Park in Virginia with a $Q/d > 1.0$. The Department noted that reasonable progress can be achieved by focusing on facilities with an above average impact. DEP set a threshold by calculating the average Q/d value of the forty Pennsylvania facilities impacting Shenandoah National Park, which equaled 12.79. Facilities with a $Q/d > 12.79$ average emissions impact are required to conduct a four-factor analysis. Keystone Station was identified as a source of emissions with a Q/d value of 124.4, which exceeds the threshold of 12.79.

Therefore, DEP requests that you prepare a four-factor analysis for sulfur dioxide (SO_2) and oxides of nitrogen (NOx) for subject sources at your facility (see attachment). The Department will review your analysis as part of its determination of what emission control measures may be necessary as part of determining reasonable progress. DEP will then submit the analysis to EPA in support of the Regional Haze SIP for the second planning period.

DEP has provided an attachment with resources and links to assist in your analysis. DEP understands the time and resources that go into conducting a four-factor analysis and suggests that your analysis be concise, yet thoroughly documented. Please submit the analysis via email to Bryan Oshinski at boshinski@pa.gov and Robert Cook at rwcook@pa.gov by July 31, 2020.

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[1] MANE-VU includes the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and the District of Columbia, as well as tribal members Penobscot Indian Nation and St. Regis Mohawk Tribe.

[2] In the Q/d analysis, Q is defined as annual emissions of oxides of nitrogen (NOx) and sulfur dioxide (SO_2) in tons, divided by kilometers between a source and the nearest national park.

Should you have questions, or if current circumstances require additional time, please contact Bryan Oshinski, Air Quality Program Specialist of the Air Resource Management Division, by e-mail at boshinski@pa.gov or by telephone at 717.783.8949 or Robert Cook, Air Quality Engineering Specialist of the Bureau of Air Quality's Permitting Division, by email at rwcook@pa.gov or by telephone at 717.772.3974.

Sincerely,

Viren Trivedi

Viren Trivedi
Acting Director

Enclosure

cc: Mr. Kirit Dalal
Mr. Randy Bordner
Mr. Nash Bhatt
Mr. Bryan Oshinski
Mr. Robert Cook
Mr. Eric Gustafson

Appendix B

Summary of VISTAS Visibility Modeling Results

Table B-1 Estimated Haze based on Current Emissions from Units 1 and 2 at the Keystone Station

	Keystone Adjusted 2028 Emissions Modeled		2019 Keystone Emissions	
	SO2 (tpy):	21,066	SO2 (tpy):	19,806
	NOX (tpy):	5,086	NOX (tpy):	7,140
Extinction for 20% Worst Haze Days				
Class I Area	Total Modeled Sulfate Extinction Mm-1	Total Modeled Nitrate Extinction Mm-1	Scaled Modeled Impacts Results: Sulfate Extinction Mm-1	Scaled Modeled Impacts Results: Nitrate Extinction Mm-1
Shenandoah NP	0.7400	0.0093	0.6957	0.0130
Brigantine WA	0.3637	0.0394	0.3419	0.0554
Dolly Sods WA	0.2464	0.0008	0.2317	0.0011
Otter Creek WA	0.1902	0.0008	0.1788	0.0011
James River Face WA	0.2172	0.0054	0.2042	0.0076

Data from ATTACHMENT_A_PSAT_TAG_RESULTS_adjusted_08-11-2020.xlsx.

Projected 2028 Visibility at Current Emissions Levels

Class I Areas Nearest to Keystone Generating Station	Total Haze Impact from 2019 SO_2 Emissions		Total Haze Impact from 2019 NOx Emissions	
	Mm^{-1}	DV	Mm^{-1}	DV
Shenandoah National Park	0.696	0.083	0.013	0.002
Brigantine Wilderness Area	0.342	0.041	0.055	0.007
Dolly Sods Wilderness Area	0.232	0.028	0.001	0.000
Otter Creek Wilderness Area	0.179	0.021	0.001	0.000
James River Face Wilderness Area	0.204	0.025	0.008	0.001
0.12 DV per Mm^{-1} (See explanation in report)				

Appendix C

PA DEP Request for a Case-by-Case RACT Analysis

Keystone Generating Station
313 Keystone Drive
Shelocta, PA 15774

November 25, 2020

<u>**Via Email Delivery – egustafson@pa.gov**</u>
Mr. Eric A. Gustafson
Regional Air Quality Program Manager
Pennsylvania Department of Environmental Protection
Northwest Regional Office
230 Chestnut Street
Meadville, PA 16335

Re: Keystone Generating Station – Title V Operating Permit No. 03-00027 Acknowledgement of Department's Request for Case-by-Case RACT Analysis for Two Existing Coal-Fired Combustion Units Equipped with Selective Catalytic Reduction (SCR) System

Dear Mr. Gustafson:

Keystone Station is in receipt of the attached letter, which includes the following request:

> *Please confirm in writing, within 10 days of receipt of this correspondence, that your facility will submit complete case-by-case RACT II determinations for existing coal-fired combustion units which are equipped with SCR to DEP, along with a significant operating permit modification application, on or before April 1, 2021.*

Keystone Station is planning to submit the above-mentioned determination and application on or before April 1, 2021. It is our understanding that once the determination is approved, the applicable requirements will be captured in an updated Title V operating permit and will both supersede the existing RACT II Rule requirements and satisfy the Department's forthcoming RACT III Rule requirements.

If you have questions or concerns regarding this letter, then please contact me at (724) 354-5475 or nrozic@keyconops.com.

Very truly yours,

Nathan J. Rozic

Nathan J. Rozic
Environmental Specialist – Keystone Generating Station

Cc: Joseph Kushner, Strategy & Compliance Manager – Keystone and Conemaugh Stations

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

November 17, 2020

Nathan J. Rozic – Environmental Specialist mailto:nrozic@keyconops.com
Keystone Conemaugh Project LLC
175 Cornell RD STE 1
Blairsville, PA 15717

Re: RACT II regulation Implementation, §§ 129.96 to 129.100
Keystone Station
Title V Permit No: 03-00027
Plumcreek Township, Armstrong County

Dear Mr. Nathan J. Rozic:

On August 27, 2020, the U.S. Third Circuit Court of Appeals issued an opinion in *Sierra Club v. EPA*, 3d. Cir. No. 19-2562 ("Sierra Club") vacating and remanding three aspects of the U.S. Environmental Protection Agency's (EPA) May 19, 2019 approval of DEP's 2016 reasonably available control technology (RACT II) Rule to reduce ozone pollution from coal-fired power plants (84 FR 20274). Sierra Club challenged EPA's approval of the RACT II Rule's oxides of nitrogen emission limit for coal-fired power plants with selective catalytic reduction (SCR) pollution controls; the inlet operating temperature threshold for power plants to operate SCR pollution controls; and operating temperature data recordkeeping and reporting requirements. The Court found EPA's approval of these three provisions of the RACT II Rule to be arbitrary and capricious, because they were not supported by the administrative record. As a result, the Court vacated EPA's approval of these three provisions and remanded them back to the agency for further action. The vacated portion of the RACT II Rule affects your facility.

As a result of the Court's decision in Sierra Club, DEP is required to address RACT II requirements for existing coal-fired combustion units with SCR systems. DEP has determined that the best method to do this is through requiring the owner or operator of each unit affected by the Court's decision to submit case-by-case RACT II determinations that satisfy 25 Pa. Code § 129.99 (relating to alternative RACT proposal and petition for alternative compliance schedule) requirements. Case-by-case RACT determinations must be developed in accordance with the procedures in §129.92(a)(1)—(5) and (b), which includes a top-down analysis. DEP will review the proposed case-by-case determinations and incorporate the final determinations and associated conditions into your facility's Title V operating permit in accordance with 25 Pa. Code § 127.542 (relating to revising an operating permit for cause). The RACT determinations incorporated into the Title V operating permit will then be submitted to EPA as a state implementation plan revision.

Please confirm in writing, within 10 days of receipt of this correspondence, that your facility will submit complete case-by-case RACT II determinations for existing coal-fired combustion units which are equipped with SCR to DEP, along with a significant operating permit modification application, on or before April 1, 2021. If you are planning to modify any existing equipment or install a control device as a result of your RACT II determination, please contact us regarding the need to submit a plan approval application. Please note that DEP is waiving permit fees for review of the significant operating permit modification application.

If you have any questions, please contact me at 814-656-1346 or egustafson@pa.gov.

Sincerely,

Eric A. Gustafson

Eric A. Gustafson
Program Manager
Northwest Region Air Quality Program

cc: Mark Hammond, Bureau Director
Hbg. – Permits
File

VISTAS Consultation with PA Bureau of Air Quality

Homer City Gen LP/Center TWP (42063-3005211)

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Correspondence Record

Date	From	To	Description
June 22, 2020	VISTAS	PA Bureau of Air Quality	Request for Regional Haze Reasonable Progress Analyses for Pennsylvania Sources Impacting VISTAS Class I Areas
October 30, 2020	Homer City Generation/ PA Bureau of Air Quality	VISTAS	Four Factor Analysis for Regional Haze, Homer City Generating Station, Units 1, 2 and 3

Visibility Improvement State and Tribal Association of the Southeast

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June 22, 2020

Virendra Trivedi, Acting Director
Pennsylvania Bureau of Air Quality
PO Box 8468
Harrisburg, Pennsylvania 17105-8468

RE: Request for Regional Haze Reasonable Progress Analyses for Pennsylvania Sources Impacting VISTAS Class I Areas

Dear Mr. Trivedi:

The Regional Haze Regulation 40 CFR § 51.308(d) requires each state to "address regional haze in each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State which may be affected by emissions from within the State." 40 CFR § 51.308(f) requires states to submit a regional haze implementation plan revision by July 31, 2021. As part of the plan revision, states must establish a reasonable progress goal that provides for reasonable progress towards achieving natural visibility conditions for each mandatory Class I Federal area (Class I area) within their state. 40 CFR § 51.308(d)(1) requires that reasonable progress goals "must provide for an improvement in visibility for the most impaired days over the period of the implementation plan and ensure no degradation in visibility for the least impaired days over the same period."

In establishing reasonable progress goals, states must consider the four factors specified in § 169A of the Federal Clean Air Act and in 40 CFR § 51.308(f)(2)(i). The four factors are: 1) the cost of compliance, 2) the time necessary for compliance, 3) the energy and non-air quality environmental impacts of compliance, and 4) the remaining useful life of any potentially affected sources. Consideration of these four factors is frequently referenced as the "four-factor analysis."

To assist its member states, the Visibility Improvement State and Tribal Association of the Southeast[1] (VISTAS) and its contractors conducted technical analyses to help states identify

[1] The VISTAS states are Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

sources that significantly impact visibility impairment for Class I areas within and outside of the VISTAS region. VISTAS initially used an Area of Influence (AoI) analysis to identify the areas and sources most likely contributing to poor visibility in Class I areas. This AoI analysis involved running the HYSPLIT Trajectory Model to determine the origin of the air parcels affecting visibility within each Class I area. This information was then spatially combined with emissions data to determine the pollutants, sectors, and individual sources that are most likely contributing to the visibility impairment at each Class I area. This information indicated that the pollutants and sector with the largest impact on visibility impairment were sulfur dioxide (SO_2) and nitrogen oxides (NO_x) from point sources. Next, VISTAS states used the results of the AoI analysis to identify sources to “tag” for PM (Particulate Matter) Source Apportionment Technology (PSAT) modeling. PSAT modeling uses “reactive tracers” to apportion particulate matter among different sources, source categories, and regions. PSAT was implemented with the Comprehensive Air Quality Model with extensions photochemical model (CAMx Model) to determine visibility impairment due to individual sources. PSAT results showed that in 2028 the majority of visibility impairment at VISTAS Class I areas will continue to be from point source SO_2 and NO_x emissions. Using the PSAT data, VISTAS states identified, for reasonable progress analysis, sources shown to have a sulfate or nitrate impact on one or more Class I areas greater than or equal to 1.00 percent of the total sulfate plus nitrate point source visibility impairment on the 20 percent most impaired days for each Class I area. This analysis has identified the following sources in Pennsylvania that meet this criterion:

- NRG Wholesale Gen/Seward Gen Sta (42063-3005111)
- Homer City Gen LP/Center TWP (42063-3005211)
- Genon NE Mgmt Co/Keystone Sta (42005-3866111)

Information regarding projected 2028 SO_2 and NO_x emissions and visibility impacts on VISTAS Class I areas is shown in the tables attached to this letter (Attachment 1).

As required in 40 CFR § 51.308(d)(1)(i)(A), VISTAS, on behalf of Georgia, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia, requests that Pennsylvania conduct, or require that the sources in question initiate, and share when completed, the results of a reasonable progress analysis for each noted source with VISTAS. This will be helpful to the VISTAS states as they begin the formal Federal Land Manager consultation process for their individual draft Regional Haze Plans in early 2021. So that the VISTAS states can include the results of your state's reasonable progress analyses in developing the long-term strategies for Class I areas in their states, we request that you submit this information to VISTAS no later than October 30, 2020. If any reasonable progress analyses cannot be completed by this date, please provide, no later than this date, notice of an attainable date for completion of the analysis. If you determine that a four-factor analysis is not warranted for one or more of the identified sources, please provide the rationale for this determination by the requested date.

In developing projected 2028 emissions for these sources, VISTAS utilized ERTAC_16.0 emissions projections and sought additional input from Pennsylvania in February 2020. Please review these projections to verify that they are reasonable. Should you be aware of significantly different emission projections for 2028 for any of the sources or pollutants, please provide revised estimates within thirty (30) days of the date of this letter. The applicable VISTAS states will review any revised emission estimates, determine if reasonable progress analyses are not needed to meet their regional haze obligations, and notify you accordingly.

Updated 2028 emission projections, if necessary, the results of your state's reasonable progress analyses for the requested sources, and any necessary ongoing communications should be sent via email to vistas@metro4-sesarm.org.

Should you have any questions concerning this request, please contact me through September 30, 2020, at 404-361-4000 or hornback@metro4-sesarm.org.

Sincerely,

John E. Hornback
Executive Director
Metro 4/SESARM/VISTAS

Attachment

Copies: Karen Hays, Georgia Air Protection Branch
Mike Abraczinskas, North Carolina Division of Air Quality
Rhonda Thompson, South Carolina Bureau of Air Quality
Michelle Walker Owenby, Tennessee Division of Air Pollution Control
Mike Dowd, Virginia Air and Renewable Energy Division
Laura Crowder, West Virginia Division of Air Quality
Marc Cone, Mid-Atlantic Regional Air Management Association
Paul Miller, Northeast States for Coordinated Air Use Management

Attachment 1: Projected 2028 SO_2 and NO_x Emissions and VISTAS Class I Area Impacts

Table 1. NRG Wholesale Gen/Seward Gen Sta (42063-3005111)
Modeled SO_2 = 6,813.9 tpy, Modeled NOx = 1,632.9 tpy

Impacted VISTAS Class I Area	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.172	0.003	15.375	1.12%	0.02%

Table 2. Homer City Gen LP/Center TWP (42063-3005211)
Modeled SO_2 = 9,274.9 tpy, Modeled NOx = 4,962.3 tpy

Impacted VISTAS Class I Areas	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.274	0.010	15.375	1.78%	0.06%
Swanquarter Wilderness Area	0.151	0.008	10.894	1.38%	0.07%

Table 3. Genon NE Mgmt Co/Keystone Sta (42005-3866111)
Modeled SO_2 = 21,066.4 tpy, Modeled NOx = 5,086.3 tpy

Impacted VISTAS Class I Areas	Sulfate PSAT (Mm^{-1})	Nitrate PSAT (Mm^{-1})	Total EGU & non-EGU Sulfate + Nitrate (Mm^{-1})	Sulfate PSAT % Impact	Nitrate PSAT % Impact
Shenandoah NP	0.740	0.009	15.375	4.81%	0.06%
Swanquarter Wilderness Area	0.375	0.009	10.894	3.44%	0.09%
Cape Romain Wilderness	0.320	0.002	14.028	2.28%	0.01%
Linville Gorge Wilderness Area	0.235	0.000	12.884	1.82%	0.00%
James River Face Wilderness	0.217	0.005	14.404	1.51%	0.04%
Dolly Sods Wilderness	0.246	0.001	19.349	1.27%	0.00%
Shining Rock Wilderness Area	0.151	0.000	12.313	1.23%	0.00%
Great Smoky Mountains NP	0.166	0.001	13.916	1.19%	0.01%
Wolf Island Wilderness	0.149	0.002	12.957	1.15%	0.01%
Joyce Kilmer-Slickrock Wilderness	0.154	0.000	13.694	1.12%	0.00%
Cohutta Wilderness Area	0.137	0.002	13.229	1.04%	0.01%
Okefenokee Wilderness Area	0.137	0.002	13.400	1.02%	0.01%
Otter Creek Wilderness	0.190	0.001	19.077	1.00%	0.00%

Four Factor Analysis for Regional Haze

Homer City Generating Station

Units 1, 2 and 3

Homer City Generation L.P.

Center Township

Indiana County

Pennsylvania

Title V Operating Permit Number: 32-00055

October 30, 2020

TABLE OF CONTENTS

APPENDICES

APPENDIX	TITLE
A	Coal Analysis Reports – Units 1/2; and Unit 3
B	RACT / BACT / LAER Clearinghouse: NO_x Controls
C	Cost Analysis – NO_x Controls: SCR Replacement Units 1, 2, and 3
D	RACT / BACT / LAER Clearinghouse: SO_2 Controls
E	Cost Analysis SO_2 Controls: Units 1 and 2 Dry Scrubber (NIDS)
F	Cost Analysis SO_2 Controls: Unit 3 Dry Scrubber (NIDS)
G	Table 2.8, Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision" (DRAFT 10/31/2019)

LIST OF ACRONYMS

AIG .... Ammonia Injection Grid

BART .... Best Available Retrofit Technology

BOFA .... Boosted Over-Fired Air

CAA .... Clean Air Act

CAMD.. Clean Air Markets Division

CO .... Carbon Monoxide

CO_2 .... Carbon Dioxide

CPI .... Consumer Price Index

Department.. Pennsylvania Department of Environmental Protection

EGU .... Electric Generating Unit

EPA .... Environmental Protection Agency

ESP .... Electrostatic Precipitator

FGD .... Flue Gas Desulfurization

GHG .... Greenhouse Gas

GMW .... Gross Megawatts

HCl .... Hydrogen Chloride

HF .... Hydrogen Fluoride

LNB .... Low NOx Burners

MANE-VU .... Mid-Atlantic Northeast-Visibility Union

MMBtu .... Million British Thermal Units

MW .... Megawatt

N_2 .... Molecular Nitrogen

NH_3 .... Ammonia

NIDS .... Novel Integrated Desulfurization Systems

NO_x .... Nitrogen Oxides

NPS .... National Park Service

NSCR .... Non-Selective Catalytic Reduction

OFA .... Over-Fired Air

PADEP .... Pennsylvania Department of Environmental Protection

PM .... Particulate Matter

RACT II .... Reasonably Available Control Technology

RBLC .... RACT/BACT/LAER Clearinghouse

RFP .... Reasonable Further Progress

ROFA .... Rotating Opposed Fire Air

SIP .... State Implementation Plan

SCR .... Selective Catalytic Reduction

SNCR .... Selective Non-Catalytic Reduction

SOFA .... Separated Over-Fired Air

SO_2 .... Sulfur Dioxide

TPY .... Tons per Year

VISTAS .... Visibility Improvement State and Tribal Association of the Southeast

1. Introduction

The Clean Air Act's visibility protection program ("Regional Haze Program") helps to protect clear views in national parks, such as Grand Canyon National Park, and wilderness areas, such as the Okefenokee National Wildlife Refuge (federal "Class I" areas). States are required to submit periodic plans demonstrating how they have and will continue to make progress towards achieving their visibility improvement goals. The first state plans were due in 2007 and covered the 2008-2018 planning period. States are required to submit SIPS for the second implementation period, 2018-2028 by July 31, 2021.

The PADEP is in the process of developing a Regional Haze SIP revision to address requirements for the second Regional Haze implementation period. PADEP has determined that the Homer City Generating Station ("Homer City") is a major source and that the emissions from Homer City may impact visibility in Class I Areas. This determination is based on three separate analyses performed by the MANE-VU[1], the NPS[2], and the VISTAS.[3]

PADEP has requested Homer City to evaluate control measures for SO_2 and NO_x using the four factors set forth in the Clean Air Act,[4] and Regional Haze Rule.[5] These four factors are:

- Cost of compliance;
- Time necessary for compliance;
- Energy and non-air quality environmental impacts of compliance; and
- Remaining useful life of the source.

Calendar year 2019 emissions for EGUs are to be used as a baseline to evaluate cost and feasibility of additional control measures for Homer City Units 1, 2, and 3. The analysis is to identify available control measures that are technically feasible for SO_2 and NO_x using a top-down approach to analyze multiple control options, and to identify the most effective and reasonable control measures in light of the costs of compliance (in 2019 $/ton).

This report presents Homer City's analysis.

2. Background

The Homer City Generating Station is located 45 miles northeast of Pittsburgh in Indiana County, PA. The Station includes three coal-fired units with a nominal total 2,090 MW of gross

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[1] https://otcair.org/MANEVU/Upload/Publication/Formal%20Actions/MANE-VU%20Intra-Regional%20Ask%20Final%208-25-2017.pdf

[2] http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Pollutants/Haze/NPS%20Q%20over%20d%20analysis%20-%20PA%20facilities%202020.pdf

[3] Visibility Improvement State and Tribal Association of the Southeast (VISTAS) Letter dated June 22, 2020 to Mr. Virendra Trivedi, PADEP

[4] 42 USC § 7491(g)(1)

[5] 40 CFR § 51.308(f)(2)(i)

generation capacity. Units 1, 2, and 3 have gross generating capacities of 690 MW, 690 MW, and 710 MW, respectively.

The boiler nameplate rated capacities are stated in terms of pounds of steam per hour 4,613,000 lb/hr, 4,613,000 lb/hr, and 4,750,000 lb/hr for units 1, 2, and 3, respectively. The maximum heat input has been determined based on fuel heating value and burner firing capabilities.

Units 1 and 2 are Foster Wheeler wall-fired, dry bottom boilers constructed in 1969. Number 2 distillate oil is the fuel used for start-ups. Each of the units has a nominal rated heat input capacity of 6,792 MMBtu/hr. Units 1 and 2 are each equipped with a 40 CFR Part 75 CEMS for NO_x, SO_2, and CO_2 and a COMS for opacity. PM emissions are measured periodically based on 40 CFR Part 60 stack testing and in accordance with procedures in 25 Pa. Code Chapter 139 (source testing requirements).

Units 1 and 2 utilize medium to high sulfur Pennsylvania bituminous coal ("steam coal") with a maximum sulfur content of 2.25 weight percent. A recent coal analysis report is shown in Appendix A. Units 1 and 2 are equipped with LNB/SOFA and SCR for NOx, ESP for particulate control, and were retrofitted in 2014 and 2015 with NIDS. The NIDS is a dry sulfur oxide (SO_2) removal system integrated with fabric filter controls. The ESPs remain in service and are located between the SCR system and the NIDS.

Unit No. 3 is a Babcock & Wilcox, wall-fired boiler constructed in 1977. Number 2 distillate oil is the fuel used for start-ups. The unit has a rated heat input capacity output of 7,260 MMBtu/hr. Units 3 is equipped with a 40 CFR Part 75 CEMS for NO_x, SO_2, and CO_2. PM emissions are measured periodically based on 40 CFR Part 60 stack testing and in accordance with procedures in 25 Pa. Code Chapter 139 (source testing requirements).

Unit 3 utilizes Pennsylvania steam coal with a maximum sulfur content of 3.25 weight percent. A recent coal analysis report is shown in Appendix A. Unit 3 is equipped with LNB/SOFA and SCR for NO_x control and ESPs for particulate control. A wet limestone FGD system is used for SO_2 control.

The coal supply for Units 1 and 2 and the coal supply for Unit 3 are segregated.

2.1 Emissions

Actual emissions for Homer City Units 1, 2, and 3 are summarized in Table 1. At the Homer City Generating Station, the Units 1, 2, and 3 actual emissions (TPY) of SO_2 have been reduced between 2006-2008 (baseline emissions before implementation of the first phase of the regional haze program) and 2019 by approximately 97.7% and emissions (TPY) of NO_x have been reduced by approximately 91.3%. The emission reductions are indicative of the reductions achieved since commencement of the regional haze program and are primarily attributable to the installation of state of the art SO_2 and NOx controls. For purposes of this analysis cost calculations have been based on operation at 100 percent capacity.

Table 1. Homer City Emissions

YEAR	UNIT	Operating (hr)	Output (GMW)	Capacity (GMW pct)	Heat Input (MMbtu)	SO_2 (ton)	SO_2 (lb/MMbtu)	NO_x (ton)	NO_x (lb/MMbtu)
2006	**1**	8,350	4,753,576	79.2	42,138,453	53,168	2.523	4,929	0.242
	2	7,971	4,452,801	74.2	40,354,389	51,006	2.518	5,558	0.281
	3	6,143	3,882,967	61.6	34,172,587	2,598	0.133	4,532	0.287
	HCS AVE	**7,488**	**4,363,115**	**71.7**	**38,888,476**	**35,591**	**1.887**	**5,006**	**0.274**
	HCS TOTAL		**13,089,344**		**116,665,428**	**106,772**		**15,019**	
2007	**1**	8,202	4,836,563	80.6	44,709,617	63,112	2.805	6,304	0.288
	2	7,321	4,340,022	72.3	38,920,483	54,066	2.783	3,228	0.180
	3	8,350	5,346,270	84.8	48,688,691	3,589	0.140	7,910	0.323
	HCS AVE	**7,958**	**4,840,952**	**79.2**	**44,106,264**	**40,256**	**1.806**	**5,814**	**0.270**
	HCS TOTAL		**14,522,855**		**132,318,791**	**120,768**		**17,442**	
2008	**1**	6,482	3,485,801	58.1	31,688,086	44,411	2.712	5,080	0.320
	2	8,083	4,231,975	70.5	39,571,744	55,230	2.784	5,758	0.290
	3	8,013	4,394,033	69.7	40,562,901	2,844	0.133	7,048	0.340
	HCS AVE	**7,526**	**4,037,269**	**66.1**	**37,274,244**	**34,161**	**1.818**	**5,962**	**0.317**
	HCS TOTAL		**12,111,808**		**111,822,731**	**102,484**		**17,886**	
2006-08	**AVERAGE**	**7,657**	**4,413,779**	**72.3**	**40,089,661**	**36,669**	**1.837**	**5,594**	**0.287**
2006-08	**TOTAL**					**110,008**		**16,782**	
2019	**1**	6,629	2,487,618	41.8	24,627,892	2,277	0.177	1,451	0.120
	2	5,035	1,914,841	32.1	19,338,077	1,827	0.178	1,511	0.158
	3	6,833	3,143,128	50.5	30,720,108	3,613	0.205	1,412	0.091
	HCS AVE	**6,166**	**2,515,196**	**41.5**	**24,895,359**	**2,572**	**0.187**	**1,458**	**0.117**
	HCS TOTAL		**7,545,587**		**74,686,077**	**7,717**		**4,374**	
			Emissions Reduction (pct)			**93.0**	**89.8**	**73.9**	**59.3**

3. History of NO_x Emission Control Installations at Homer City

Since the beginning of the Regional Haze Phase I initiative (December 2007), Homer City has made significant capital expenditures to reduce NO_x emissions. As late as 2015, NO_x emissions from Homer City Station were approximately 18,400 tons per year. Through the installation and operation of the NO_x controls discussed below, NO_x emissions were reduced to approximately 4,375 tons per year in 2019--an approximate 75% reduction from 2015 NOx emission levels.

3.1 Homer City Units 1 and 2

Homer City Units 1 and 2 are each equipped with LNB/SOFA systems which were installed in 1995, and SCR NO_x controls which were installed in 2001. Through the use of the LNB/SOFA system, Homer City maintains NO_x emissions from the boiler combustion zones at approximately 0.55 lb/MMBtu heat input. The initial capital cost for the Units 1 and 2 SCR systems was approximately $75 million (2001$) for each system. Upgrades were completed on the Units 1 and 2 SCR systems in 2009 and in 2018.

The 2009 upgrades included winterization of the SCR systems, including replacement of solenoids, relocation of the ammonia storage facility and upgrades required to operate the systems year-round to comply with the Clean Air Interstate Rule (CAIR).

The 2018 SCR system upgrades were to reduce emissions to comply with the Pennsylvania RACT II requirements established in 25 Pa. Code Section 129.97 (i.e., 4.0 lbs NOx/MMBtu when the SCR inlet is below 600^{o} F and a 30-day rolling average of 0.12 lbs NOx/MMBtu when the SCR is at or above 600^{o} F) and included installation of a new AIGs and static mixers in the exhausts upstream of the catalyst beds to provide better mixing of the ammonia in the exhaust stream. These upgrades were completed at a cost of approximately $6.1 million and $5.5 million for Units 1 and 2, respectively.

The emission reductions achieved as a result of the upgrades in 2009 and 2018 are in excess of those required to meet BART.

Through the use of the LNB/SOFA systems and the recently upgraded SCR systems, Homer City maintains NO_x emissions from Units 1 and 2 at or below 0.12 lb/MMBtu on a 30-day rolling basis when the SCR inlet temperature is equal to or greater than 600^{o} F.

Units 1 and 3 operated at equal to or less than 0.12 lb NOx/MMBtu on a 30-day rolling basis in 2019. Unit 2 achieved RACT 2 emission limits on July 1, 2019. Prior to that time, Unit 2 was authorized to emit at greater than 0.12 lb NOx/MMBtu under a RACT 2 compliance extension.

The LNB/SOFA systems are in operation all the time the unit is in operation. The SCR systems operate at all times when the SCR inlet temperature is equal to or greater than 600^{o} F.

3.2 Homer City Unit 3

Homer City Unit 3 is equipped with LNB which were installed in 1977 and SOFA which was installed in 1995. SCR NO_x controls were installed in 2003. The Unit 3 SCR system reduces emissions to comply with the Pennsylvania RACT II requirements established in 25 Pa. Code Section 129.97.

Through the use of the LNB/SOFA systems and the SCR system, Homer City maintains NO_x emissions from Unit 3 at or below 0.12 lb/MMBtu on a 30-day rolling basis when the SCR inlet temperature is equal to or greater than 600° F. The LNB/SOFA systems are in operation all the time the unit is in operation. The SCR system operates at all times when the SCR inlet temperature is equal to or greater than 600° F.

4. History of SO_2 Emission Control Installations at Homer City

Since the beginning of the Regional Haze initiative Phase I (December 2007), Homer City has made significant capital expenditures to reduce SO_2 emissions. As late as 2015, SO_2 emissions from Homer City Station were approximately 100,000 tons per year. Through the installation and operation of the SO_2 controls discussed below, emissions were reduced to approximately 7,700 tons per year in 2019--an approximate 93% reduction from 2015 SO_2 emission levels. Average gross station capacity over this period was 40%. Gross station capacity in 2015 was 54%, and in 2019 was 42%. As a merchant generator, Homer City's operations are dictated by electrical demand. Therefore, it is not possible to predict unit operations and unit emissions.

4.1 Homer City Units 1 and 2

Homer City Units 1 and 2 are each equipped with a NIDS system installed in 2015 and 2016 at a cost of approximately $450 million for each NIDS. Each NIDS is a dry SO2 scrubber made up of an integrated lime hydrator/mixer, a J-duct reactor, and a fabric filter. Hydrated lime is used as a reagent to react with gaseous pollutants including SO_2, HCl, and HF. The scrubbers achieve approximately 95% control of SO_2.

The control efficiency was calculated using the following formula:

(4.0 inlet lb SO_2/MMbtu - 0.2 outlet lb SO_2/MMbtu)/(4.0 inlet lb SO_2/MMbtu)*100 = 95% Reduction

Through the use of the Units 1 and 2 NIDS dry scrubbers, Homer City maintains SO_2 emissions from Units 1 and 2 at a rate equal to or less than 0.2 lb/MMBtu heat input on a per boiler basis.

4.2 Homer City Unit 3

Homer City Unit 3 is equipped with a wet limestone scrubber for control of SO_2. The wet limestone scrubber was installed in 2001 at a cost of approximately $95 million (2001$). The scrubber achieves approximately 90% control of SO_2 emissions.

The control efficiency was calculated using the following formula:

(4.5 inlet lb SO2/MMbtu - 0.4 outlet lb SO2/MMbtu)/(4.0 inlet lb SO2/MMbtu)*100 = 90% Reduction

Through the use of the Unit 3 wet limestone scrubber, Homer City maintains SO_2 emissions from Unit 3 at a rate equal to or less than 0.4 lb/MMBtu heat input.

5. Four Factor Analysis Criteria

The CAA and the Regional Haze Program rules establish certain requirements for regional haze programs. 40 CFR § 51.308(d) establishes requirements for regional haze SIPs including requirements for establishment of RFP goals for any mandatory Class I Federal area within the state. 40 CFR 51.308(d)(1). In establishing a reasonable progress goal for any mandatory Class I Federal area within the State, the State must:

> Consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and include a demonstration showing how these factors were taken into consideration in selecting the goal. 40 CFR § 51.308(f)

Prior to the first step in the four-factor analysis, technically feasible control measures should be identified. Once selected, the four factors can be characterized for each measure. In general, available emission reduction measures can include:

- Improved work practices.
- Retrofits for sources with no existing controls.
- Upgrades or replacements for existing, less effective controls.
- Year-round operation of existing controls.
- Fuel mix with inherently lower emissions.

5.1 Cost of Compliance

For purposes of the second implementation period, EPA recommends that states follow the source type-relevant recommendations in the EPA Air Pollution Control Cost Manual that are stated in the manual as applying to cost estimates in a permitting context.[6] In addition to the Cost Control Manual, Homer City prepared certain control cost estimates using the EPA's CAMD Retrofit Cost Analyzer Tool[7] and on information in Appendix K of the "New Hampshire Regional

[6] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019, p. 31.

[7] https://www.epa.gov/airmarkets/retrofit-cost-analyzer

Haze Plan Periodic Comprehensive Revision" (DRAFT 10/31/2019)[8]. Costs determined using these tools were adjusted to 2019$.

5.2 Time Necessary for Compliance

The second statutory factor – the time necessary for compliance – involves estimating the time needed for a source to implement a potential control measure. States should consider source-specific factors.

5.3 Energy and Non-Air Quality Environmental Impacts of Compliance

Characterizing information about the third statutory factor, including the energy and non-air environmental impacts, involves assessing the impacts of a control measure on the energy consumed by a source. Non-air environmental impacts can include the generation of wastes for disposal and impacts on other environmental media, such as nearby water bodies.

5.4 Remaining Useful Life of Any Potentially Affected Sources

Generally, this factor considers the useful life of the control system rather than the source. Typically, the remaining useful life of the source itself will be longer than the useful life of the emission control system under consideration unless there is an enforceable requirement for the source to cease operation sooner. The presumption is that after the end of the useful life of the emission control system, it will be replaced by a like system. Thus, annualized compliance costs are typically based on the useful life of the control equipment rather than the life of the source.

6. NO_x Control Options

Homer City has reviewed information reported to the RBLC[9] and other publicly available information concerning NO_x control technologies for coal-fired utility boilers. (See Appendix B) Based on information available on the RBLC website, NO_x emissions controls installed on coal-fired utility boilers include LNB, OFA, and SCR either singly or in combination. All three Homer City Units already are equipped with LNB/SOFA combustion controls and SCR post-combustion controls.

Other potential NO_x controls include oxy-combustion, NSCR and SNCR. Oxy-combustion has not been evaluated. The Homer City units are not designed and cannot be retrofitted to use pure oxygen in the combustion process. Further, Homer City's analysis did not determine the existence of any oxy-combustion systems in operation on full sized commercial coal-fired EGUs, either existing or new units.

Further discussion of each of the technologies identified in the RBLC review and discussion of combustion optimization, and of NSCR and SNCR follows.

[8] https://www.des.nh.gov/organization/divisions/air/do/asab/rhp/index.htm
[9] https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblc-basic-information

6.1 Combustion Controls

6.1.1 Low NO_x Burners

With LNB the initial fuel combustion occurs in a fuel-rich, oxygen deficient zone. This is followed by a reducing atmosphere, where hydrocarbons created during coal combustion react with already formed NO_x to turn it into N_2. Downstream of the primary combustion zone, the air required to complete combustion of coal is added. The staging results in lower flame temperatures, which results in lower NO_x formation. LNB can reduce NO_x formation by approximately 30 to 50%.

6.1.2 Overfire Air Systems

OFA controls are designed to reduce the available oxygen near the burner area, resulting in minimized formation of fuel NO_x. As little as 70 per cent of the required total combustion air is provided near the burners, creating an oxygen-deficient, fuel-rich zone, resulting in partial combustion of fuel. The remaining combustion air is injected above the burner elevation, through the OFA nozzles into the furnace. Because the combustion temperature in the secondary zone is relatively low, thermal NO_x production is limited.

Variations of OFA systems include two-stage overfire air systems or SOFA, BOFA systems, ROFA, and bypass over fire air systems. These promote improved mixing of the overfire air and the furnace gases. In some cases, these systems can result in slightly higher NO_x reductions when compared to a conventional OFA system.

Typically, LNB and OFA systems, combined, result in potential NO_x emission reductions of approximately 45% to 75%.

6.1.3 Combustion Optimization

One method of combustion modification to control NO_x from boilers is combustion optimization or "tuning." In combustion tuning, the air to fuel ratio for combustion is analyzed and adjusted to lower NO_x emissions. For properly instrumented and maintained and operated boilers, the benefits of a combustion optimization program beyond current facility practices are extremely limited.

Combustion tuning to minimize NO_x emissions can also have detrimental effects, including increased CO emissions and reduced boiler efficiency. In addition, the tuning can result in increased unburned carbon in the fly ash, rendering is unsuitable for sale (for beneficial use) and increasing waste disposal costs.

6.2 Post-combustion Controls

6.2.1 Selective Non-Catalytic Reduction (SNCR)

SNCR involves injection of ammonia or urea into a boiler in a zone where the flue gas temperature is between 1650° F and 2200° F to reduce NO_x to N_2. SNCR can achieve NO_x

reductions ranging from 25–60 per cent for urea-based systems, while reductions for ammonia-based SNCR systems range from 61 to 65 percent.

SNCR systems do not require a catalyst. The NO_x control effectiveness of SNCR is dependent on achieving adequate mixing of the ammonia/urea in the exhaust and maintaining sufficient reaction time within a narrow flue gas temperature band. If the injection zone temperature is too high, the ammonia/urea will decompose forming additional NO_x. If the temperature is too low, the reaction will not occur. The ammonia "slip" will react with sulfur from the fuel to form ammonium sulfate and ammonium bisulfate. When these compounds condense on cooler surfaces of the air heater, significant loss of efficiency and mechanical damage can occur.

Typically, SNCR systems on pulverized coal-fired boilers achieve efficiencies in the range of 30% to 50%.

6.2.2 Selective Catalytic Reduction

SCR is the most effective and well-established NO_x emission reduction technology in use. SCR has been installed as a single NO_x control technology, but it is generally used in conjunction with other technologies, such as LNB and OFA. SCR operates on a principal similar to SNCR by using a reagent such as ammonia to reduce NO_x to nitrogen and water. In an SCR system the reaction is carried out in the presence of a catalyst which promotes the reduction reaction.

Two advantages of SCR over SNCR are:

1. By using a catalyst, SCR systems can achieve a higher NO_x removal than SNCR systems.

2. The NO_x reduction reaction takes place at a lower temperature and over a wider temperature band. SCR systems typically operate in a temperature range of 600° F to 750° F. However, SCR systems have higher capital costs and additional costs are experienced for replacement of catalyst and disposal of the deteriorated catalyst elements.

Theoretically, SCR systems can be designed for NOx removal efficiencies approaching 100 percent. In practice, commercial coal-, oil-, and natural gas–fired SCR systems are often designed to meet control targets of over 90 percent. However, the reduction may be less than 90 percent when SCR follows other NO_x controls such as LNB, LNB/SOFA, or FGR that achieve relatively low emissions on their own.

Based on Homer City's experience, NO_x removal efficiencies for well-designed and well-operated SCR systems associated with LNB/SOFA are in the range of 85 to 90%.

6.2.3 Nonselective Catalytic Reduction (NSCR)

In NSCR systems, CO, NO_x and hydrocarbons are converted into CO_2 and N_2 via a catalyst. This technique does not need additional reagents to be injected because the unburned hydrocarbons are used as a reductant; though gases must not contain more than 0.5% oxygen. For this reason, the oxygen concentration in flue gases must be kept below 0.5%. Because of the exhaust characteristics of coal-fired utility boilers, NSCR systems are not feasible for coal-fired utility boilers.

6.3 NO_x Emission Reduction Options

Homer City Units 1, 2, and 3 are currently equipped with LNB and OFA combustion systems and post-combustion NO_x control is further reduced through the use of SCR systems on each boiler. The NO_x emissions control technologies installed on Homer City Units 1, 2, and 3 are consistent with the technologies installed to meet emission limitations required of similar sources as reflected in the RCLB. The combination of LNB/OFA/SCR controls, coupled with combustion optimization, represents BACT for NO_x emissions for Homer City Units 1, 2, and 3.

For optimal efficiency, the NO_x controls are installed between the boilers and the SO_2 controls. Changing the sequence of treatment is technically infeasible considering the volume of exhausts being handled and the temperatures at which these controls operate. For example, it is impractical to treat NO_x with SCRs after SO_2 wet scrubbing. The amount of energy needed to reheat the gas stream from the 125° F exit temperature from the wet FGD unit to 600° F inlet temperature required for SCR operation would be enormous. It would be practically impossible to reheat the approximately 2.8 million cubic feet per minute of exhaust in a reasonable time. Further, the use of fuel to reheat the exhaust would be at counter purposes to the Affordable Clean Energy (ACE) program requirements and would result in significant GHG emissions increases from the facility.

Nevertheless, Homer City has investigated the potential costs and NO_x reduction benefits of upgrades/replacements to the existing LNB/OFA systems and the SCR systems.

7. Enhanced NO_x Control Options

Based on Homer City's analysis of available, feasible options for achieving further NOx emission reductions from Homer City Units 1, 2, and 3, Homer City determined that the only technically feasible options available are replacement of the existing LNB/SOFA systems with new LNB/SOFA systems and replacement/additional upgrades to the SCR systems. These potential measures are discussed below.

7.1 LNB/OFA Replacement

During development of a compliance strategy for the Pennsylvania RACT II program in 2015/2016, Homer City investigated the cost, emission reduction benefits and delivery times for LNB replacements and OFA upgrades for Units 1 and 2. Currently both units operate LNB/OFA systems with combustion zone emissions of 0.55 lb/MMBtu. The vendor estimates to replace the existing LNB/OFA system in each of Units 1 and 2 was $25 million (2016$). Cost estimates for Unit 3 are approximately $30 million, based on prorating the Units 1 and 2 estimates. Vendor estimates for the new LNB/SOFA systems for Units 1 and 2 were that boiler combustion zone NO_x would not exceed 0.47 lb/MMBtu (versus 0.55 lb /MMBtu for the currently installed LNB/SOFA systems). Vendor estimates for the new LNB/SOFA system for Unit 3 were that boiler combustion zone NO_x would not exceed 0.35 lb/MMBtu (versus 0.38 lb /MMBtu for the currently installed

LNB/SOFA systems).Replacement of the existing burners would result in NOx emission reduction from the boiler combustion zone of approximately 476, 476, and 191 tons per year, respectively, for Units 1, 2, and 3.

In addition to the cost information developed by Homer City during the RACT II compliance analysis, Homer City developed cost information for the installation of new LNB/SOFA systems for the boilers based on cost data developed by MANE-VU consistent with EPA guidance. These comparative capital cost and operating cost estimates are summarized in Table 1. Costs for replacement of the LNB/SOFA systems based on the MANE-VU/EPA approach are approximately a factor of 2 higher than the vendor estimates provided to Homer City.

As is shown in Table 2, below, the cost of NO_x emissions control for replacement of the existing burners, based on the vendor estimates provided during the Homer City RACT II analysis, is approximately (2019$): $8,170/ton, $8,170/ton, and $23,929/ton for Units 1, 2, and 3, respectively. These cost estimates assume the replacement burners will require the same level of maintenance effort as the existing burners. The 2016 costs have been adjusted based on the U.S. Bureau of Labor Statistics CPI.[10] Table 2 further shows control costs, based on the MANE-VU costing methodology, of approximately: (2019$): $17,305/ton, $17,305/ton, and $43,883/ton for Units 1, 2, and 3, respectively.

7.2 Changes/Upgrades to SCR Systems

In 2018 and in 2019, Homer City made modifications to the SCRs on Units 1 and 2 to ensure that the units could operate in compliance with Pennsylvania's RACT II requirements. These modifications required a capital investment of approximately $6.1 million and $5.5 million for Units 1 and 2, respectively. Capital costs and operating costs of the 2018/2019 SCR system upgrades, the resulting emission reductions and the cost per ton of NO_x reduced are shown in Tables 1 and 2.

Any additional performance improvement on these SCRs would require significant capital expenditures beyond those incurred during the recent upgrade and would impose additional operating costs. Among the measures that would be necessary for significant performance upgrade would be:

- Replacement of ammonia pumps with higher capacity pumps;
- Replacement of the ammonia vaporizers to provide for increased ammonia injection into the exhaust stream; and,
- Installation of additional catalyst elements and more frequent catalyst replacement.

Projected emission reductions related to the SCR system upgrades are estimated to be approximately 818, 818 and 604 tons per year respectively for Units 1, 2, and 3. Costs related to the SCR upgrades are summarized in Table 1, below. As is shown in Table 1, the cost of NO_x emissions control for the upgrade of the SCR systems is approximately (2019$): $ 9,599/ton, 9,599/ton, and $10,112/ton for Units 1, 2, and 3, respectively.

[10] https://www.bls.gov/data/inflation_calculator.htm

7.3 Replacement of SCR Systems

Homer City has evaluated the cost for replacing the SCR systems for Units 1, 2, and 3. The cost estimates for replacing the SCR systems were determined in accordance with Air Markets Retrofit Cost Analyzer. Estimated additional NO_x emission reductions that could result from the replacement of the SCR systems are approximately 977, 977, and 695 tons per year, respectively. Capital costs for the replacement of the SCR systems determined in accordance with Air Markets Retrofit Cost Analyzer are estimated to be: $204,703,000, $ 204,703,000 and $209,514,000 for Units 1, 2, and 3, respectively. (See Appendix C) Additionally, projected operating costs are estimated to be: $4,834,000 , $4,834,000 and $4,717,000 for Units 1, 2, and 3, respectively. Costs of the emission reductions are estimated to be are estimated to be: $14,830, $14,830 and $ 21,151/ton for Units 1, 2, and 3, respectively. These costs are shown in Tables 1 and 2.

8. SO_2 Control Options

Homer City has reviewed information reported to the RBLC and other publicly available information concerning SO_2 control technologies for coal-fired utility boilers. Based on information available on the RBLC site and other sources, SO_2 emissions control measures implemented for coal-fired utility boilers include: switching to lower sulfur coal; and installing flue gas desulfurization systems (FGD). (See Appendix D) Further discussion of each of these measures follows.

8.1 Switching to Lower Sulfur Coal

Switching to lower sulfur content coal is a pre-combustion SO_2 emission control technique. Homer City Units 1, 2, and 3 currently burn medium sulfur content western Pennsylvania bituminous coal. The coal sulfur content is approximately 2.3 to 3.0 weight percent sulfur, as burned.

Coal with lower sulfur content than the coal currently burned at Homer City could be used as fuel, but typically is used to produce metallurgical coke and for other uses in the metal industry. However, there is a significant cost difference between “steam” coal and “met” coal. The U.S. Energy Information Administration (EIA) reported September 18, 2020 spot coal prices for Central Appalachia (1.2% S) and Northern Appalachia (<3% S) coals as $59.50 and $42.45 per ton, respectively. (https://www.eia.gov/coal/). The extent of emission reductions achievable from burning lower sulfur coal depends on the relative fuel sulfur contents of the current fuel and the replacement fuel.

Cost analyses were conducted for each unit individually. Converting all units to a single coal would make fuel management simpler and would assure maximum SO_2 emission reductions. The cost analysis was based on the relative costs of low sulfur “met” and high sulfur eastern bituminous “steam” coal. No additional capital expense was associated with a conversion to low sulfur “met” coal.

8.2 Flue Gas Desulfurization (FGD)

Flue gas desulfurization (FGD) is a post combustion SO_2 control method. There are two basic types of FGD, wet and dry. Wet scrubbers are the most prevalent, accounting for in excess of 80% of post-combustion SO_2 control systems worldwide.

In a "wet" FGD a mixture of limestone and water is sprayed over the flue gas. This mixture reacts with the SO_2 to form gypsum (calcium sulfate), which is removed from the water and disposed.

There are variations on dry FGD. Lime is typically the sorbent used. A slurry of slaked lime is sprayed into the exhaust ductwork to remove SO_2. Reaction products, primarily calcium sulfate, and fly ash are captured downstream in the particulate removal device, typically a fabric filter. A variation is dry sorbent injection (in-duct dry injection) in which hydrated lime or other sorbent is injected into the flue gas. Duct spray drying is also used as post-combustion SO_2 removal method.

Flue gas desulfurization systems typically achieve control efficiencies in excess of 95%.

9. Enhanced SO_2 Control Measures

Homer City considered several measures that might be implemented to further reduce SO_2 emissions from Units 1, 2, and 3. These measures include:

- Switching to lower sulfur fuel;
- Upgrading the existing NID systems installed on Units 1 and 2; and
- Replacing the wet FGD installed on Unit 3 with a NID system.

9.1 Switching to Lower Sulfur Fuel

Homer City has evaluated two lower sulfur fuel options for the facility, lower sulfur coal and natural gas co-firing options. These options are discussed below.

9.1.1 Lower Sulfur Coal

Homer City evaluated the availability and cost of lower sulfur coal for use as fuel at the facility. Basically, Pennsylvania coal is divided into two classes — "steam coal" and "metallurgical" or "met" coal. Steam coal is that portion of the coal with a sulfur content greater than 1.5 % by weight and met coal has a sulfur content less than 1.0 % by weight. Homer City Units 1, 2, and 3 were designed to burn Pennsylvania (Appalachian Basin) bituminous coal with specified heating values and other characteristics. Although other coals, such as Powder River Basin coal, may be available at a lower cost, there are significant obstacles to their use at a facility such as Homer City. These include: significantly lower heating value per ton; ash fusion temperature issues; degradation of the coal in transport; and high transportation costs.

The U.S. Energy Information publishes coal prices and a primary determinant of coal price is the sulfur content.[11] Comparison of high and low sulfur eastern bituminous coal prices on the EIA website indicate September 18, 2020 prices of $42.45/ton for higher sulfur coal vs $59.50 /ton low sulfur coal. (https://www.eia.gov/coal/) It should be noted that spot coal prices vary on a day-to-day basis. Based on its evaluation, Homer City has determined that the additional cost for the purchase of lower sulfur coal would increase the fuel costs by approximately $29,617,635, $29,617,635, and $41,389,146 for Units 1, 2, and 3, respectively. These additional fuel costs would be recurring annual expenses.

9.1.2 Conversion to Natural Gas

Homer City has evaluated the potential for conversion of the facility to natural gas firing. Based on the analysis conducted in 2014, it was concluded that full conversion of the facility to natural gas firing was not economically feasible for three reasons. First, the quantity of natural gas was not readily available. Second, full conversion to natural gas firing would result in a significant de-rating of the facility. The de-rating of the facility would result in the loss of capacity payments and loss of generating revenue when the plant was in operation. Both of these consequences would have significant adverse impacts on the facility. Finally, the interruptible nature of the gas supply as opposed to on-site storage of coal could jeopardize operations.

Attempting to replace the total coal heat input of any of the Homer City units with natural gas would result in derating of the unit simply because the combustion chambers are not large enough to accommodate the volume of natural gas and combustion air required to maintain the same heat input as achieved with coal. The derating would be a result of the simple physics of combustion, not directly a natural gas supply issue. Replacing 1 ton of coal with natural gas would require approximately 25,000 cubic feet of natural gas. At full load, Homer City Station would require approximately 20,000,000 cubic feet of natural gas per hour.

Conversion of the facility to 50% natural gas firing was determined to be practical from the standpoint of potentially available natural gas supplies and would not de-rate the facility. However, cost of natural gas and the possibility of interruption of gas supply continue to be significant concerns.

9.2 Upgrading the Existing Units 1 and 2 NID Systems

Homer City completed the installation of NID (dry SO_2 scrubbers) systems on Units 1 and 2 in 2015 and 2016, respectively. These systems were designed to reduce SO_2 emissions from the Units to 0.2 lb/MMBtu. Increasing the SO_2 removal efficiency of the NID systems could be accomplished by injecting additional lime in the J-duct dry reactors. However, the injection of additional lime would create additional byproduct, which would overload the existing dry scrubber by-product handling system. Projected cost for the replacement of the by-product handling systems with larger capacity systems is approximately $5 million for each system. In addition, increased material costs would be experienced for the additional lime to be injected and increased disposal costs would be incurred for the additional waste solids disposal. The increased lime

[11] https://www.eia.gov/coal/markets/

purchase and increased waste disposal costs associated with the use of additional lime are estimated to be approximately $10.5 million per year for each unit. The additional lime and waste disposal requirements will result in additional hauling that will result in increased mobile source emissions and the additional disposal requirements will shorten the life of the waste disposal site.

Replacing these newly installed dry SO_2 controls with wet scrubbers after only a few years of operation would be cost prohibitive. (See Appendix E) Installation and operation of additional wet scrubbers at the facility would require significant capital investment for the scrubbers as well as advanced wastewater treatment to meet discharge limits for FGD wastewater.

9.3 Replacing the Unit 3 Wet FGD System

Homer City Unit 3 is currently equipped with a wet SO_2 scrubber. Additional reductions of SO_2 emissions could be achieved by replacing the existing Unit 3 wet FGD system with a NIDS dry SO_2 removal system. Homer City has projected costs of a NIDS for Unit 3 based on scaling of the recently installed Units 1 and 2 NIDS and on the methodology in the Air Markets Retrofit Cost Analyzer. (See Appendix F)

10. Four Factor Analysis

Homer City has evaluated emission reduction technologies and techniques which might be applied to reduce SO_2 and NO_x emissions from Homer City Units 1, 2, and 3 with respect to the four factors specified in the Regional Haze regulations. Discussion of each factor with respect to each pollutant (SO_2 and NO_x) follows.

10.1 Cost of Compliance

Homer City evaluated the cost of each available emission reduction technique/technology for each pollutant using a 100 percent capacity factor as the emissions baseline. Costs for each measure were developed using several methods. First, where available, Homer City uses cost proposals obtained from vendors for other purposes (e.g., compliance with MATS or RACT II). Second, for certain control options, costs were estimated in accordance with the source type-relevant recommendations in the EPA Air Pollution Control Cost Manual as applying to cost estimates in a permitting context. Third, for certain control options, costs were evaluated using EPA's CAMD Retrofit Cost Analyzer Tool. In each case, costs are adjusted to 2019 dollars for comparison. Each of the potential emission reductions for the individual pollutants is discussed more fully below. In its cost calculations, Homer City used an interest cost of 7.0 percent for capital to finance the projects and a 20-year life of the equipment. The use of a 7 percent interest charge is conservative given the reluctance of investors generally to provide funding for fossil-fired generating projects.

10.1.1 Enhanced NOx Control Measures

As is discussed earlier, Homer City completed upgrades of the Units 1 and 2 SCR systems in 2018 and 2019, respectively. These upgraded SCR controls complement the existing LNB/SOFA systems on the Units to comply with PADEP's RACT II requirements of 0.12

lb/MMBtu. The upgrades were completed at a capital cost of approximately \$6.5 million for Unit 1 and \$5.5 million for Unit 2, respectively. Homer City Unit 3 is equipped with LNB/SOFA and SCR NOx emission controls and did not require modification to comply with PADEP's RACT II requirements.

A summary of the projected NO_x emission reductions, costs, and time to implement for the available additional NO_x emissions strategies for Units 1, 2, and 3 is shown in Table 2. The cost data for the "Homer City Cost Estimates" are based on preliminary vendor quotations and the "Costs Based on MANE-VU/EPA Data" are based on information contained in Appendix K of the "New Hampshire Regional Haze Plan Periodic Comprehensive Revision" (DRAFT 10/31/2019) and on EPA's Air Markets Retrofit Cost Analyzer. Table 3 shows annualized cost for the potential NOx control options on a cost per ton of pollutant and annualized costs based on the capital costs and annual operating expenses shown in Table 2. Additional discussion is provided below for each of the NO_x control strategies.

Table 2. NOx Strategies, Estimated Costs and Time to Implement

	Homer City Cost Estimates			Estimated Costs Based on MANE-VU/EPA Data / EPA's CAMD Retrofit Cost Analyzer Tool			
Strategy	**Emission Reductions (TPY)**	**Capital Cost (2019$)**	**Annual Operating Cost (2019$)**	**Emission Reductions (TPY)**	**Capital Cost (2019$)**	**Annual Operating Cost (2019$)**	**Time to Implement (Years) (1)**
New LNB/SOFA							
Unit 1	476	27,093,900	300,000	476	52,290,800 (2)	1,036,487 (2)	3 – 6
Unit 2	476	27,093,900	300,000	476	52,290,800 (2)	1,036,487 (2)	3 – 6
Unit 3	191	32,512,700	300,000	191	53,806,500 (2)	987,631 (2)	3 – 6
New SCR							
Unit 1				1,629	204,703,000 (3)	4,834,000 (3)	3 - 6
Unit 2				1,629	204,703,000 (3)	4,834,000 (3)	3 - 6
Unit 3				1,158	209,514,000 (3)	4,717,000 (3)	3 - 6
New NH3 Vaporizers							
Unit 1	818	1,625,630	4,779,513				3 - 6
Unit 2	818	1,625,630	4,779,513				3 – 6
Unit 3	604	1,625,630	3,689,374				3 – 6
2018 SCR Upgrades							
Unit 1	11,007	6,131,910	6,506,910				Complete
Unit 2	11,007	5,461,310	5,461,685				Complete

(1) Schedule assumes 2 - 3 years for permitting, design, fabrication and delivery, and installation over a 3-year period during scheduled outages.
(2) Costs based on Tables 2.10 thru 2.13, Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision" (DRAFT 10/31/2019).
(3) Costs based on CAMD Air Markets Retrofit Cost Analyzer Tool.

Table 3. NOx Strategies, Estimated Annualized Costs, and Cost per Ton Reduced

	Homer City Cost Estimates			Estimated Costs Based on MANE-VU/EPA Data / EPA's CAMD Retrofit Cost Analyzer Tool		
Strategy	**Emission Reduction (TPY)**	**Annualized Cost (2019$)**	**Cost (2019$ per ton)**	**Emission Reduction (TPY)**	**Annualized Cost (2019$)**	**Cost (2019 $ per ton)**
New LNB/SOFA						
Unit 1	476	3,888,684	8,170	476	8,237,084 (1)	17,305 (1)
Unit 2	476	3,888,684	8,170	476	8,237,085 (1)	17,305 (1)
Unit 3	191	4,570,422	23,929	191	8,381,605 (1)	43,883 (1)
New SCR						
Unit 1				1,629	24,158,000 (2)	14,830(2)
Unit 2				1,629	24,158,000 (2)	14,830(2)
Unit 3				1,158	19,778,000 (2)	21,151(2)
New NH3 Vaporizers						
Unit 1	818	7,851,741	9,599			
Unit 2	818	7,851,741	9,599			
Unit 3	604	6,107,518	10,112			
2018 SCR Upgrades						
Unit 1	11,007	8,156,415	741			
Unit 2	11,000	8,066,286	733			

(1) Costs based on Tables 2.10 thru 2.13, Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision" (DRAFT 10/31/2019).
(2) Costs based on CAMD Air Markets Retrofit Cost Analyzer Tool.

10.1.1.1 LNB/OFA Replacement

In 2016 and 2017, Homer City evaluated compliance options for Units 1 and 2 for PADEP's RACT II program. As part of the evaluation, Homer City obtained quotations for replacement of the LNBs in Units 1 and 2. Cost estimates and performance guarantees submitted by the vendor during that analysis were used to determine costs per ton of NO_x removed for Units 1 and 2 if the new LNB/SOFA system were installed.

NO_x emissions from the Units 1 and 2 combustion zones with the existing burners are approximately 0.55 lb/MMBtu. The vendor for the burners evaluated for RACT II estimated a combustion zone NOx emission not to exceed a NO_x emission rate of 0.47 lb/MMBtu. Assuming 8,760 hours of operation at full load, installation of the new LNB/SOFA system would result in NOx emission reductions of approximately 476 tons per year each for Units 1 and 2.

NO_x emissions from the Unit 3 combustion zone with the existing burners are approximately 0.38 lb/MMBtu. Installation and operation of a new LNB/SOFA system could reduce the combustion zone NO_x emissions to approximately 0.35 lb/MMBtu. Assuming 8,760 hours of operation at full load, installation of the new LNB/SOFA system would result in NO_x emission reductions of approximately 191 tons per year for Unit 3.

10.1.1.2 Upgrades to SCR System

During 2018 and 2019, the SCR systems for Units 1 and 2 were upgraded at a cost of $6.1 and $5.5, respectively. These upgrades included replacement of the AIG and installation of static mixers between the AIG and the catalyst to assure uniform distribution of the ammonia across the catalyst. Additional upgrades to the Units 1 and 2 SCR systems would require capital investment for installation of new AIGs with increased ammonia injection capacity, replacement of existing ammonia pumps and addition of catalyst beds. Increased operating costs would be as a result of increased ammonia use and catalyst replacement costs.

Upgrading the SCR system for Unit 3 would involve similar capital effort, i.e., replacing the AIG and installation of additional catalysts, along with associated annual operating costs due to increased ammonia use and need for additional catalyst bed replacements.

Assuming 8,760 hours of operation at full load, upgrades of the SCR systems would result in NOx emission reductions of approximately 818, 818, and 604 tons per year each for Units 1, 2 and 3, respectively.

10.1.1.3 Replacement of the SCR Systems

Homer City has investigated the costs and emission reduction potential of replacement of the existing SCR systems with new SCR systems. Costs were evaluated using the EPA CAMD Retrofit Cost Analyzer Tool. Assuming 8,760 hours of operation at full load, upgrades of the SCR systems would result in NOx emission reductions of approximately 1,629, 1,629, and 1,158 tons per year each for Units 1, 2 and 3, respectively.

10.1.2 Enhanced SO_2 Control Measures

As is discussed above, Homer City completed installation of NIDS SO_2 removal systems on Units 1 and 2 at a total cost of approximately $900 million (2014$). The allowable SO_2 rate was decreased from 3.7 lb/MMBtu to 0.20 lb/MMBtu (95% reduction in SO_2 rate), and a 95% reduction in tons emitted per hour. As a merchant generator, Homer City's operations are dictated by PJM, the grid operator based on electrical demand. Therefore, it is not possible to predict unit utilization and corresponding emissions.

A summary of the projected SO_2 emission reductions, costs, and time to implement for the available SO_2 emissions strategies for Units 1, 2, and 3 is shown in Table 4. Table 5 shows annualized cost for the potential SO_2 control options on a cost per ton of pollutant and annualized costs based on the capitol costs and annual operating expenses shown in Table 4. Additional discussion is provided below for each of the SO_2 control strategies.

Table 4. SO_2 Strategies, Estimated Costs and Time to Implement

	Homer City Cost Estimates			Estimated Costs Based on MANE-VU/EPA Data / EPA's CAMD Retrofit Cost Analyzer Tool/MANE-VU/EPA Data			
Strategy	Emission Reduction (TPY)	Capital Cost (2019$)	Annual Operating Cost (2019$)	Emission Reduction (TPY)	Capital Cost (2019$)	Annual Operating Cost (2019$)	Time to Implement (Years) (8)
Low Sulfur Coal (1)							
Unit 1	4,462	0	29,617,635				3 - 6
Unit 2	4,462	0	29,617,635				3 – 6
Unit 3	4,477	0	41,389,146				3 – 6
NIDS Upgrade							
Unit 1	1,487	5,000,000	10,648,210				3 – 6
Unit 2	1,487	5,000,000	10,648,210				3 - 6
New NIDS							
Unit 3	6,360	524,521,000 (7)	23,687,770 (7)	6,095	$348790,000 (4)	11,7132,000(4)	3 - 6
Partial NG Conversion (2)							
Unit 1, 2, and 3	17,616	90,556,500	155,867,893	17,616	211,877,500 (5)	171,088,000 (5)	6 - 10 (3)
2015/2016 NIDS Install							
Unit 1	104,121	493,945,000 (6)	20,061,688 (6)	112,547	$345,442,000 377,345,000 (4)	49,151,600 (4)	Completed
Unit 2	104,121	493,945,000 (6)	20,061,688 (6)	112,547	$345,442,000 377,345,000 (4)	49,151,600 (4)	Completed

(1) Costs based on current coal market costs
(2) Conversion would replace only approximately 50% of the coal firing with natural gas.
(3) Estimated schedule includes siting and construction of natural gas pipeline.
(4) Costs based on CAMD Air Markets Retrofit Cost Analyzer Tool for a dry lime scrubber.
(5) Costs based on Tables 2.10 thru 2.13, Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision (DRAFT 10/31/2019) 12
(6) Adjusted actual capital expenditure and operating costs based on Units 1 and 2, and adjusted to 2019$.
(7) Projected capital and operating costs are scaled from actual costs for Unit 1 and 2, and adjusted to 2019$.
(8) Schedule assumes 2 - 3 years for permitting, design, fabrication and delivery, and installation over a 3-year period during scheduled outages.

[12] https://www.des.nh.gov/organization/divisions/air/do/asab/rhp/documents/r-ard-19-01.pdf

Table 5. SO_2 Strategies, Estimated Annualized Costs, and Cost per Ton Reduced

	Homer City Cost Estimates			Estimated Costs Based on MANE-VU/EPA Data / EPA's CAMD Retrofit Cost Analyzer Tool/MANE-VU/EPA Data		
Strategy	**Emission Reduction (TPY)**	**Annualized Cost (2019$)**	**Cost (2019$ per ton)**	**Emission Reduction (TPY)**	**Annualized Cost (2019$)**	**Cost (2019$ per ton)**
Low Sulfur Coal						
Unit 1	4,462	47,388,216	10,607			
Unit 2	4,462	47,388,216	10,607			
Unit 3	4,477	41,389,146	14,792			
NIDS Upgrade						
Unit 1	1,487	19,211,356	12,920			
Unit 2	1,487	19,211,356	12,920			
New NIDS						
Unit 3	6,360	103,890,419	16,335	6,095	33,063,200 (2)	7,245 (2)
Partial NG Conversion (1)						
Units 1, 2, and 3	17,616	260,781,542	14,804	17,616	274,463,996 (3)	15,580 (3)
2015/2016 NIDS Install						
Unit 1	104,121	83,468,980 (4)	802 (4)	112,547	35,341,300(2)	751(2)
Unit 2	104,121	83,468,980 (4)	802 (4)	112,547	35,341,300 (2)	751(2)

(1) Conversion would replace only approximately 50% of the coal firing with natural gas.
(2) Costs based on CAMD Air Markets Retrofit Cost Analyzer Tool.
(3) Costs based on Tables 2.10 thru 2.13, Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision (DRAFT 10/31/2019).
(4) Costs based on actual capital expenditure and operating costs adjusted to 2019$.

10.1.2.1 Switching to Lower Sulfur Coal

Homer City investigated the availability and quality of lower sulfur coal for use in Units 1, 2, and 3. Homer City was designed for, and currently burns western Pennsylvania bituminous coal, typically containing a sulfur content of approximately 3.5%, and greater. Lower sulfur western Pennsylvania bituminous coal, typically metallurgical (met) coal is available. Securing contracts and obtaining long term contracts for met coal in the quantities required for Homer City would be a lengthy process. The length of the process is a function of the duration of the contract of the existing contract. For example, negotiations to renew a 2-year contract will not start until several months before the end of that contract.

Costs incurred would be the recurring cost differential between steam coal and met coal. Comparison of high and low sulfur bituminous coal prices on the EIA website indicate September 18, 2020 prices of $42.45/ton for higher sulfur coal vs $59.50 /ton low sulfur coal. (https://www.eia.gov/coal/) It should be noted that spot coal prices vary on a day-to-day basis.

Projected SO_2 emission reductions and costs for conversion to lower sulfur met coal for Units 1, 2, and 3 and projected times for installation are shown in Table 4.

10.1.2.2 Upgrading the Existing Units 1 and 2 NIDS

As discussed earlier, Homer City recently completed the installation of NIDS (dry FGD) to reduce SO_2 emissions from Units 1 and 2. These NIDS were installed in 2015 and 2016 at a cost of $450 million (2014$) each for Units 1 and 2. Homer City evaluated measures necessary to improve the SO_2 removal efficiency of the NIDS. Enhancing the SO_2 removal efficiency can be accomplished through the injection of additional lime into the NIDS J-ducts. However, injection of additional lime would result in overload of the NIDS by-product handling system. In order for Homer City to upgrade the NIDS performance by injection of additional lime, it would be necessary to replace the by-product handling system with a higher capacity system. Capital cost estimates for replacement of the by-product handling systems are approximately $5 million each for Units 1 and 2. Additional annual operating costs of approximately $10.5 million would be experienced because of the cost of purchase of additional lime required, increased electrical costs for motors, and in increased waste transport and disposal and shortened life of the waste disposal site.

Projected SO_2 emission reductions and costs for NIDS by-product handling system replacement/upgrades for Units 1 and 2 and projected times for installation are shown in Table 4.

10.1.2.3 Replacing the Unit 3 Wet FGD System

Homer City has investigated measures necessary to improve the SO_2 emission reduction efficiency of the Unit 3 wet FGD. Significant upgrades to the existing scrubber would negatively impact the water balance at the facility and would likely require significant investment in new wastewater capability in addition to requiring significant additional fan capacity and resulting loss in plant efficiency.

Therefore, Homer City has evaluated the installation of a dry scrubber-type system similar to the NIDS installed on Units 1 and 2. Homer City has developed control cost estimates for a dry scrubber system based on the scaling of the costs experienced for the recent installation of the Units 1 and 2 NIDS and adjusting the 2014($) to 2019($) and by using the calculation methodologies in EPA's Air Markets Retrofit Cost Analyzer. (See Appendix F) The projected costs for procurement and operation of a new dry scrubber for Unit 3 are shown in Tables 4 and 5.

10.1.2.4 Conversion to Natural Gas

Homer City has investigated conversion of the facility to firing of natural gas. Because of the quantity of natural gas fuel that would be required for full conversion of the facility it was determined that full conversion was not practical. The evaluation indicated that replacement of approximately 50% of the heat input with natural gas was feasible. Conversion of the facility to partial firing of natural gas would require the construction of a major natural gas pipeline and related natural gas handling facilities with associated air quality and non-air quality environmental impacts, as well as boiler burner replacements. In addition, there is a projected significant increase in fuel costs associated with a partial conversion to of the facility to natural gas firing. The fuel cost differential was calculated using Homer City's current coal cost and Henry Hub Natural Gas Futures Quotes.[13] Other costs related to partial conversion to natural gas, including estimated pipeline construction costs and burners, were developed based on information in Appendix K, New Hampshire Regional Haze Plan Periodic Comprehensive Revision (DRAFT 10/31/2019. (See Appendix G)

Projected SO_2 emission reductions and costs for the partial conversion to natural gas for Units 1, 2, and 3 and projected times for installation are shown in Table 4.

10.2 Time Necessary for Compliance

The second statutory factor – the time necessary for compliance – involves estimating the time needed for a source to implement a potential control measure. Each of these control options would require permitting, engineering design, procurement and installation coordinated with scheduled outages. Homer City has provided estimates for implementation of each of the potential emissions measures in Tables 2 and 4.

10.3 Energy and Non-Air Quality Environmental Impacts of Compliance

The third statutory factor requires characterizing information about energy and non-air quality environmental impacts. There are a number of associated environmental and energy issues associated with the available NO_x and SO_2 emission reduction measures. These are discussed more fully below.

10.3.1 Energy

Each of the available measures for reducing emissions of NO_x or SO_2 at the facility has some increased energy consumption component. Increased material transport, increased size of

[13] https://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html

motors, as well as related activities will result in increased emissions of criteria pollutants as well as GHGs. Increased parasitic energy use will have a negative impact on the facility's ability to produce power for the grid and will negatively impact efforts to reduce GHG emissions as required under the Affordable Clean Energy (ACE) rule.

10.3.1.1 LNB/SOFA

LNB/SOFA systems typically result in less than complete combustion of the fuel. This is manifest in increased levels of unburned carbon in the fly ash. Tuning of burners to lower NOx emissions also results in increased emissions of CO. These products of incomplete combustion are indicative of increased energy inputs required over those for a non-LNB/SOFA system. This incomplete combustion may have impacts on other factors including additional waste disposal and additional fuel use resulting in associated increased mobile source emissions.

10.3.1.2 Changes/Upgrades to SCR System

Upgrades to the SCR systems will require additional energy to power the ammonia pumps which supply ammonia to the AIG.

10.3.1.3 Switching to Lower Sulfur Coal

Lower sulfur "met" coal has a lower heating value per ton that the "steam" coal currently burned at the facility. Therefore, replacing the "steam" coal with "met" coal will result in increased emissions from transport of the additional tonnage of coal required to make up for the difference in energy content. Since the energy content of the "met" coal is approximately 96 to 97% that of steam coal, it is anticipated that transportation emissions required for transport of "met" coal to the site would increase by approximately 3-4% with associated GHG emissions.

10.3.1.4 Upgrading the Existing Units 1 and 2 NIDS

Upgrading of the NIDS systems would result in additional energy consumption to transport the additional lime to the facility, inject the lime into the J-duct scrubbers, and to transport the additional waste for disposal. Additionally, transport of the additional lime required will increase emissions of criteria pollutants and GHGs.

10.3.2 Waste Transport/Disposal

All of the available strategies have additional waste issues/costs associated with them. Most of these are energy and disposal capacity issues on site. Generation of increased quantities of SO_2 scrubber by-product materials and the transport of the materials will result in increased emissions and shorten the on-site disposal site life, ultimately requiring expenditure to find a new site or a way to increase capacity at the site. In addition, the transport of the additional waste will result in increased emissions of criteria pollutants and GHGs.

10.4 Remaining Useful Life of Any Potentially Affected Sources

Homer City Units 1 and 2 were installed in 1969 and Homer City Unit 3 was installed in 1977. Although Units 1 and 2 the units are more than 50 years old and Unit 3 is 43 years old, no specific retirement dates have been set. Therefore, the remaining useful lives of the Units may be assumed to be at least 20 years.

11. Conclusion

Homer City has installed and operates BACT level controls for SO2, NOx and PM. The four-factor analysis considers the potential and costs of upgrading these controls for SO_2 and NO_x. These controls already meet LEE emission limits under the MATS Rule.

Homer City has identified a number of additional controls that are technically feasible for reducing emissions of NO_x and SO_2. However, the projected costs of the emission reductions are not reasonable, even assuming a 100% capacity factor for the facility. Costs per ton of emissions reduction range from \$8,170 to \$43,883 for NO_x; and from \$7,245 to \$15,580 for SO_2. Moreover, any of these options would take several years to implement and would result in increased energy consumption, increased emissions of GHGs and other pollutants, increased consumption of consumables (e.g., ammonia, lime, coal), and/or increased wastes to be disposed.

APPENDIX A
Coal Analysis Report

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Friday, July 24, 2020

TOM SUDA
HCG-PERFORMANCE/BUNKER - #1/2
HOMER CITY GENERATION
1750 POWER PLANT RD
HOMER CITY, PA 15748-9558

RE: HCG Units 1&2 Majors Full List — Order No.: G2007D18

Dear TOM SUDA:

Geochemical Testing received 1 sample(s) on 7/21/2020 for the analyses presented in the following report.

There were no problems with sample receipt protocols and analyses met the TNI/NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser
Director of Technical Services

CLIENT: HCG-PERFORMANCE/BUNKER - #1/2
Project: HCG Units 1&2 Majors Full List
Lab Order: G2007D18

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

Legend:

H - Method Hold Time exceeded and is not compliant with 40CFR136 Table II.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q1 - See case narrative
ND - Not Detected
MCL - Contaminant Limit
J - Indicates an estimated value.
Q - Qualifier
QL -Quantitation Limit
DF - Dilution Factor
S - Surrogate Recovery outside accepted recovery limits
T - Sample received above required temperature and is not compliant with 40CFR136 Table II.
T1 - Sample received above required temperature
MDA - Minimum Detectable Activity.
** - Value exceeds Action Limit
TICs - Tentatively Identified Compounds.
E - Value above quantitation range

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: HCG-PERFORMANCE/BUNKER - #1/2

Sampled by: Client

Sampling Date: 07/21/2020

Analyzed on: 07/22/2020

Description: Unit #1 Bunker Sample 14 A & B

LAB NO. 20-388458

	As Received	Dry	Dry Ash-Free
PROXIMATE ANALYSIS D3172			
Moisture	6.61		
Ash	8.75	9.37	
Volatile Matter	36.92	39.53	43.62
Fixed Carbon	47.72	51.10	56.38
	100.00	100.00	100.00
ULTIMATE ANALYSIS			
Hydrogen D5373-0	5.44	5.03	5.55
Carbon D5373-0	69.75	74.68	82.41
Nitrogen D5373-0	1.38	1.48	1.63
Sulfur D4239-08	2.72	2.92	3.22
Oxygen D3176..	11.96	6.52	7.19
Ash D3174-04	8.75	9.37	
	100.00	100.00	100.00
Heating Value(BTU/Lb) D5865	12747	13649	15060

Free Swelling Index D720-91 8.0

Ash Fusion (Reducing Atmosphere) ASTM D-1857

	Initial D.	Softening T.	Hemi T.	Fluid T.
Temp o F	2050	2150	2310	2390

Ash Fusion (Oxidizing Atmosphere) ASTM D-1857

	Initial D.	Softening T.	Hemi T.	Fluid T.
Temp o F	2460	2510	2550	2590

Lbs Sulfur/Million Btu 2.13

Lbs SO2/Million Btu 4.26

Wade Bergstresser
Director of Coal Services

GEOCHEMICAL TESTING
Environmental and Energy Analysis

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Somerset, PA 15501

814/443-1671
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COAL ANALYSIS REPORT

Client: HCG-PERFORMANCE/BUNKER - #1/2

Sampled by: Client

Sampling Date: 07/21/2020

Analyzed on: 07/22/2020

Description: Unit #1 Bunker Sample 14 A & B

LAB NO. 20-388458

Chlorine......ASTM D4208 ...... 0.10 %

Wade Bergstresser
Director of Coal Services

Laboratory Results

Geochemical Testing

Date: *24-Jul-20*

CLIENT:	HCG-PERFORMANCE/BUNKER - #1/2	**Client Sample ID:**	Unit #1 Bunker Sample 14 A & 388458
Lab Order:	G2007D18		
Project:	HCG Units 1&2 Majors Full List	**Sampled By:**	HCG
Lab ID:	G2007D18-001	**Collection Date:**	7/21/2020 12:01:00 AM
Matrix:	COAL	**Received Date:**	7/21/2020 7:56:00 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
MAJOR / MINOR ELEMENTS IN ASH		Analyst: **MEG**				**ASTM D 6349**	**EPA 6010 D**
Silicon Dioxide	45.55	1.00		% Dry	10	07/22/20 5:30 AM	07/23/20 11:37 AM
Aluminum Oxide	22.30	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Iron Oxide	21.48	0.10		% Dry	10	07/22/20 5:30 AM	07/23/20 11:37 AM
Titanium Dioxide	0.97	0.02		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Phosphorus Pentoxide	0.27	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Calcium Oxide	3.23	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Magnesium Oxide	0.80	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Sodium Oxide	0.70	0.02		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Potassium Oxide	1.67	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Sulfur Trioxide	3.06	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Manganese Dioxide	0.04	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Lithium Oxide	0.03	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Strontium Oxide	0.13	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
Barium Oxide	0.09	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:31 PM
ARSENIC/SELENIUM		Analyst: **RLR**				**ASTM D 4606**	**EPA 6020 B**
Arsenic	12.0	1.0		mg/Kg-dry	20	07/22/20 12:59 AM	07/23/20 1:51 PM
Selenium	1.9	1.0		mg/Kg-dry	20	07/22/20 12:59 AM	07/23/20 1:51 PM

GEOCHEMICAL TESTING
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814/445-6666
FAX: 814/445-6729

Friday, July 24, 2020

TOM SUDA
HCG-PERFORMANCE/BUNKER - #1/2
HOMER CITY GENERATION
1750 POWER PLANT RD
HOMER CITY, PA 15748-9558

RE: HCG Unit 3 Majors Full List

Order No.: G2007D19

Dear TOM SUDA:

Geochemical Testing received 1 sample(s) on 7/21/2020 for the analyses presented in the following report.

There were no problems with sample receipt protocols and analyses met the TNI/NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Timothy W. Bergstresser

Timothy W. Bergstresser
Director of Technical Services

Geochemical Testing **Date:** *24-Jul-20*

CLIENT: HCG-PERFORMANCE/BUNKER - #1/2
Project: HCG Unit 3 Majors Full List
Lab Order: G2007D19

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

Legend:

H - Method Hold Time exceeded and is not compliant with 40CFR136 Table II.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q1 - See case narrative
ND - Not Detected
MCL - Contaminant Limit
J - Indicates an estimated value.
Q - Qualifier
QL -Quantitation Limit
DF - Dilution Factor
S - Surrogate Recovery outside accepted recovery limits
T - Sample received above required temperature and is not compliant with 40CFR136 Table II.
T1 - Sample received above required temperature
MDA - Minimum Detectable Activity.
** - Value exceeds Action Limit
TICs - Tentatively Identified Compounds.
E - Value above quantitation range

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

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Environmental and Energy Analysis

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814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: HCG-PERFORMANCE/BUNKER - #3

Sampled by: Client

Sampling Date: 07/21/2020

Analyzed on: 07/22/2020

Description: Unit #3 Bunker Sample 21 A & B

LAB NO. 20-388460

	As Received	Dry	Dry Ash-Free
PROXIMATE ANALYSIS D3172			
Moisture	4.97		
Ash	8.13	8.55	
Volatile Matter	38.54	40.56	44.35
Fixed Carbon	48.36	50.89	55.65
	100.00	100.00	100.00
ULTIMATE ANALYSIS			
Hydrogen ... D5373-0	5.40	5.09	5.57
Carbon ... D5373-0	71.06	74.78	81.77
Nitrogen ... D5373-0	1.36	1.43	1.56
Sulfur ... D4239-08	3.07	3.23	3.53
Oxygen ... D3176..	10.98	6.92	7.57
Ash ... D3174-04	8.13	8.55	
	100.00	100.00	100.00
Heating Value(BTU/Lb) D5865	13056	13739	15024

Free Swelling Index D720-91 8.0

Ash Fusion (Reducing Atmosphere) ASTM D-1857

	Initial D.	Softening T.	Hemi T.	Fluid T.
Temp o F	2040	2150	2320	2380

Ash Fusion (Oxidizing Atmosphere) ASTM D-1857

	Initial D.	Softening T.	Hemi T.	Fluid T.
Temp o F	2420	2500	2530	2580

Lbs Sulfur/Million Btu 2.35
Lbs SO2/Million Btu 4.70

Fluorine.........ASTM D3761-02 19 mg/kg, dry

Wade Bergstresser
Director of Coal Services

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: HCG-PERFORMANCE/BUNKER - #3

Sampled by: Client

Sampling Date: 07/21/2020

Analyzed on: 07/22/2020

Description: Unit #3 Bunker Sample 21 A & B

LAB NO. 20-388460

Chlorine......ASTM D4208 ...... 0.10 %

Wade Bergstresser
Director of Coal Services

Laboratory Results

Geochemical Testing

Date: *24-Jul-20*

CLIENT:	HCG-PERFORMANCE/BUNKER - #1/2	**Client Sample ID:**	Unit #3 Bunker Sample 21 A&B 388460
Lab Order:	G2007D19		
Project:	HCG Unit 3 Majors Full List	**Sampled By:**	HCG
Lab ID:	G2007D19-001	**Collection Date:**	7/21/2020 12:01:00 AM
Matrix:	COAL	**Received Date:**	7/21/2020 7:56:00 PM

Analyses	Result	QL	Q	Units	DF	Date Prepared	Date Analyzed
MAJOR / MINOR ELEMENTS IN ASH		Analyst: **MEG**				**ASTM D 6349**	**EPA 6010 D**
Silicon Dioxide	42.84	1.00		% Dry	10	07/22/20 5:30 AM	07/23/20 11:41 AM
Aluminum Oxide	22.40	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Iron Oxide	21.84	0.10		% Dry	10	07/22/20 5:30 AM	07/23/20 11:41 AM
Titanium Dioxide	0.99	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Phosphorus Pentoxide	0.24	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Calcium Oxide	4.10	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Magnesium Oxide	0.94	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Sodium Oxide	1.05	0.02		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Potassium Oxide	1.40	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Sulfur Trioxide	4.43	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Manganese Dioxide	0.04	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Lithium Oxide	0.03	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Strontium Oxide	0.18	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
Barium Oxide	0.11	0.01		% Dry	1	07/22/20 5:30 AM	07/23/20 12:35 PM
ARSENIC/SELENIUM		Analyst: **RLR**				**ASTM D 4606**	**EPA 6020 B**
Arsenic	7.3	1.0		mg/Kg-dry	20	07/22/20 12:59 AM	07/23/20 1:54 PM
Selenium	1.8	1.0		mg/Kg-dry	20	07/22/20 12:59 AM	07/23/20 1:54 PM

GEOCHEMICAL TESTING
Environmental and Energy Analysis

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Analysis Date: 08/20/20

	MOS	ASH	VOL	FC	SUL	BTU	FSI LBS A LBS S

390461 0 HCG-PERFORMANCE/BUNKER Samp by Client On 08/19/2020 C
Unit #3 Bunker Sample 21 A & B

	MOS	ASH	VOL	FC	SUL	BTU	FSI
AR	5.11	7.55	38.47	48.87	2.98	13197	9.0
DRY		7.95	40.54	51.51	3.14	13908	5.72
DAF			44.04	55.96		15109	2.26

APPENDIX B

RACT / BACT / LAER Clearinghouse

NO_x Controls

Previous Page

COMPREHENSIVE REPORT
Report Date:08/17/2020

Facility Information

RBLC ID:	AZ-0055 (final)	**Date Determination Last Updated:**	01/08/2014
Corporate/Company Name:	SALT RIVER PROJECT AGRICULTURAL AND POWER DISTRICT	**Permit Number:**	AZ 08-01
Facility Name:	NAVAJO GENERATING STATION	**Permit Date:**	02/06/2012 (actual)
Facility Contact:	KARA MONTALVO	**FRS Number:**	110028287725
Facility Description:	2,250 MW COAL FIRED POWER PLANT	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221112
Permit URL:	http://www.epa.gov/region9/air/permit/r9-permits-issued.html		
EPA Region:	9	**COUNTRY:**	USA
Facility County:	COCONINO		
Facility State:	AZ		
Facility ZIP Code:	86040		
Permit Issued By:	EPA REGION IX (Agency Name) MR. GERARDO RIOS(Agency Contact) (415)972-3974 rios.gerardo@epa.gov		
Other Agency Contact Info:	GERARDO RIOS, EPA REGION IX, 415-972-3974, RIOS.GERARDO@EPA.GOV		
Permit Notes:	PERMIT ISSUED ON 11/20/2008 AND ADMINISTRATIVELY AMENDED ON 2/6/2012. AFFECTED CLASS I AREAS CAN BE FOUND IN BART REGULATORY DOCKET AT http://www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R09-OAR-2008-0454		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	UT	Arches NP	100km - 50km
CLASS1	UT	Bryce Canyon NP	< 100 km
CLASS1	UT	Canyonlands NP	100km - 50km
CLASS1	UT	Capitol Reef NP	< 100 km
CLASS1	AZ	Grand Canyon NP	< 100 km
CLASS1	AZ	Mazatzal	> 250 km
CLASS1	CO	Mesa Verde NP	100km - 50km
CLASS1	AZ	Petrified Forest NP	100km - 50km
CLASS1	AZ	Pine Mountain	> 250 km
CLASS1	AZ	Sycamore Canyon	100km - 50km
CLASS1	UT	Zion NP	100km - 50km

Process/Pollutant Information

PROCESS NAME:	PULVERIZED COAL FIRED BOILER
Process Type:	11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel:	COAL
Throughput:	7725.00 MMBTU/H
Process Notes:	BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME:	Nitrogen Oxides (NOx)
CAS Number:	10102
Test Method:	Unspecified
Pollutant Group(s):	(InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1:	0.2400 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	
Control Method:	(P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

Process/Pollutant Information

PROCESS NAME: PULVERIZED COAL FIRED BOILER
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: COAL
Throughput: 7725.00 MMBTU/H
Process Notes: BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.2400 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

Process/Pollutant Information

PROCESS NAME: PULVERIZED COAL FIRED BOILER
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: COAL
Throughput: 7725.00 MMBTU/H
Process Notes: BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.2400 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO_2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	TX-0601 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	TEXAS MUNICIPAL POWER AGENCY	**Permit Number:**	5699 AND PSDTX18M2
Facility Name:	GIBBONS CREEK STEAM ELECTRIC STATION	**Permit Date:**	10/28/2011 (actual)
Facility Contact:	KEN BABB (936)873-1147	**FRS Number:**	110008138078
Facility Description:	one 5,060 MMBtu/h boiler burning natural gas, lignite, coal, and a blend of lignite or coal with petroleum coke	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221122
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	GRIMES		
Facility State:	TX		
Facility ZIP Code:	77830		
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		

Other Agency Contact Info: Kate Stinchcomb, (512)239-1583, katherine.stinchcomb@tceq.texas.gov

Permit Notes:

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	TX	Big Bend NP	> 250 km

Process/Pollutant Information

PROCESS NAME: Boiler

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Coal

Throughput: 5060.00 MMBtu/h

Process Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.1200 LB/MMBTU 30-DAY ROLLING AVERAGE

Emission Limit 2: 2428.0000 LB/H

Standard Emission: 2365.0000 T/YR

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 1.2000 LB/MMBTU

Emission Limit 2: 1771.0000 LB/H

Standard Emission: 6052.0000 T/YR

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Wet Flue Gas Desulfurization

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID: CA-1206 (final)

Date Determination Last Updated: 01/14/2014

Corporate/Company Name: APMC STOCKTON COGEN

Permit Number: SJ 85-04

Facility Name: STOCKTON COGEN COMPANY

Permit Date: 09/16/2011 (actual)

Facility Contact: GLENN SIZEMORE

FRS Number: 110000484930

Facility Description:	49.9 MW COGENERATION POWER PLANT OWNED BY AIR PRODUCTS MANUFACTURING CORPORATION (APMC) STOCKTON COGEN AND LOCATED IN STOCKTON, CALIFORNIA	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221112
Permit URL:	http://www.epa.gov/region09/air/permit/r9-permits-issued.html		
EPA Region:	9	**COUNTRY:**	USA
Facility County:	SAN JOAQUIN COUNTY		
Facility State:	CA		
Facility ZIP Code:	95206		
Permit Issued By:	EPA REGION IX (Agency Name) MR. GERARDO RIOS(Agency Contact) (415)972-3974 rios.gerardo@epa.gov		
Permit Notes:	PSD permit amended to allow increased operation of facility's natural gas-fired auxiliary boiler and reduced operation of its coal-fired circulating fluidized bed boiler. Facilitywide emission increases less than the PSD significant thresholds.		

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	28.8000 (Tons/Year)
Nitrogen Oxides (NOx)	6.6200 (Tons/Year)
Particulate Matter (PM)	9.9300 (Tons/Year)
Sulfur Oxides (SOx)	2.2600 (Tons/Year)
Volatile Organic Compounds (VOC)	0.9900 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: CIRCULATING FLUIDIZED BED BOILER

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: COAL

Throughput: 730.00 MMBTU/H

Process Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 59.0000 LB/H 8-HR AVG

Emission Limit 2: 100.0000 LB/H 3-HR AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) LIMESTONE INJECTION W/ A MINIMUM REMOVAL EFFICIENCY OF 70% (3-HR AVG) TO BE MAINTAINED AT ALL TIMES

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 50.0000 PPM @3% O2, 3-HR AVG

Emission Limit 2: 42.0000 LB/H 3-HR AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (B) LOW BED TEMPERATUR STAGED COMBUSTION; SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: OTHER LIMITS: AUX BOILER AND CIRCULATING FLUIDIZED BED BOILER MAY ONLY BE OPERATED SIMULTANEOUSLY FOR UP TO 250 HRS PER YEAR, DURING CIRCULATING FLUIDIZED BED BOILER STARTUP AND SHUTDOWN PERIODS, AND PERIODS OF LESS THAN 10 HRS DURATION TO CONDUCT EMISSIONS TESTING

Process/Pollutant Information

PROCESS NAME: AUXILIARY BOILER

Process Type: 12.310 (Natural Gas (includes propane and liquefied petroleum gas))

Primary Fuel: NATURAL GAS

Throughput: 178.00 MMBTU/H

Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 7.0000 PPMVD @3% O2

Emission Limit 2: 0.0085 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: OTHER LIMITS: AUX BOILER AND CIRCULATING FLUIDIZED BED BOILER MAY ONLY BE OPERATED SIMULTANEOUSLY FOR UP TO 250 HRS PER YEAR, DURING CIRCULATING FLUIDIZED BED BOILER STARTUP AND SHUTDOWN PERIODS, AND PERIODS OF LESS THAN 10 HRS DURATION TO CONDUCT EMISSIONS TESTING

Previous Page

Facility Information

RBLC ID: MI-0400 (final)

Date Determination Last Updated: 04/14/2016

Corporate/Company Name: WOLVERINE POWER SUPPLY COOPERATIVE, INC.

Permit Number: 317-07

Facility Name: WOLVERINE POWER

Permit Date: 06/29/2011 (actual)

Facility Contact: BRIAN WARNER 2317755700 X 3336 BWARNER@WPSCI.COM

FRS Number: 26-14105823

Facility Description: Coal-fired power plant.

SIC Code: 4911

Permit Type: A: New/Greenfield Facility

NAICS Code: 221112

Permit URL:

EPA Region: 5

COUNTRY: USA

Facility County: PRESQUE ISLE

Facility State: MI

Facility ZIP Code: 49779

Permit Issued By: MICHIGAN DEPT OF ENVIRONMENTAL QUALITY (Agency Name)
MS. CINDY SMITH(Agency Contact) (517)284-6802 SMITHC17@MICHIGAN.GOV

Other Agency Contact Info: Please contact permit engineer Melissa Byrnes at 517-373-7065 with questions regarding this permit. Thank you.

Permit Notes:

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	MI	Seney	100km - 50km

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2)

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Petcoke/coal

Throughput: 3030.00 MMBTU/H EACH

Process Notes: 3,030 MMBTU/H each boiler

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0100 LB/MMBTU EACH; TEST PROTOCOL

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , MACT , SIP

Control Method: (A) Pulse jet fabric filter

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: Limit of 0.010 LB/MMBTU is for EACH boiler. Test Protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0260 LB/MMBTU EACH; TEST PROTOCOL

Emission Limit 2: 78.8000 LB/H EACH; TEST PROTOCOL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Pulset jet fabric filter

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: The limits specified above apply to EACH boiler.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0240 LB/MMBTU EACH; TEST PROTOCOL; BACT

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Pulse jet fabric filter

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: The PM2.5 limit above applies to EACH boiler.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 1.0000 LB/MW-H GROSS OUTPUT; EACH; 30 D ROLL. AVG; NSPS
Emission Limit 2: 281.1000 LB/H EACH; 24H ROLL.AVG.; BACT
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SNCR (Selective Non-Catalytic Reduction)
Est. % Efficiency: 63.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The limits above apply to EACH boiler.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1:
Emission Limit 2: 744.0000 LB/H EACH; 24H ROLL. AVG.; BACT&SIP
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission Limit of 744 LB/H is for each boiler and is based on a 24-hr rolling average determined each hour the boiler operates. This limit is set per BACT & SIP.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 303.0000 LB/H EACH; 24-H ROLL.AVG.; BACT & SIP
Emission Limit 2: 1.4000 LB/MW-H GROSS OUTPUT; EACH; 30D ROLL.AVG.
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission limits above apply to EACH boiler. Emission Limit 2 above of 1.4 LB/MW-H gross ouput is for each boiler and is based on a 30-day rolling average and is set per the NSPS.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 17.8000 LB/H EACH; TEST PROTOCOL; BACT,MACT,SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The emission limit above is for EACH boiler.

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0030 LB/MMBTU EACH; TEST PROTOCOL; BACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 14.0000 E-5 LB/MMBTU EACH; TEST PROTOCOL; MACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber and pulse jet fabric filter
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission limit is 0.00014 LB/MMBTU for each boiler. Test Protocol will specify averaging time.

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 0.0077 LB/GW-H EACH; 12-MO ROLLING; MACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber, sorbent injection (e.ge. activated carbon), and a fabric filter.

Est. % Efficiency: 93.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 2.1000 LB/KW-H EACH; 12-MO ROLL.AVG.; BACT
Emission Limit 2: 6024107.0000 T/YR EACH; 12-MO ROLL.AVG.; BACT
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of biomass and energy efficiencies.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0011 LB/MMBTU EACH; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber and pulse jet fabric filter
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Auxiliary Boiler
Process Type: 13.220 (Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel
Throughput: 72.40 MMBTU/H
Process Notes: Maximum operation was based on 4,000 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1100 LB/H TEST PROTOCOL; BACT/SIP/MACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP

Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.1700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.1700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 1.6700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Low NOx burner
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 6.1100 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) Good combustion control
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.3000 LB/H TEST PROTOCOL; BACT/SIP/MACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid

CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0500 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Emergency generator

Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel
Throughput: 4000.00 HP

Process Notes: Maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1500 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1.7600 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1.7600 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Fire Pump

Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))

Primary Fuel: Diesel

Throughput: 420.00 HP

Process Notes: Maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1500 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 3.0000 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS

Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission limit is expresssed as NMHC+NOx = 3.0 G/HP-H.

Process/Pollutant Information

PROCESS NAME: Turbine generator (EUBLACKSTART)
Process Type: 15.190 (Liquid Fuel & Liquid Fuel Mixtures)
Primary Fuel: Diesel
Throughput: 540.00 MMBTU/H
Process Notes: This is a turbine generator identified in the permit as EUBLACKSTART. It has a throughput capacity of 540MMBTU/HR which equates to 102 MW. The maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0300 LB/MMBTU TEST PROTOCOL
Emission Limit 2: 16.2000 LB/H TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 16.2000 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1600 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0450 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0110 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Cooling Tower (EUCOOLINGTWR)
Process Type: 99.009 (Industrial Process Cooling Towers)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM

Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0005 %
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Drift eliminators
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE)
Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel:
Throughput: 0
Process Notes: Limestone handling activities

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0002 GR/DSCF LIMESTONE PROCESS. EQUIP.;TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM limit for limestone handling (EULIMESTONE) is 0.00016 gr/dscf and is established per BACT. This limit applies to the limestone processing equipment within this emission unit.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: This PM10 limit is for the limestone processing equipment within EULIMESTONE portion of the permit.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: This PM2.5 limit is for the limestone processing equipment portion of EULIMESTONE in the permit.

Process/Pollutant Information

PROCESS NAME: Limestone preparation (EULIMESTONEPREP)
Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel:
Throughput: 0
Process Notes: This is the limestone preparation activities within this permit and is identified as EULIMESTONEPREP in the permit.

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE
Test Method: Other
Other Test Method: See Pollutant Notes field below.
Pollutant Group(s):
Emission Limit 1: 7.0000 % OPACITY TRANSFER PTS.
Emission Limit 2: % OPACITY BLDG. HOUSING CRUSHER
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Test method used varies per emission point. See below: The 7% opacity limit applies to the transfer points portion of EULIMESTONEPREP. Method 9 is to be used if emissions are detected. The 0% opacity limit applies to the building housing crusher. If emissions are detected, then Method 22 is to be used. A 7% opacity limit ALSO applies to the dust collectors. If emissions are detected, then Method 9 is to be used.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 18.0000 E-7 GR/DSCF LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM limit of 0.0000018 grains/dscf applies to the limestone prep train portion of EULIMESTONEPREP.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/H LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP , NSPS
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM10 limit of 0.0006 LB/H applies to the limestone prep. train portion of EULIMESTONEPREP.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/H LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM2.5 limit of 0.0006 LB/H applies to the limestone prep train portion of EULIMESTONEPREP.

Process/Pollutant Information

PROCESS NAME: CFB Bed Ash Removal (EUBEDASH)
Process Type: 99.120 (Ash Storage, Handling, Disposal)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: If emissions are detected, then Method 9 to be used.
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY TRANSFER POINTS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector

Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 5% Opacity at transfer points. Method 9 to be used if emissions are detected.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 11.0000 E-6 GR/DSCF BEDASH COLLECTION & REMOVAL EQUIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.000011 GR/DSCF for bedash collection & removal equipment. Averaging time is determined from test protocol.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H BEDASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.0012 LB/H for bedash collection & removal equipment. The averaging time is determined from the test protocol.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H BEDASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.0012 LB/H for bedash collection & removal equipment. Averaging time is determined from test protocol.

Process/Pollutant Information

PROCESS NAME: Ash Removal Economizer & Fabric filter hoppers

Process Type: 99.120 (Ash Storage, Handling, Disposal)

Primary Fuel:

Throughput: 0

Process Notes: Ash removal economizer & fabric filter hoppers (EUFLYASH)

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE

Test Method: Unspecified

Pollutant Group(s):

Emission Limit 1: 5.0000 % TRANSFER PTS.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: VE = 5% opacity at transfer points. Method 9 is to be used if emissions are detected.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 32.0000 E-6 GR/DSCF FLYASH COLLECTION & REMOVAL EQUIP.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: PM = 0.000032 GR/DSCF for flyash collection & removal equipment. The averaging time is determined from the test protocol.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0012 LB/H FLYASH COLLECTION & REMOVAL EQUIP.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.0012 LB/H for flyash collection & removal equipment. Test protocol will determine the averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H FLYASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.0012 LB/H for flyash collection & removal equipment. Test protocol will determine averaging time.

Process/Pollutant Information

PROCESS NAME: Solid fuel handling system (EUSOLIDFUELHANDLING)
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: See Pollutant Notes for details.
Pollutant Group(s):
Emission Limit 1: 10.0000 % OPACITY DROP & TRANSFER PTS.
Emission Limit 2: 5.0000 % OPACITY BLDG. HOUSING CRUSHER
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 10% opacity at drop & transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, SIP, & NSPS. 5% opacity for the building housing crusher. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 18.4000 E-4 GR/DSCF TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:

Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.00184 GR/DSCF for the transfer tower. Test protocol will determine averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2360 LB/H TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.236 LB/H for the transfer tower. Test protocol will determine the averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2360 LB/H TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.236 LB/H for the transfer tower. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: Coal crushers (EUFUELCRUSHER)
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: See pollutant notes below.
Pollutant Group(s):
Emission Limit 1: 10.0000 % OPACITY DROP & TRANSFER PTS.
Emission Limit 2: 5.0000 % OPACITY DUST COLLECTOR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Fabric filter dust collector.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 10% opacity for the drop and transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit are PSD-BACT, SIP & NSPS. 5% opacity for the dust collector. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit are PSD-BACT & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.0000 E-5 GR/DSCF FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Fabric filter dust collector.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.00002 GR/DSCF for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.00276 LB/H for the fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: Coal fuel storage silos (EUFUELSILO)
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 10.0000 % DROP & TRANSFER PTS.
Emission Limit 2: 5.0000 % DUST COLLECTOR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 10% opacity at drop & transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, NSPS, & SIP. 5% opacity for the dust collector. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 25.0000 E-5 GR/DSCF FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.00025 GR/DSCF for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector

Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2) - EXCLUDING Startup & Shutdown
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: Petcoke/coal
Throughput: 3030.00 MMBTU/H each
Process Notes: Each boiler is rated at 3,030 MMBTU/H. NOTE -The emission limits included under this process name specifically EXCLUDE startup & shutdown. The other CFB1 & CFB2 boiler section are the emission limits for the boiler that INCLUDE the startup & shutdown emissions. This has been changed per discussion with RBLC Administrator.

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0600 LB/MMBTU EACH; 30D ROLL.AVG.; BACT&SIP; EXC. SS
Emission Limit 2: 0.0500 LB/MMBTU EACH;12-MO ROLL.AVG.; BACT&SIP; EXC.SS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: These SO2 limits apply to EACH boiler and EXCLUDE startup & shutdown emissions.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 72.7000 LB/H EACH; TEST PROTOCOL; BACT&SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Pulse jet Fabric filter
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The 72.7 LB/H limit is for EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0700 LB/MMBTU EACH, 30 D ROLLING AVG; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) SNCR (Selective Non-Catalytic Reduction)
Est. % Efficiency: 63.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Note: This limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1500 LB/MMBTU EACH; 30 D ROLLING AVG; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOTE: This limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0030 LB/MMBTU EACH; LIMIT PER BACT, MACT, & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOTE: This VOC limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

Process/Pollutant Information

PROCESS NAME:	Limestone handling (EULIMESTONE) - Transfer Points
Process Type:	90.999 (Other Mineral Processing Sources)
Primary Fuel:	
Throughput:	0
Process Notes:	Was part of the "" Process untill broken out by RBLC Admin. Original Notes: Limestone handling (EULIMESTONE)

POLLUTANT NAME:	Visible Emissions (VE)
CAS Number:	VE
Test Method:	EPA/OAR Mthd 9
Pollutant Group(s):	
Emission Limit 1:	7.0000 % OPACITY TRANSFER PTS.,
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	SIP
Control Method:	(A) Dust collector. Test Method varies depending on process within this emission unit; i.e. transfer pts., truck traffic, etc.)
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	(RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. ------ Original Note ------ "7% opacity is limit for the transfer points within EULIMESTONE. If emissions are detected, Method 9 is to be used."

Process/Pollutant Information

PROCESS NAME:	Limestone handling (EULIMESTONE) - BLDG. HOUSING CRUSHER
Process Type:	90.999 (Other Mineral Processing Sources)
Primary Fuel:	
Throughput:	0
Process Notes:	Was part of the "" Process untill broken out by RBLC Admin. Limestone handling activities - This portion is for the building housing crusher.

POLLUTANT NAME:	Visible Emissions (VE)
CAS Number:	VE
Test Method:	EPA/OAR Mthd 22
Pollutant Group(s):	
Emission Limit 1:	% OPACITY BLDG. HOUSING CRUSHER
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	SIP
Control Method:	(A) Dust collector. This portion is for the building housing crusher.
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	(RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. --------- Original Notes --------- 0% opacity is the limit for the building housing crusher portion of the emission unit. If emissions are detected, Method 22 is to be used.

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE) - WHEEL LOADERS & TRUCK TRAFFIC EACH

Process Type: 90.999 (Other Mineral Processing Sources)

Primary Fuel:

Throughput: 0

Process Notes: Was part of the "Limestone handling (EULIMESTONE) " Process until broken out by RBLC Admin. Limestone handling activities

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE

Test Method: Other

Other Test Method: Method 9D, if emissions detected

Pollutant Group(s):

Emission Limit 1: 5.0000 % OPACITY WHEEL LOADERS & TRUCK TRAFFIC EACH

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) This portion of the emission unit is wheel loaders and truck traffic.

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: (RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. ------------ original note ------------- 5% is the opacity limit for the wheel loaders and truck traffic portion of the limestone handling emission unit EULIMESTONE. If emissions are detected, Method 9D is to be used.

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2)--Startup & Shutdown ONLY

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Petcoke/coal

Throughput: 3030.00 MMBTU/H EACH

Process Notes: This section is for emissions associated with startup & shutdown ONLY.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 54.5000 LB/H EACH; BACT & SIP; SS ONLY

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Pulse jet fabric filter

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: This limit (PM2.5 = 54.5 LB/HR) applies ONLY during startup & shutdown of the boilers. There are no other specific pollutant limits for either boiler during startup & shutdown.

Previous Page

Facility Information

RBLC ID:	TX-0585 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	TENASKA TRAILBLAZER PARTNERS LLC	**Permit Number:**	PSDTX1123 AND HAP13, 84167
Facility Name:	TENASKA TRAILBLAZER ENERGY CENTER	**Permit Date:**	12/30/2010 (actual)
Facility Contact:	LARRY CARLSON 402-938-1661	**FRS Number:**	UNKNOWN
Facility Description:	Coal-fired electric generating facility	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	NOLAN		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Other Agency Contact Info:	Mr. Richard Hughes 512-239-1554 richard.hughes@tceq.texas.gov		
Permit Notes:	HAP13, 84167		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	OK	Wichita Mountains	> 250 km

Process/Pollutant Information

PROCESS NAME: Coal-fired Boiler

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Sub-bituminous coal

Throughput: 8307.00 MMBTU/H

Process Notes: Fuel is PRB coal. Output is 900MW gross and 700 MW net. this boiler will have an amine scrubber to remove approximately 85% of the CO2 to be used for enhanced recovery in nearby oil fields and gas wells; this is not required by the permit but is voluntary.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7E

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0500 LB/MMBTU 12-MONTH ROLLING

Emission Limit 2: 0.0600 LB/MMBTU 30-DAY ROLLING

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (A) Selective Catalytic Reduction

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Other limits: 0.070 lb/MMBtu 24-hour avg 498 lb/hr 30-day avg 1661 lb/hr startup/shutdown

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0600 LB/MMBTU 30-DAY ROLLING

Emission Limit 2: 0.0600 LB/MMBTU 12-MONTH ROLLING

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Wet limestone scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 498 lb/hr 30-day rolling

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1000 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.1000 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 830lb/hr 30-day rolling avg

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0120 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 99.6800 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Fabric Filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0250 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 207.6800 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter and wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0036 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 29.9100 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practice
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0037 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2: 5.2000 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) Wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0005 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2: 4.1500 LB/H 1-H

Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) Wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Lead (Pb) / Lead Compounds
CAS Number: 7439-92-1
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: LB/MMBTU 12-MONTH ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Ammonia (NH3)
CAS Number: 7664-41-7
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 10.0000 PPMVD 12-MONTH ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: LB/MMBTU 12-MONTH ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: NSPS
Control Method: (A) Sorbent injection and fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	TX-0593 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	SUMMIT TEXAS CLEAN ENERGY	**Permit Number:**	PSDTX1218 & 92350
Facility Name:	TEXAS CLEAN ENERGY PROJECT	**Permit Date:**	12/28/2010 (actual)
Facility Contact:	KARL MATTES (262)439-8007	**FRS Number:**	UNKNOWN
Facility Description:	Integrated Gasification Combined Cycle	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	EXTOR		
Facility State:	TX		
Facility ZIP Code:			

Permit Issued By: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)
MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov

Other Agency Contact Info: Erik Hendrickson
(512)239-1095
Erik.Hendrickson@tceq.texas.gov

Permit Notes: State permit number 92350

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	NM	Carlsbad Caverns NP	100km - 50km

Process/Pollutant Information

PROCESS NAME: Integrated Gasification Combined Cycle
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: PRB coal
Throughput: 400.00 MW
Process Notes: This facility is an integrated gasification combined cycle power plant. It will produce a nominal 400 MW of electricity and it will produce ammonia/urea and recover sulphuric acid as commercial products.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 3.5000 PPM ON SYNGAS
Emission Limit 2: 2.5000 PPM ON NATURAL GAS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SCR
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 10.0000 PPM SULFUR CONTENT OF SYNGAS
Emission Limit 2: 2.0000 GR/100 DSCF SULFUR CONTENT OF NATURAL GAS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) gasification of coal and sulfur recovery in syngas before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0070 LB/MWH
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasification of coal and sulfur recovery in syngas before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Sulfur content of syngas is limited to 10 ppm. Sulfur content of natural gas is limited to 2 gr/100 dscf

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) gasification of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (including natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 10.0000 PPM
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) good combustion controls
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201A and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasificaiton of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasification of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 1.0000 PPM
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) good combustion controls
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0001 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: RACT
Other Applicable Requirements:
Control Method: (P) sungas clean-up before combustio in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) syngas clean-up before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	MI-0399 (final)	**Date Determination Last Updated:**	04/14/2016
Corporate/Company Name:	DETROIT EDISON	**Permit Number:**	93-09A
Facility Name:	DETROIT EDISON--MONROE	**Permit Date:**	12/21/2010 (actual)
Facility Contact:	LILLIAN WOOLLEY 313-235-5611 WOOLLEYL@DTEENERGY.COM	**FRS Number:**	26-11500020
Facility Description:	Utility--Coal fired power plant	**SIC Code:**	4911
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS Code:**	221112
Permit URL:			
EPA Region:	5	**COUNTRY:**	USA
Facility County:	MONROE		
Facility State:	MI		
Facility ZIP Code:	48161-1970		
Permit Issued By:	MICHIGAN DEPT OF ENVIRONMENTAL QUALITY (Agency Name) MS. CINDY SMITH(Agency Contact) (517)284-6802 SMITHC17@MICHIGAN.GOV		

Other Agency Contact Info: Please contact permit engineer Julie Brunner at 517-373-7088 with questions related to the permit. Thank you.

Permit Notes:

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
INTL BORDER		US/Canada Border	< 100 km

Process/Pollutant Information

PROCESS NAME: Boiler Units 1, 2, 3 and 4

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Coal

Throughput: 7624.00 MMBTU/H

Process Notes: 7,624 MMBTU/HR (Each unit). Pulverized coal-fired boilers, adding petroleum coke and increasing usage of subbituminous coal.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.1500 LB/MMBTU EACH, 30D ROLL. AVG. EXCL. STRTUP&SHTDWN

Emission Limit 2: 27446.4000 LB/D EACH, 30D ROLLING AVG.

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (P) Good combustion practices.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Yes

Pollutant/Compliance Notes: Under 'Basis Information' and 'Other Applicable Requirements'--Other--NAAQS (above on page). Top Ranking Option

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0800 LB/MMBTU EACH, 12-MONTH ROLLING AVG.

Emission Limit 2: 222.6000 T/MO EACH, 12-MONTH ROLLING AVG.

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (A) Staged combustion, low-NOx burners, overfire air, and SCR.

Est. % Efficiency: 95.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Yes

Pollutant/Compliance Notes: Top ranking option. Under 'Basis Information' and 'Other Applicable Requirements--Other--NAAQS' (above on page).

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0110 LB/MMBTU EACH, TEST/ OR 24H ROLL.AVG. IF PM CEMS

Emission Limit 2: 10.0000 OPAC EACH, 6 MIN AVG TEST /OR COMS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 168 $/ton
Incremental Cost Effectiveness: 18299 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: 3rd ranking option

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.1070 LB/MMBTU EACH, 24-H ROLL. AVG.
Emission Limit 2: 815.8000 LB/H EACH, 24-H ROLL. AVG.
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Wet flue gas desulfurization.
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: Top ranking option. 'Other--NAAQS' (above)

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0034 LB/MMBTU EACH, TEST PROTOCOL
Emission Limit 2: 25.9000 LB/H EACH, TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: Top ranking option. 'Other--State'

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0240 LB/MMBTU EACH, TEST
Emission Limit 2: 183.0000 LB/H EACH, TEST
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 167 $/ton
Incremental Cost Effectiveness: 13093 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: 3rd ranking option.

POLLUTANT NAME: Lead (Pb) / Lead Compounds
CAS Number: 7439-92-1
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: LB/MMBTU EACH, TEST
Emission Limit 2: 0.1300 LB/H EACH, TEST
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 168 $/ton
Incremental Cost Effectiveness: 18299 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 3rd ranking option (cost based on surrogate of PM) 'Other -- NAAQS'

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/MMBTU EACH, TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 89.000
Cost Effectiveness: 126565 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Incremental Cost Effectiveness ($/ton)=NA 4th ranking option Note: Estimated Control Efficiency is 42% - 89%. Only one value allowed to be entered on this page above.

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0002 LB/MMBTU EACH, TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 94.000
Cost Effectiveness: 122779 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 3rd ranking option. Incremental Cost Effectivenss ($/ton) = NA

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 0.0200 LB/GW-H EACH, 12MO. ROLL. AVG.-CEMS
Emission Limit 2: 143.1000 LB/YR UNITS 1&4, 12MO.ROLL.-CEMS
Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE

Other Applicable Requirements: OTHER

Control Method: (A) Co-benefit reduction due to SCRs, ESPs, and wet flue gas desulfurization.

Est. % Efficiency: 90.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: Units 2 & 3 have a limit of 144.2 LB/YR based on a 12-month rolling time period--using CEMS. NOTE: Under 'Control Efficiency' above, it is a range from 75% to 90% depending on the fuel type. Since only one limit may be included above, 90% was used.

POLLUTANT NAME: Arsenic / Arsenic Compounds

CAS Number: 7440-38-2

Test Method: Unspecified

Pollutant Group(s): (Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: 6.3000 E-6 LB/MMBTU EACH, TEST PROTOCOL

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE

Other Applicable Requirements: OTHER

Control Method: (A) ESPs and wet flue gas desulfurization.

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: Other Case by Case basis is T-BACT which is State Rule 336.1224.

POLLUTANT NAME: Hydrochloric Acid

CAS Number: 7647-01-0

Test Method: Unspecified

Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: 0.0024 LB/MMBTU LIMIT IS FOR EACH BOILER; TEST

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE

Other Applicable Requirements: OTHER

Control Method: (A) ESPs and wet flue gas desulfurization

Est. % Efficiency: 97.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: Limit is 0.0024 LB/MMBTU for each boiler. Test method will specify averaging time. The limit(s) were established per Rule 336.1224, state rule, known as T-BACT (Best Available Control Technology for toxics).

Process/Pollutant Information

PROCESS NAME: 4 Diesel-fired quench pumps

Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))

Primary Fuel: Diesel fuel

Throughput: 252.00 HP

Process Notes: Each pump engine is 252 HP. They are limited to emergency use and subject to NSPS Subpart IIII.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2 EACH, TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4 EACH, TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. Note: QP1 = Quench pump#1; QP2= Quench pump#2; QP3=Quench pump#3; QP4 = Quench pump#4.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2, EACH; TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4, EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option Note: QP1=Quench pump #1; QP2=Quench pump#2; QP3=Quench pump#3; QP4=Quench pump#4.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2 EACH; TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4 EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. 'Other Case-by-Case' is PM2.5 non-attainment, hybrid applicability

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 20.0000 % OPACITY 20% OPAC, 6 MIN. AVG; EACH PUMP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. 20% opacity on a 6-minute average for each pump QP1, QP2, QP3, QP4.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 2.6000 G/HP-H EACH PUMP; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 7.8000 G/HP-H QP1&QP2 EACH; TEST PROTOCOL
Emission Limit 2: 3.0000 G/HP-H QP3&QP4 EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Limits are as NMHC+NOx based upon NSPS Subpart IIII.

Process/Pollutant Information

PROCESS NAME: Fuel handling activities
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel: Coal
Throughput: 19.20 MTons/yr
Process Notes: Coal = 19.2 Mtons/yr PetCoke = 1.1 Mtons/yr New and existing fuel handling for bituminous coal, subbituminous coal and petroleum coke.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input; 99% was chosen.

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY TEST PROTOCOL; BACT
Emission Limit 2: 10.0000 % OPACITY TEST PROTOCOL; EXISTING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input into the table.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Fabric filters; fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input. PM10 LB/H rate varies based upon the 0.004 GR/DSCF

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Fabric filters; fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. 'Other' = PM2.5 nonattainment, hybrid applicability PM2.5 emission rate varies based upon 0.004 GR/DSCF. Estimated efficiency is 70%-99%; however only one value is allowed to be input into the table.

Process/Pollutant Information

PROCESS NAME: Limestone, gypsum, hydrated lime handling activities
Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel: Gypsum
Throughput: 360000.00 T/YR
Process Notes: Process is limestone, gypsum, hydrated lime handling acitivities. Limestone throughput capacity = 240,000 T/YR; Gypsum throughput capacity = 360,000 T/YR. New material handling for limestone, gypsum, hydrated lime; limestone & gypsum subject to NSPS Subpart OOO.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input.

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY FABRIC FILTERS; TEST PROTOCOL
Emission Limit 2: 10.0000 % OPACITY DROP POINTS; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER

Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value allowed to be input. The PM10 emission rate varies and is based upon 0.004 GR/DSCF.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. 'Other' = PM2.5 nonattainment, hybrid applicability. Estimated control efficiency is 70%-99%; however only one value allowed to be input. PM2.5 rate varies and is based upon 0.004 GR/DSCF.

Previous Page

Facility Information

RBLC ID: TX-0554 (final)
Date Determination Last Updated: 02/03/2020
Corporate/Company Name: COLETO CREEK
Permit Number: PSDTX1118 AND 83778
Facility Name: COLETO CREEK UNIT 2
Permit Date: 05/03/2010 (actual)
Facility Contact: ROSS CRYSUP
FRS Number: 110000599692
Facility Description: Coal-fired boiler
SIC Code: 4911
Permit Type: A: New/Greenfield Facility
NAICS Code: 221112
Permit URL:
EPA Region: 6
COUNTRY: USA
Facility County: GOLIAD
Facility State: TX
Facility ZIP Code: 77960
Permit Issued By: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)
MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov
Other Agency Contact Info: Sean O'Brien
512-239-1137
sean.obrien@tceq.texas.gov
Permit Notes: 83778 HAP18

Process/Pollutant Information

PROCESS NAME: Coal-fired Boiler Unit 2
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: PRB coal
Throughput: 6670.00 MMBTU/H
Process Notes: IPA Coleto Creek, L.L.C. (IPA) has proposed to install a new solid fuel-fired utility boiler, Unit 2 (CC2), at their existing Coleto Creek Power Station

(CC) which has one existing solid fuel fired boiler. CC2 will be a nominal 650 MW net (750 MW gross) boiler firing sub-bituminous coal and/or bituminous coal with a maximum heat input rate of 6,670 MMBtu/hr based on a 30 day average of the heat input. The boiler will operate burning sub-bituminous coal or a blend of that and up to 40% bituminous coal.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0600 LB/MMBTU ROLLING 30 DAY AVG
Emission Limit 2: 0.0500 LB/MMBTU ROLLING 12 MONTH AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) low-NOx burners with OFA, Selective Catalytic Reduction
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0600 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.0600 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Spray Dry Adsorber/Fabric Filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1200 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.1200 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)

Emission Limit 1: 0.0120 LB/GW-H 12-MONTH ROLLING / MIXED FUEL
Emission Limit 2: 0.0150 LB/GW-H 12-MONTH ROLLING/ PRB ONLY
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) Fabric filter with sorbent injection
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The mercury standard is based on this formula: % sub-bituminous coal x 0.015 lb Hg/GW-hr + % bituminous coal x 0.0075 lb Hg/GW-hr

POLLUTANT NAME: Ammonia (NH3)
CAS Number: 7664-41-7
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 10.0000 PPMVD 3-HOUR ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0120 LB/MMBTU ANNUAL / BASED ON STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0250 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) fabric filter, spray dry adsorber for acid gases

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0034 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0040 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) spray dry adsorber/fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0008 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) spray dry adsorber/ fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride

CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0005 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) spray dry adsorber/fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	KY-0100 (final)	**Date Determination Last Updated:**	03/15/2011
Corporate/Company Name:	EAST KENTUCKY POWER COOPERATIVE, INC	**Permit Number:**	V-05-070 R3
Facility Name:	J.K. SMITH GENERATING STATION	**Permit Date:**	04/09/2010 (actual)
Facility Contact:	859.744.4812 JERRY PURVIS [JERRY.PURVIS@EKPC.COOP]	**FRS Number:**	110017429521
Facility Description:	NEW CFB EGU BECAUSE OF A LEGAL CHALLENGE OUTSIDE OF THE TITLE V PROCEDURES, PERMITTEE AGREED TO TERMINATE CONSTRUCTION AUTHORITY FOR PROJECT. R4 TO THIS PERMIT REMOVES CONSTRUCTION AURTHORITY, AND THE PERMIT MAY NOT BE AVAILABLE FROM KENTUCKY'S WEBSITE.	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	4	**COUNTRY:**	USA
Facility County:			
Facility State:	KY		
Facility ZIP Code:			
Permit Issued By:	KENTUCKY DEP, DIV FOR AIR QUALITY (Agency Name) MR. RICK SHEWEKAH, MGR(Agency Contact) (502)564-3999 Sreenivas.Kesaraju@ky.gov		
Other Agency Contact Info:	TOM ADAMS OR BEN MARKIN		
Permit Notes:	BECAUSE OF A LEGAL CHALLENGE OUTSIDE OF THE TITLE V PROCEDURES, PERMITTEE AGREED TO TERMINATE CONSTRUCTION AUTHORITY FOR PROJECT. R4 TO THIS PERMIT REMOVES CONSTRUCTION AURTHORITY, AND THE PERMIT MAY NOT BE AVAILABLE FROM KENTUCKY'S WEBSITE.		

Process/Pollutant Information

PROCESS NAME: CIRCULATING FLUIDIZED BED BOILER CFB1 AND CFB2
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: COAL
Throughput: 3000.00 MMBTU/H
Process Notes: COAL AND WASTE COAL WITH NATURAL GAS FOR STARTUP THRUPUT IS PER UNIT.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0900 LB/MMBTU 30 DAY AVERAGE

Emission Limit 2: 210.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM CEMS FOR COMPLIANCE

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0900 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: METHOD 201 AND 202 FOR TOTAL PM10/2.5

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Other
Other Test Method:
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1000 LB/MMBTU 30 DAY
Emission Limit 2: 300.0000 LB/H 8 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) GOOD COMBUSTION CONTROLS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: CO CEMS

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0750 LB/MMBTU 30 DAY AVERAGE
Emission Limit 2: 225.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER

Control Method: (A) LIMESTONE INJECTION (CFB)AND A FLASH DRYER ABSORBER WITH FRESH LIME INJECTION
Est. % Efficiency: 99.100
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: LB/MMBTU LIMIT EXCLUDES STARTUP/SHUTDOWN. LBS/DAY LIMIT INCLUDES STARTUP AND SHUTDOWN

POLLUTANT NAME: Nitrogen Dioxide (NO2)
CAS Number: 10102-44-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx))
Emission Limit 1: 0.0700 LB/MMBTU 30 DAY AVERAGE
Emission Limit 2: 210.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SNCR
Est. % Efficiency: 53.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: LBS/MMBTU EXCLUDES STARTUP.SHUTDOWN; LBS/HR INCLUDES S&S

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0200 LB/MMBTU 3-HOUR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) GOOD COMBUSTION CONTROL
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 6.0000 E-6 LB/MWH BIT COAL ON ANNUAL AVERAG
Emission Limit 2: 6.0000 E-6 LB/MWH WASTE COAL ON ANNUAL AVE
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) FABRIC FILTER, SNCR
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 40 CFR 72.2 OR MERCURY CEMS. LIMIT SET TO MEET COMPLIANCE WITH STATE REGULATION. Limits are 0.000006 LB/MWH.

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)

CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/MMBTU 3-HR
Emission Limit 2: 15.0000 LB/H 3 HR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) SAME AS CONTROLS FOR PARTICULATES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: LB/MMBTU EXCLUDES SSM LB/HR INCLUDES SSM

Process/Pollutant Information

PROCESS NAME: ASH HANDLING

Process Type: 99.120 (Ash Storage, Handling, Disposal)
Primary Fuel:
Throughput: 0
Process Notes: CFB1 FLY ASH SILO 73 TON/HR CFB1 BED ASH SILO 37 TONS/HR CFB2 FLY ASH SILO 73 TONS/HR CFB2 BED ASH SILO 37 TONS/HR

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 G/DSCF 24 BLOCK
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 0.005 GR/DSCF

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes: FOUR STACKS FOR FLY AND BED ASH

Process/Pollutant Information

PROCESS NAME: COAL CRUSHING AND SILO STORAGE
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: COAL STOCKPILE
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 3000.00 T/H
Process Notes: STORAGE PILES, RAILCAR UNLOADING, EGRESS TO UNDERGROUND CONVEYOR

POLLUTANT NAME: Particulate Matter (PM)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 10.0000 OPACITY 3 MINUTE
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) WET SUPPRESSION, DUST SUPPRESSENT LOWERING WELL AND COMPACTION.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: LIMIT FOR PM/PM10/PM2.5

Process/Pollutant Information

PROCESS NAME: LIME SILO STORAGES

Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME:	Particulate matter, filterable < 10 µ (FPM10)
CAS Number:	PM
Test Method:	Other
Other Test Method:	
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	0.0050 GR/DSCF
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	OTHER
Control Method:	(A) FABRIC FILTERS
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	BACT FOR PM10 AND 2.5. THREE DIFFERENT TYPES OF SILOS WITH DIFFERENT PROCESS RATES. 0.30 LBS/HOUR FROM EACH FRESH LIME SILO 0.17 LBS/HOUR EACH RECYCLED LIME SILO . 0.02 LBS/HOUR FROM EACH SCRUBBER SLAKER

Process/Pollutant Information

PROCESS NAME: LIMESTONE UNLOADING

Process Type: 99.190 (Other Fugitive Dust Sources)

Primary Fuel:

Throughput: 44.00 T/H

Process Notes: LIMESTONE STORAGE PILE FUGITIVE EMISSIONS FROM UNLOADING/HANDLING

POLLUTANT NAME:	Particulate matter, fugitive
CAS Number:	PM
Test Method:	Unspecified
Pollutant Group(s):	
Emission Limit 1:	
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	OTHER
Control Method:	(A) WET SUPPRESSION OR DUST SUPPRESSANT
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	SUBJECT TO STATE FUGITIVE REGULATION

Process/Pollutant Information

PROCESS NAME: COALING TOWERS

Process Type: 99.999 (Other Miscellaneous Sources)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) 0.0005% DRIFT ELIMINATORS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COOLING TECHNOLOGY INSTITUTE (CTI) ACCEPTANCE TEST CODE (ATC) #140 TO VERIFY DRIFT PERCENT ACHIEVED BY THE DRIFT ELIMINATOR

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) BACT FOR PM/PM10/PM2.5 IS 0.0005% DRIFT ELIMINATORS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COOLING TECHNOLOGY INSTITUTE (CTI) ACCEPTANCE TEST CODE (ATC) #140 TO VERIFY DRIFT PERCENT ACHIEVED BY THE DRIFT ELIMINATOR

Process/Pollutant Information

PROCESS NAME: HAUL ROADS
Process Type: 99.140 (Paved Roads)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, fugitive

CAS Number: PM
Test Method: EPA/OAR Mthd 22
Pollutant Group(s):
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) PAVED ROADWAYS, CLEANING OR PROMPT REMOVAL OF MATERIAL, AND THE APPLICATION OF WET SUPPRESSION, AS APPLICABLE.
Est. % Efficiency:

Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: BACT REQUIRES PAVED ROADS ONLY SUBJECT TO STATE FUGITIVE REGULATION

Process/Pollutant Information

PROCESS NAME: LIMESTONE STORAGE SILOS
Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:
Throughput: 40.00 T/H
Process Notes: 2 SILOS, 40 TONS PER HOUR EACH.

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF 24 HR
Emission Limit 2: 0.5100 LB/H (EACH) 24 HR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: ALSO LISTED AS PM2.5 LIMIT.

Previous Page

APPENDIX C

Cost Analysis – NO_x Controls

SCR Replacement Units 1, 2, and 3

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	Designation	Units	Value	Calculation
EPC Project?			☑ TRUE	
Unit Size	A	(MW)	690	<--- User Input
Retrofit Factor	B		1.00	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	9800	<--- User Input
NOx Rate	D	(lb/MMBtu)	0.11	<--- User Input
SO2 Rate	E	(lb/MMBtu)	0.2	<--- User Input
Type of Coal	F		Bituminous	<--- User Input
Coal Factor	G		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	H		0.98	C/10000
Heat Input	I	(Btu/hr)	6.76E+09	A*C*1000
Capacity Factor	J	(%)	100	<--- User Input
NOx Removal Efficiency	K	(%)	50	<--- User Input
NOx Removal Factor	L		0.6250	K/80
NOx Removed	M	(lb/hr)	372	D*I/10^6*K/100
Urea Rate (100%)	N	(lb/hr)	260	M*0.525*60/46*1.01/0.99
Steam Required	O	(lb/hr)	294	N*1.1315
Aux Power **Include in VOM?** ☑	P	(%)	0.56	0.56*(G*H)^0.43
Makeup Water Rate	Q	(1000 gph)	0	
Urea Cost (50% wt solution)	R	($/ton)	350	<--- User Input
Catalyst Cost	S	($/m3)	8000	<--- User Input
Aux Power Cost	T	($/kWh)	0.06	<--- User Input (includes removal and disposal of existing catalyst and installation of new catalyst)
Steam Cost	U	($/klb)	4	<--- User Input
Operating Labor Rate	V	($/hr)	60	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	Example	Comments
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = 310000*(B)*(L)^0.2*(A*G*H)^0.92	$ 113,294,000	SCR (ductwork modifications and strengthening, reactor, bypass) island cost
BMF ($) = 564000*(M)^0.25	$ 2,477,000	Base reagent preparation cost
BMA ($) = IF E>= 3 and F = Bituminous, THEN 69000*(B)*(A*G*H)^0.78, ELSE 0	$ -	Air heater modifications /SO3 control (Bituminous only and >= 3 lb/MMBtu)
BMB ($) = 529000*(B)*(A*G*H)^0.42	$ 8,167,000	ID or booster fans and auxiliary power modification costs
BM ($) = BMR + BMF + BMA + BMB	$ 123,938,000	Total base module cost including retrofit factor
BM ($/kW) =	180	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 12,394,000	Engineering and Construction Management costs
A2= 10% of BM	$ 12,394,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 12,394,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 161,120,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**234**	Capital, engineering and construction cost subtotal per kW
B1 = 5% of CECC	$ 8,056,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 169,176,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**245**	Total project cost per kW without AFUDC
B2 = 6% of (CECC + B1)	$ 10,151,000	AFUDC (Based on a 2 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 25,376,000	EPC fees of 15%
TPC ($) = CECC + B1 + B2 + C1	**$ 204,703,000**	Total project cost
TPC ($/kW) =	**297**	Total project cost per kW

Fixed O&M Cost

FOMO ($/kW yr) = 1/2 operator time assumed)*2080*V/(A*1000)	$	0.09	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(IF A < 300 then 0.005*BM ELSE 0.003*BM)/(B*A*1000)	$	0.54	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$	0.01	Fixed O&M additional administrative labor costs
FOM ($/kW yr) = FOMO +FOMM+FOMA	**$**	**0.64**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = N*R/(A*1000)	$	0.13	Variable O&M costs for Urea
VOMW ($/MWh) = (0.4*(G^2.9)*(L^0.71)*S)/(8760)	$	0.26	Variable O&M costs for catalyst: replacement & disposal
VOMP ($/MWh) = P*T*10	$	0.33	Variable O&M costs for additional auxiliary power required including additional fan power
VOMM ($/MWh) = O*U/A/1000	$	0.00	Variable O&M costs for steam
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**0.73**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,044,400	
Annual Heat Input MMBtu =	59,235,120	
Annual Tons NOx Created =	3,258	current NOx Emission
Annual Tons NOx Removed =	1,629	at removal efficiency = 50%
Annual Tons NOx Emission =	1,629	
Annual Avg NOx Emission Rate, lb/MMBtu =	0.055	Value is BELOW a 0.07 floor rate

Annual Capital Recovery Factor =	**0.094**	SCR	
Annual Capital Cost (Including AFUDC), $ =	19,324,000		
Annual FOM Cost, $ =	441,000		
Annual VOM Cost, $ =	4,393,000		4,834,000
Total Annual SCR Cost, $ =	24,158,000		

Capital Cost, $/MWh =	3.20
FOM Cost, $/MWh =	0.07
VOM Cost, $/MWh =	0.73
Total SCR Cost, $/MWh =	4.00

Capital Cost, $/ton =	11,863
FOM Cost, $/ton =	271
VOM Cost, $/ton =	2,697
Total SCR Cost, $/ton =	14,830

Lookup Table			0.07
	Coal	Coal Facto	NOx Floor Limit
1	PRB	1.05	0.05
2	Lignite	1.07	0.05
3	Bituminous	1	0.07

Aux Power

TRUE

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	Designation	Units	Value	Calculation
EPC Project?			☑ **TRUE**	
Unit Size	A	(MW)	**690**	<--- User Input
Retrofit Factor	B		**1.00**	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	**9800**	<--- User Input
NOx Rate	D	(lb/MMBtu)	**0.11**	<--- User Input
SO2 Rate	E	(lb/MMBtu)	**0.2**	<--- User Input
Type of Coal	F		Bituminous	<--- User Input
Coal Factor	G		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	H		0.98	C/10000
Heat Input	I	(Btu/hr)	6.76E+09	A*C*1000
Capacity Factor	J	(%)	**100**	<--- User Input
NOx Removal Efficiency	K	(%)	**50**	<--- User Input
NOx Removal Factor	L		0.6250	K/80
NOx Removed	M	(lb/hr)	372	D*I/10^6*K/100
Urea Rate (100%)	N	(lb/hr)	260	M*0.525*60/46*1.01/0.99
Steam Required	O	(lb/hr)	294	N*1.1315
Aux Power **Include in VOM?** ☑	P	(%)	0.56	0.56*(G*H)^0.43
Makeup Water Rate	Q	(1000 gph)	0	
Urea Cost (50% wt solution)	R	($/ton)	**350**	<--- User Input
Catalyst Cost	S	($/m3)	**8000**	<--- User Input
Aux Power Cost	T	($/kWh)	**0.06**	<--- User Input (includes removal and disposal of existing catalyst and installation of new catalyst)
Steam Cost	U	($/klb)	**4**	<--- User Input
Operating Labor Rate	V	($/hr)	**60**	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	**Example**	**Comments**
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = 310000*(B)*(L)^0.2*(A*G*H)^0.92	$ 113,294,000	SCR (ductwork modifications and strengthening, reactor, bypass) island cost
BMF ($) = 564000*(M)^0.25	$ 2,477,000	Base reagent preparation cost
BMA ($) = IF E>= 3 and F = Bituminous, THEN 69000*(B)*(A*G*H)^0.78, ELSE 0	$ -	Air heater modifications /SO3 control (Bituminous only and >= 3 lb/MMBtu)
BMB ($) = 529000*(B)*(A*G*H)^0.42	$ 8,167,000	ID or booster fans and auxiliary power modification costs
BM ($) = BMR + BMF + BMA + BMB	$ 123,938,000	Total base module cost including retrofit factor
BM ($/kW) =	180	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 12,394,000	Engineering and Construction Management costs
A2= 10% of BM	$ 12,394,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 12,394,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 161,120,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**234**	Capital, engineering and construction cost subtotal per kW
B1 = 5% of CECC	$ 8,056,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 169,176,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**245**	Total project cost per kW without AFUDC
B2 = 6% of (CECC + B1)	$ 10,151,000	AFUDC (Based on a 2 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 25,376,000	EPC fees of 15%
TPC ($) = CECC + B1 + B2 + C1	**$ 204,703,000**	Total project cost
TPC ($/kW) =	**297**	Total project cost per kW

Fixed O&M Cost

FOMO ($/kW yr) = 1/2 operator time assumed)*2080*V/(A*1000)	$	0.09	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(IF A < 300 then 0.005*BM ELSE 0.003*BM)/(B*A*1000)	$	0.54	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$	0.01	Fixed O&M additional administrative labor costs
FOM ($/kW yr) = FOMO +FOMM+FOMA	**$**	**0.64**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = N*R/(A*1000)	$	0.13	Variable O&M costs for Urea
VOMW ($/MWh) = (0.4*(G^2.9)*(L^0.71)*S)/(8760)	$	0.26	Variable O&M costs for catalyst: replacement & disposal
VOMP ($/MWh) = P*T*10	$	0.33	Variable O&M costs for additional auxiliary power required including additional fan power
VOMM ($/MWh) = O*U/A/1000	$	0.00	Variable O&M costs for steam
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**0.73**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,044,400	
Annual Heat Input MMBtu =	59,235,120	
Annual Tons NOx Created =	3,258	current NOx Emission
Annual Tons NOx Removed =	1,629	at removal efficiency = 50%
Annual Tons NOx Emission =	1,629	
Annual Avg NOx Emission Rate, lb/MMBtu =	0.055	Value is BELOW a 0.07 floor rate

Annual Capital Recovery Factor =	**0.094**	SCR
Annual Capital Cost (Including AFUDC), $ =	19,324,000	
Annual FOM Cost, $ =	441,000	
Annual VOM Cost, $ =	4,393,000	4,834,000
Total Annual SCR Cost, $ =	24,158,000	

Capital Cost, $/MWh =	3.20
FOM Cost, $/MWh =	0.07
VOM Cost, $/MWh =	0.73
Total SCR Cost, $/MWh =	4.00

Capital Cost, $/ton =	11,863
FOM Cost, $/ton =	271
VOM Cost, $/ton =	2,697
Total SCR Cost, $/ton =	14,830

Lookup Table 0.07

	Coal	Coal Facto	NOx Floor Limit
1	PRB	1.05	0.05
2	Lignite	1.07	0.05
3	Bituminous	1	0.07

Aux Power

TRUE

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	**Designation**	**Units**	**Value**	**Calculation**
EPC Project?			☑ **TRUE**	
Unit Size	A	(MW)	**710**	<--- User Input
Retrofit Factor	B		**1.00**	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	**9800**	<--- User Input
NOx Rate	D	(lb/MMBtu)	**0.076**	<--- User Input
SO2 Rate	E	(lb/MMBtu)	**0.4**	<--- User Input
Type of Coal	F		Bituminous	<--- User Input
Coal Factor	G		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	H		0.98	C/10000
Heat Input	I	(Btu/hr)	6.96E+09	A*C*1000
Capacity Factor	J	(%)	**100**	<--- User Input
NOx Removal Efficiency	K	(%)	**50**	<--- User Input
NOx Removal Factor	L		0.6250	K/80
NOx Removed	M	(lb/hr)	264	D*I/10^6*K/100
Urea Rate (100%)	N	(lb/hr)	185	M*0.525*60/46*1.01/0.99
Steam Required	O	(lb/hr)	209	N*1.1315
Aux Power **Include in VOM?** ☑	P	(%)	0.56	0.56*(G*H)^0.43
Makeup Water Rate	Q	(1000 gph)	0	
Urea Cost (50% wt solution)	R	($/ton)	**350**	<--- User Input
Catalyst Cost	S	($/m3)	**8000**	<--- User Input
Aux Power Cost	T	($/kWh)	**0.06**	<--- User Input (includes removal and disposal of existing catalyst and installation of new catalyst)
Steam Cost	U	($/klb)	**4**	<--- User Input
Operating Labor Rate	V	($/hr)	**60**	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	**Example**	**Comments**
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = 310000*(B)*(L)^0.2*(A*G*H)^0.92	$ 116,312,000	SCR (ductwork modifications and strengthening, reactor, bypass) island cost
BMF ($) = 564000*(M)^0.25	$ 2,274,000	Base reagent preparation cost
BMA ($) = IF E>= 3 and F = Bituminous, THEN 69000*(B)*(A*G*H)^0.78, ELSE 0	$ -	Air heater modifications /SO3 control (Bituminous only and >= 3 lb/MMBtu)
BMB ($) = 529000*(B)*(A*G*H)^0.42	$ 8,266,000	ID or booster fans and auxiliary power modification costs
BM ($) = BMR + BMF + BMA + BMB	$ 126,852,000	Total base module cost including retrofit factor
BM ($/kW) =	179	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 12,685,000	Engineering and Construction Management costs
A2= 10% of BM	$ 12,685,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 12,685,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 164,907,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**232**	Capital, engineering and construction cost subtotal per kW
B1 = 5% of CECC	$ 8,245,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 173,152,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**244**	Total project cost per kW without AFUDC
B2 = 6% of (CECC + B1)	$ 10,389,000	AFUDC (Based on a 2 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 25,973,000	EPC fees of 15%
TPC ($) = CECC + B1 + B2 + C1	**$ 209,514,000**	Total project cost
TPC ($/kW) =	**295**	Total project cost per kW

Fixed O&M Cost

FOMO ($/kW yr) = 1/2 operator time assumed)*2080*V/(A*1000)	$	0.09	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(IF A < 300 then 0.005*BM ELSE 0.003*BM)/(B*A*1000)	$	0.54	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$	0.01	Fixed O&M additional administrative labor costs
FOM ($/kW yr) = FOMO +FOMM+FOMA	**$**	**0.64**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = N*R/(A*1000)	$	0.09	Variable O&M costs for Urea
VOMW ($/MWh) = (0.4*(G^2.9)*(L^0.71)*S)/(8760)	$	0.26	Variable O&M costs for catalyst: replacement & disposal
VOMP ($/MWh) = P*T*10	$	0.33	Variable O&M costs for additional auxiliary power required including additional fan power
VOMM ($/MWh) = O*U/A/1000	$	0.00	Variable O&M costs for steam
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**0.69**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,219,600	
Annual Heat Input MMBtu =	60,952,080	
Annual Tons NOx Created =	2,316	current NOx Emission
Annual Tons NOx Removed =	1,158	at removal efficiency = 50%
Annual Tons NOx Emission =	1,158	
Annual Avg NOx Emission Rate, lb/MMBtu =	0.038	Value is BELOW a 0.07 floor rate

Annual Capital Recovery Factor =	**0.094**	SCR
Annual Capital Cost (Including AFUDC), $ =	19,778,000	
Annual FOM Cost, $ =	452,000	
Annual VOM Cost, $ =	4,265,000	
Total Annual SCR Cost, $ =	24,495,000	

Capital Cost, $/MWh =	3.18
FOM Cost, $/MWh =	0.07
VOM Cost, $/MWh =	0.69
Total SCR Cost, $/MWh =	3.94

Capital Cost, $/ton =	17,078
FOM Cost, $/ton =	390
VOM Cost, $/ton =	3,683
Total SCR Cost, $/ton =	21,151

Lookup Table 0.07

	Coal	Coal Facto	NOx Floor Limit
1	PRB	1.05	0.05
2	Lignite	1.07	0.05
3	Bituminous	1	0.07

Aux Power

TRUE

APPENDIX D

RACT / BACT / LAER Clearinghouse

SO_2 Controls

Previous Page

COMPREHENSIVE REPORT
Report Date:08/17/2020

Facility Information

RBLC ID:	AZ-0055 (final)	**Date Determination Last Updated:**	01/08/2014
Corporate/Company Name:	SALT RIVER PROJECT AGRICULTURAL AND POWER DISTRICT	**Permit Number:**	AZ 08-01
Facility Name:	NAVAJO GENERATING STATION	**Permit Date:**	02/06/2012 (actual)
Facility Contact:	KARA MONTALVO	**FRS Number:**	110028287725
Facility Description:	2,250 MW COAL FIRED POWER PLANT	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221112
Permit URL:	http://www.epa.gov/region9/air/permit/r9-permits-issued.html		
EPA Region:	9	**COUNTRY:**	USA
Facility County:	COCONINO		
Facility State:	AZ		
Facility ZIP Code:	86040		
Permit Issued By:	EPA REGION IX (Agency Name) MR. GERARDO RIOS(Agency Contact) (415)972-3974 rios.gerardo@epa.gov		
Other Agency Contact Info:	GERARDO RIOS, EPA REGION IX, 415-972-3974, RIOS.GERARDO@EPA.GOV		
Permit Notes:	PERMIT ISSUED ON 11/20/2008 AND ADMINISTRATIVELY AMENDED ON 2/6/2012. AFFECTED CLASS I AREAS CAN BE FOUND IN BART REGULATORY DOCKET AT http://www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R09-OAR-2008-0454		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	UT	Arches NP	100km - 50km
CLASS1	UT	Bryce Canyon NP	< 100 km
CLASS1	UT	Canyonlands NP	100km - 50km
CLASS1	UT	Capitol Reef NP	< 100 km
CLASS1	AZ	Grand Canyon NP	< 100 km
CLASS1	AZ	Mazatzal	> 250 km
CLASS1	CO	Mesa Verde NP	100km - 50km
CLASS1	AZ	Petrified Forest NP	100km - 50km
CLASS1	AZ	Pine Mountain	> 250 km
CLASS1	AZ	Sycamore Canyon	100km - 50km
CLASS1	UT	Zion NP	100km - 50km

Process/Pollutant Information

PROCESS NAME: PULVERIZED COAL FIRED BOILER

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: COAL

Throughput: 7725.00 MMBTU/H

Process Notes: BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.2400 LB/MMBTU 30-DAY ROLLING AVG

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

Process/Pollutant Information

PROCESS NAME: PULVERIZED COAL FIRED BOILER
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: COAL
Throughput: 7725.00 MMBTU/H
Process Notes: BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.2400 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

Process/Pollutant Information

PROCESS NAME: PULVERIZED COAL FIRED BOILER
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: COAL
Throughput: 7725.00 MMBTU/H
Process Notes: BOILER ALLOWED TO USE NO. 2 FUEL OIL FOR IGNITION FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.2400 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) LOW NOX BURNER (LNB), SEPARATED OVERFIRE AIR (SOFA) SYSTEM,
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BART
Other Applicable Requirements:
Control Method: (A) FLUE GAS DESULFURIZATION (FGD), SCRUBBER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NO EMISSION LIMITS

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.2300 LB/MMBTU 30-DAY ROLLING AVG
Emission Limit 2: 0.1500 LB/MMBTU 12-MONTH ROLLING AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) GOOD COMBUSTION PRACTICES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	TX-0601 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	TEXAS MUNICIPAL POWER AGENCY	**Permit Number:**	5699 AND PSDTX18M2
Facility Name:	GIBBONS CREEK STEAM ELECTRIC STATION	**Permit Date:**	10/28/2011 (actual)
Facility Contact:	KEN BABB (936)873-1147	**FRS Number:**	110008138078
Facility Description:	one 5,060 MMBtu/h boiler burning natural gas, lignite, coal, and a blend of lignite or coal with petroleum coke	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221122
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	GRIMES		
Facility State:	TX		
Facility ZIP Code:	77830		
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		

Other Agency Contact Info: Kate Stinchcomb, (512)239-1583, katherine.stinchcomb@tceq.texas.gov

Permit Notes:

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	TX	Big Bend NP	> 250 km

Process/Pollutant Information

PROCESS NAME: Boiler

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Coal

Throughput: 5060.00 MMBtu/h

Process Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.1200 LB/MMBTU 30-DAY ROLLING AVERAGE

Emission Limit 2: 2428.0000 LB/H

Standard Emission: 2365.0000 T/YR

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) Good combustion practices

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 1.2000 LB/MMBTU

Emission Limit 2: 1771.0000 LB/H

Standard Emission: 6052.0000 T/YR

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Wet Flue Gas Desulfurization

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID: CA-1206 (final)

Date Determination Last Updated: 01/14/2014

Corporate/Company Name: APMC STOCKTON COGEN

Permit Number: SJ 85-04

Facility Name: STOCKTON COGEN COMPANY

Permit Date: 09/16/2011 (actual)

Facility Contact: GLENN SIZEMORE

FRS Number: 110000484930

Facility Description:	49.9 MW COGENERATION POWER PLANT OWNED BY AIR PRODUCTS MANUFACTURING CORPORATION (APMC) STOCKTON COGEN AND LOCATED IN STOCKTON, CALIFORNIA	**SIC Code:**	4911
Permit Type:	C: Modify process at existing facility	**NAICS Code:**	221112
Permit URL:	http://www.epa.gov/region09/air/permit/r9-permits-issued.html		
EPA Region:	9	**COUNTRY:**	USA
Facility County:	SAN JOAQUIN COUNTY		
Facility State:	CA		
Facility ZIP Code:	95206		
Permit Issued By:	EPA REGION IX (Agency Name) MR. GERARDO RIOS(Agency Contact) (415)972-3974 rios.gerardo@epa.gov		
Permit Notes:	PSD permit amended to allow increased operation of facility's natural gas-fired auxiliary boiler and reduced operation of its coal-fired circulating fluidized bed boiler. Facilitywide emission increases less than the PSD significant thresholds.		

Facility-wide Emissions:

Pollutant Name:	Facility-wide Emissions Increase:
Carbon Monoxide	28.8000 (Tons/Year)
Nitrogen Oxides (NOx)	6.6200 (Tons/Year)
Particulate Matter (PM)	9.9300 (Tons/Year)
Sulfur Oxides (SOx)	2.2600 (Tons/Year)
Volatile Organic Compounds (VOC)	0.9900 (Tons/Year)

Process/Pollutant Information

PROCESS NAME: CIRCULATING FLUIDIZED BED BOILER

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: COAL

Throughput: 730.00 MMBTU/H

Process Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 59.0000 LB/H 8-HR AVG

Emission Limit 2: 100.0000 LB/H 3-HR AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (P) LIMESTONE INJECTION W/ A MINIMUM REMOVAL EFFICIENCY OF 70% (3-HR AVG) TO BE MAINTAINED AT ALL TIMES

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 50.0000 PPM @3% O2, 3-HR AVG

Emission Limit 2: 42.0000 LB/H 3-HR AVG

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (B) LOW BED TEMPERATUR STAGED COMBUSTION; SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: OTHER LIMITS: AUX BOILER AND CIRCULATING FLUIDIZED BED BOILER MAY ONLY BE OPERATED SIMULTANEOUSLY FOR UP TO 250 HRS PER YEAR, DURING CIRCULATING FLUIDIZED BED BOILER STARTUP AND SHUTDOWN PERIODS, AND PERIODS OF LESS THAN 10 HRS DURATION TO CONDUCT EMISSIONS TESTING

Process/Pollutant Information

PROCESS NAME: AUXILIARY BOILER
Process Type: 12.310 (Natural Gas (includes propane and liquefied petroleum gas))
Primary Fuel: NATURAL GAS
Throughput: 178.00 MMBTU/H
Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 7.0000 PPMVD @3% O2
Emission Limit 2: 0.0085 LB/MMBTU
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: OTHER LIMITS: AUX BOILER AND CIRCULATING FLUIDIZED BED BOILER MAY ONLY BE OPERATED SIMULTANEOUSLY FOR UP TO 250 HRS PER YEAR, DURING CIRCULATING FLUIDIZED BED BOILER STARTUP AND SHUTDOWN PERIODS, AND PERIODS OF LESS THAN 10 HRS DURATION TO CONDUCT EMISSIONS TESTING

Previous Page

Facility Information

RBLC ID: MI-0400 (final)
Date Determination Last Updated: 04/14/2016
Corporate/Company Name: WOLVERINE POWER SUPPLY COOPERATIVE, INC.
Permit Number: 317-07
Facility Name: WOLVERINE POWER
Permit Date: 06/29/2011 (actual)
Facility Contact: BRIAN WARNER 2317755700 X 3336 BWARNER@WPSCI.COM
FRS Number: 26-14105823
Facility Description: Coal-fired power plant.
SIC Code: 4911
Permit Type: A: New/Greenfield Facility
NAICS Code: 221112
Permit URL:
EPA Region: 5
COUNTRY: USA
Facility County: PRESQUE ISLE
Facility State: MI
Facility ZIP Code: 49779
Permit Issued By: MICHIGAN DEPT OF ENVIRONMENTAL QUALITY (Agency Name)
MS. CINDY SMITH(Agency Contact) (517)284-6802 SMITHC17@MICHIGAN.GOV
Other Agency Contact Info: Please contact permit engineer Melissa Byrnes at 517-373-7065 with questions regarding this permit. Thank you.
Permit Notes:
Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	MI	Seney	100km - 50km

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2)

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Petcoke/coal

Throughput: 3030.00 MMBTU/H EACH

Process Notes: 3,030 MMBTU/H each boiler

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 LB/MMBTU EACH; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , MACT , SIP
Control Method: (A) Pulse jet fabric filter
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Limit of 0.010 LB/MMBTU is for EACH boiler. Test Protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0260 LB/MMBTU EACH; TEST PROTOCOL
Emission Limit 2: 78.8000 LB/H EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Pulset jet fabric filter
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The limits specified above apply to EACH boiler.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0240 LB/MMBTU EACH; TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Pulse jet fabric filter
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No

Pollutant/Compliance Notes: NOTE: The PM2.5 limit above applies to EACH boiler.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 1.0000 LB/MW-H GROSS OUTPUT; EACH; 30 D ROLL. AVG; NSPS
Emission Limit 2: 281.1000 LB/H EACH; 24H ROLL.AVG.; BACT
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SNCR (Selective Non-Catalytic Reduction)
Est. % Efficiency: 63.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The limits above apply to EACH boiler.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1:
Emission Limit 2: 744.0000 LB/H EACH; 24H ROLL. AVG.; BACT&SIP
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission Limit of 744 LB/H is for each boiler and is based on a 24-hr rolling average determined each hour the boiler operates. This limit is set per BACT & SIP.

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 303.0000 LB/H EACH; 24-H ROLL.AVG.; BACT & SIP
Emission Limit 2: 1.4000 LB/MW-H GROSS OUTPUT; EACH; 30D ROLL.AVG.
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission limits above apply to EACH boiler. Emission Limit 2 above of 1.4 LB/MW-H gross ouput is for each boiler and is based on a 30-day rolling average and is set per the NSPS.

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 17.8000 LB/H EACH; TEST PROTOCOL; BACT,MACT,SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The emission limit above is for EACH boiler.

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0030 LB/MMBTU EACH; TEST PROTOCOL; BACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 14.0000 E-5 LB/MMBTU EACH; TEST PROTOCOL; MACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber and pulse jet fabric filter
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: Emission limit is 0.00014 LB/MMBTU for each boiler. Test Protocol will specify averaging time.

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 0.0077 LB/GW-H EACH; 12-MO ROLLING; MACT & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber, sorbent injection (e.ge. activated carbon), and a fabric filter.

Est. % Efficiency: 93.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Dioxide Equivalent (CO2e)
CAS Number: CO2e
Test Method: Unspecified
Pollutant Group(s): (Greenhouse Gasses (GHG))
Emission Limit 1: 2.1000 LB/KW-H EACH; 12-MO ROLL.AVG.; BACT
Emission Limit 2: 6024107.0000 T/YR EACH; 12-MO ROLL.AVG.; BACT
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Use of biomass and energy efficiencies.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0011 LB/MMBTU EACH; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT , SIP
Control Method: (A) Polishing scrubber and pulse jet fabric filter
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Auxiliary Boiler
Process Type: 13.220 (Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel
Throughput: 72.40 MMBTU/H
Process Notes: Maximum operation was based on 4,000 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1100 LB/H TEST PROTOCOL; BACT/SIP/MACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP

Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.1700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.1700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 1.6700 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Low NOx burner
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 6.1100 LB/H TEST PROTOCOL; BACT/SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (P) Good combustion control
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.3000 LB/H TEST PROTOCOL; BACT/SIP/MACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid

CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0500 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements: MACT
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Emergency generator

Process Type: 17.110 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel
Throughput: 4000.00 HP

Process Notes: Maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1500 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1.7600 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 1.7600 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Fire Pump

Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel

Throughput: 420.00 HP

Process Notes: Maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1500 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.1400 LB/H TEST PROTOCOL; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 3.0000 G/HP-H TEST PROTOCOL; BACT/SIP/NSPS

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , SIP

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: Emission limit is expresssed as NMHC+NOx = 3.0 G/HP-H.

Process/Pollutant Information

PROCESS NAME: Turbine generator (EUBLACKSTART)

Process Type: 15.190 (Liquid Fuel & Liquid Fuel Mixtures)

Primary Fuel: Diesel

Throughput: 540.00 MMBTU/H

Process Notes: This is a turbine generator identified in the permit as EUBLACKSTART. It has a throughput capacity of 540MMBTU/HR which equates to 102 MW. The maximum operation was based on 500 hours per year.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0300 LB/MMBTU TEST PROTOCOL

Emission Limit 2: 16.2000 LB/H TEST PROTOCOL

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 16.2000 LB/H TEST PROTOCOL

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.1600 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0450 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0110 LB/MMBTU TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Cooling Tower (EUCOOLINGTWR)
Process Type: 99.009 (Industrial Process Cooling Towers)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM

Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0005 %
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Drift eliminators
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE)
Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel:
Throughput: 0
Process Notes: Limestone handling activities

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0002 GR/DSCF LIMESTONE PROCESS. EQUIP.;TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM limit for limestone handling (EULIMESTONE) is 0.00016 gr/dscf and is established per BACT. This limit applies to the limestone processing equipment within this emission unit.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: This PM10 limit is for the limestone processing equipment within EULIMESTONE portion of the permit.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0100 LB/H TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: This PM2.5 limit is for the limestone processing equipment portion of EULIMESTONE in the permit.

Process/Pollutant Information

PROCESS NAME: Limestone preparation (EULIMESTONEPREP)
Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel:
Throughput: 0
Process Notes: This is the limestone preparation activities within this permit and is identified as EULIMESTONEPREP in the permit.

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE
Test Method: Other
Other Test Method: See Pollutant Notes field below.
Pollutant Group(s):
Emission Limit 1: 7.0000 % OPACITY TRANSFER PTS.
Emission Limit 2: % OPACITY BLDG. HOUSING CRUSHER
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Test method used varies per emission point. See below: The 7% opacity limit applies to the transfer points portion of EULIMESTONEPREP. Method 9 is to be used if emissions are detected. The 0% opacity limit applies to the building housing crusher. If emissions are detected, then Method 22 is to be used. A 7% opacity limit ALSO applies to the dust collectors. If emissions are detected, then Method 9 is to be used.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 18.0000 E-7 GR/DSCF LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM limit of 0.0000018 grains/dscf applies to the limestone prep train portion of EULIMESTONEPREP.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/H LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP , NSPS
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM10 limit of 0.0006 LB/H applies to the limestone prep. train portion of EULIMESTONEPREP.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/H LIMESTONE PREP TRAIN; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: The PM2.5 limit of 0.0006 LB/H applies to the limestone prep train portion of EULIMESTONEPREP.

Process/Pollutant Information

PROCESS NAME: CFB Bed Ash Removal (EUBEDASH)
Process Type: 99.120 (Ash Storage, Handling, Disposal)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: If emissions are detected, then Method 9 to be used.
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY TRANSFER POINTS
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector

Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 5% Opacity at transfer points. Method 9 to be used if emissions are detected.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 11.0000 E-6 GR/DSCF BEDASH COLLECTION & REMOVAL EQUIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.000011 GR/DSCF for bedash collection & removal equipment. Averaging time is determined from test protocol.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H BEDASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.0012 LB/H for bedash collection & removal equipment. The averaging time is determined from the test protocol.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H BEDASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.0012 LB/H for bedash collection & removal equipment. Averaging time is determined from test protocol.

Process/Pollutant Information

PROCESS NAME: Ash Removal Economizer & Fabric filter hoppers

Process Type: 99.120 (Ash Storage, Handling, Disposal)

Primary Fuel:

Throughput: 0

Process Notes: Ash removal economizer & fabric filter hoppers (EUFLYASH)

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE

Test Method: Unspecified

Pollutant Group(s):

Emission Limit 1: 5.0000 % TRANSFER PTS.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: VE = 5% opacity at transfer points. Method 9 is to be used if emissions are detected.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 32.0000 E-6 GR/DSCF FLYASH COLLECTION & REMOVAL EQUIP.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: PM = 0.000032 GR/DSCF for flyash collection & removal equipment. The averaging time is determined from the test protocol.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0012 LB/H FLYASH COLLECTION & REMOVAL EQUIP.

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.0012 LB/H for flyash collection & removal equipment. Test protocol will determine the averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0012 LB/H FLYASH COLLECTION & REMOVAL EQUIP.
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.0012 LB/H for flyash collection & removal equipment. Test protocol will determine averaging time.

Process/Pollutant Information

PROCESS NAME: Solid fuel handling system (EUSOLIDFUELHANDLING)
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: See Pollutant Notes for details.
Pollutant Group(s):
Emission Limit 1: 10.0000 % OPACITY DROP & TRANSFER PTS.
Emission Limit 2: 5.0000 % OPACITY BLDG. HOUSING CRUSHER
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 10% opacity at drop & transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, SIP, & NSPS. 5% opacity for the building housing crusher. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 18.4000 E-4 GR/DSCF TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:

Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.00184 GR/DSCF for the transfer tower. Test protocol will determine averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2360 LB/H TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.236 LB/H for the transfer tower. Test protocol will determine the averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.2360 LB/H TRANSFER TOWER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Magnetic separators with either dust suppression or dust collectors.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.236 LB/H for the transfer tower. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: Coal crushers (EUFUELCRUSHER)
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Other
Other Test Method: See pollutant notes below.
Pollutant Group(s):
Emission Limit 1: 10.0000 % OPACITY DROP & TRANSFER PTS.
Emission Limit 2: 5.0000 % OPACITY DUST COLLECTOR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , SIP
Control Method: (A) Fabric filter dust collector.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 10% opacity for the drop and transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit are PSD-BACT, SIP & NSPS. 5% opacity for the dust collector. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit are PSD-BACT & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 2.0000 E-5 GR/DSCF FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Fabric filter dust collector.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM = 0.00002 GR/DSCF for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.00276 LB/H for the fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: PM2.5 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: Coal fuel storage silos (EUFUELSILO)

Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE

Test Method: Unspecified

Pollutant Group(s):

Emission Limit 1: 10.0000 % DROP & TRANSFER PTS.

Emission Limit 2: 5.0000 % DUST COLLECTOR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS , SIP

Control Method: (A) Fabric filter dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: 10% opacity at drop & transfer points. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT, NSPS, & SIP. 5% opacity for the dust collector. If emissions are detected, Method 9 is to be used. The applicable reqts. for this limit is PSD-BACT & SIP.

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 25.0000 E-5 GR/DSCF FABRIC FILTER

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Fabric filter dust collector

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: PM = 0.00025 GR/DSCF for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Fabric filter dust collector

Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM10 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 27.6000 E-4 LB/H FABRIC FILTER
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter dust collector
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM2.5 = 0.00276 LB/H for fabric filter. Test protocol will specify averaging time.

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2) - EXCLUDING Startup & Shutdown
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: Petcoke/coal
Throughput: 3030.00 MMBTU/H each
Process Notes: Each boiler is rated at 3,030 MMBTU/H. NOTE -The emission limits included under this process name specifically EXCLUDE startup & shutdown. The other CFB1 & CFB2 boiler section are the emission limits for the boiler that INCLUDE the startup & shutdown emissions. This has been changed per discussion with RBLC Administrator.

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0600 LB/MMBTU EACH; 30D ROLL.AVG.; BACT&SIP; EXC. SS
Emission Limit 2: 0.0500 LB/MMBTU EACH;12-MO ROLL.AVG.; BACT&SIP; EXC.SS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Dry flue gas desulfurization (spray dry absorber or polishing scrubber).
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: These SO2 limits apply to EACH boiler and EXCLUDE startup & shutdown emissions.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 72.7000 LB/H EACH; TEST PROTOCOL; BACT&SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) Pulse jet Fabric filter
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: NOTE: The 72.7 LB/H limit is for EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0700 LB/MMBTU EACH, 30 D ROLLING AVG; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) SNCR (Selective Non-Catalytic Reduction)
Est. % Efficiency: 63.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Note: This limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1500 LB/MMBTU EACH; 30 D ROLLING AVG; BACT
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOTE: This limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0030 LB/MMBTU EACH; LIMIT PER BACT, MACT, & SIP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: MACT , SIP
Control Method: (P) Good combustion
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: NOTE: This VOC limit applies to EACH boiler and EXCLUDES startup & shutdown emissions.

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE) - Transfer Points

Process Type: 90.999 (Other Mineral Processing Sources)

Primary Fuel:

Throughput: 0

Process Notes: Was part of the "" Process untill broken out by RBLC Admin. Original Notes: Limestone handling (EULIMESTONE)

POLLUTANT NAME:	Visible Emissions (VE)
CAS Number:	VE
Test Method:	EPA/OAR Mthd 9
Pollutant Group(s):	
Emission Limit 1:	7.0000 % OPACITY TRANSFER PTS.,
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	SIP
Control Method:	(A) Dust collector. Test Method varies depending on process within this emission unit; i.e. transfer pts., truck traffic, etc.)
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	(RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. ------ Original Note ------ "7% opacity is limit for the transfer points within EULIMESTONE. If emissions are detected, Method 9 is to be used."

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE) - BLDG. HOUSING CRUSHER

Process Type: 90.999 (Other Mineral Processing Sources)

Primary Fuel:

Throughput: 0

Process Notes: Was part of the "" Process untill broken out by RBLC Admin. Limestone handling activities - This portion is for the building housing crusher.

POLLUTANT NAME:	Visible Emissions (VE)
CAS Number:	VE
Test Method:	EPA/OAR Mthd 22
Pollutant Group(s):	
Emission Limit 1:	% OPACITY BLDG. HOUSING CRUSHER
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	SIP
Control Method:	(A) Dust collector. This portion is for the building housing crusher.
Est. % Efficiency:	99.000
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	No
Pollutant/Compliance Notes:	(RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. --------- Original Notes --------- 0% opacity is the limit for the building housing crusher portion of the emission unit. If emissions are detected, Method 22 is to be used.

Process/Pollutant Information

PROCESS NAME: Limestone handling (EULIMESTONE) - WHEEL LOADERS & TRUCK TRAFFIC EACH

Process Type: 90.999 (Other Mineral Processing Sources)

Primary Fuel:

Throughput: 0

Process Notes: Was part of the "Limestone handling (EULIMESTONE) " Process until broken out by RBLC Admin. Limestone handling activities

POLLUTANT NAME: Visible Emissions (VE)

CAS Number: VE

Test Method: Other

Other Test Method: Method 9D, if emissions detected

Pollutant Group(s):

Emission Limit 1: 5.0000 % OPACITY WHEEL LOADERS & TRUCK TRAFFIC EACH

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) This portion of the emission unit is wheel loaders and truck traffic.

Est. % Efficiency: 99.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: (RBLC Admin) Was under the process "Limestone handling (EULIMESTONE)", however, the same pollutant was listed 3 times which is not allowed. Each of the 3 VE limits was broken out into it's own process. ------------ original note ------------- 5% is the opacity limit for the wheel loaders and truck traffic portion of the limestone handling emission unit EULIMESTONE. If emissions are detected, Method 9D is to be used.

Process/Pollutant Information

PROCESS NAME: 2 Circulating Fluidized Bed Boilers (CFB1 & CFB2)--Startup & Shutdown ONLY

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Petcoke/coal

Throughput: 3030.00 MMBTU/H EACH

Process Notes: This section is for emissions associated with startup & shutdown ONLY.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 54.5000 LB/H EACH; BACT & SIP; SS ONLY

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (A) Pulse jet fabric filter

Est. % Efficiency: 99.900

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: NOTE: This limit (PM2.5 = 54.5 LB/HR) applies ONLY during startup & shutdown of the boilers. There are no other specific pollutant limits for either boiler during startup & shutdown.

Previous Page

Facility Information

RBLC ID:	TX-0585 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	TENASKA TRAILBLAZER PARTNERS LLC	**Permit Number:**	PSDTX1123 AND HAP13, 84167
Facility Name:	TENASKA TRAILBLAZER ENERGY CENTER	**Permit Date:**	12/30/2010 (actual)
Facility Contact:	LARRY CARLSON 402-938-1661	**FRS Number:**	UNKNOWN
Facility Description:	Coal-fired electric generating facility	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	NOLAN		
Facility State:	TX		
Facility ZIP Code:			
Permit Issued By:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name) MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov		
Other Agency Contact Info:	Mr. Richard Hughes 512-239-1554 richard.hughes@tceq.texas.gov		
Permit Notes:	HAP13, 84167		

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	OK	Wichita Mountains	> 250 km

Process/Pollutant Information

PROCESS NAME: Coal-fired Boiler

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Sub-bituminous coal

Throughput: 8307.00 MMBTU/H

Process Notes: Fuel is PRB coal. Output is 900MW gross and 700 MW net. this boiler will have an amine scrubber to remove approximately 85% of the CO2 to be used for enhanced recovery in nearby oil fields and gas wells; this is not required by the permit but is voluntary.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: EPA/OAR Mthd 7E

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0500 LB/MMBTU 12-MONTH ROLLING

Emission Limit 2: 0.0600 LB/MMBTU 30-DAY ROLLING

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: NSPS

Control Method: (A) Selective Catalytic Reduction

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: Other limits: 0.070 lb/MMBtu 24-hour avg 498 lb/hr 30-day avg 1661 lb/hr startup/shutdown

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))

Emission Limit 1: 0.0600 LB/MMBTU 30-DAY ROLLING

Emission Limit 2: 0.0600 LB/MMBTU 12-MONTH ROLLING

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Wet limestone scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 498 lb/hr 30-day rolling

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1000 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.1000 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 830lb/hr 30-day rolling avg

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0120 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 99.6800 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) Fabric Filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0250 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 207.6800 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filter and wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0036 LB/MMBTU 12-MONTH ROLLING AVG
Emission Limit 2: 29.9100 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practice
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0037 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0006 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2: 5.2000 LB/H 1-H
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) Wet scrubber
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0005 LB/MMBTU 12-MONTH ROLLING
Emission Limit 2: 4.1500 LB/H 1-H

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: MACT

Other Applicable Requirements:

Control Method: (A) Wet scrubber

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Lead (Pb) / Lead Compounds

CAS Number: 7439-92-1

Test Method: Unspecified

Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds , Particulate Matter (PM))

Emission Limit 1: LB/MMBTU 12-MONTH ROLLING

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) Fabric filter

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Ammonia (NH3)

CAS Number: 7664-41-7

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 10.0000 PPMVD 12-MONTH ROLLING

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury

CAS Number: 7439-97-6

Test Method: Unspecified

Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)

Emission Limit 1: LB/MMBTU 12-MONTH ROLLING

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: MACT

Other Applicable Requirements: NSPS

Control Method: (A) Sorbent injection and fabric filter

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	TX-0593 (final)	**Date Determination Last Updated:**	02/03/2020
Corporate/Company Name:	SUMMIT TEXAS CLEAN ENERGY	**Permit Number:**	PSDTX1218 & 92350
Facility Name:	TEXAS CLEAN ENERGY PROJECT	**Permit Date:**	12/28/2010 (actual)
Facility Contact:	KARL MATTES (262)439-8007	**FRS Number:**	UNKNOWN
Facility Description:	Integrated Gasification Combined Cycle	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	6	**COUNTRY:**	USA
Facility County:	EXTOR		
Facility State:	TX		
Facility ZIP Code:			

Permit Issued By: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)
MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov

Other Agency Contact Info: Erik Hendrickson
(512)239-1095
Erik.Hendrickson@tceq.texas.gov

Permit Notes: State permit number 92350

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
CLASS1	NM	Carlsbad Caverns NP	100km - 50km

Process/Pollutant Information

PROCESS NAME: Integrated Gasification Combined Cycle
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: PRB coal
Throughput: 400.00 MW
Process Notes: This facility is an integrated gasification combined cycle power plant. It will produce a nominal 400 MW of electricity and it will produce ammonia/urea and recover sulphuric acid as commercial products.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 3.5000 PPM ON SYNGAS
Emission Limit 2: 2.5000 PPM ON NATURAL GAS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SCR
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)

CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 10.0000 PPM SULFUR CONTENT OF SYNGAS
Emission Limit 2: 2.0000 GR/100 DSCF SULFUR CONTENT OF NATURAL GAS
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) gasification of coal and sulfur recovery in syngas before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0070 LB/MWH
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasification of coal and sulfur recovery in syngas before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: Sulfur content of syngas is limited to 10 ppm. Sulfur content of natural gas is limited to 2 gr/100 dscf

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) gasification of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (including natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 10.0000 PPM
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) good combustion controls
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201A and 202
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasificaiton of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0090 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) gasification of coal and syngas clean-up before combustion in turbine and duct burners; burning low ash fuels (natural gas)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 1.0000 PPM
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) good combustion controls
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0001 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: RACT
Other Applicable Requirements:
Control Method: (P) sungas clean-up before combustio in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) syngas clean-up before combustion in turbine and duct burners
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Previous Page

Facility Information

RBLC ID:	MI-0399 (final)	**Date Determination Last Updated:**	04/14/2016
Corporate/Company Name:	DETROIT EDISON	**Permit Number:**	93-09A
Facility Name:	DETROIT EDISON--MONROE	**Permit Date:**	12/21/2010 (actual)
Facility Contact:	LILLIAN WOOLLEY 313-235-5611 WOOLLEYL@DTEENERGY.COM	**FRS Number:**	26-11500020
Facility Description:	Utility--Coal fired power plant	**SIC Code:**	4911
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS Code:**	221112
Permit URL:			
EPA Region:	5	**COUNTRY:**	USA
Facility County:	MONROE		
Facility State:	MI		
Facility ZIP Code:	48161-1970		
Permit Issued By:	MICHIGAN DEPT OF ENVIRONMENTAL QUALITY (Agency Name) MS. CINDY SMITH(Agency Contact) (517)284-6802 SMITHC17@MICHIGAN.GOV		

Other Agency Contact Info: Please contact permit engineer Julie Brunner at 517-373-7088 with questions related to the permit. Thank you.

Permit Notes:

Affected Boundaries:

Boundary Type:	Class 1 Area State:	Boundary:	Distance:
INTL BORDER		US/Canada Border	< 100 km

Process/Pollutant Information

PROCESS NAME: Boiler Units 1, 2, 3 and 4

Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))

Primary Fuel: Coal

Throughput: 7624.00 MMBTU/H

Process Notes: 7,624 MMBTU/HR (Each unit). Pulverized coal-fired boilers, adding petroleum coke and increasing usage of subbituminous coal.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds)

Emission Limit 1: 0.1500 LB/MMBTU EACH, 30D ROLL. AVG. EXCL. STRTUP&SHTDWN

Emission Limit 2: 27446.4000 LB/D EACH, 30D ROLLING AVG.

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (P) Good combustion practices.

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Yes

Pollutant/Compliance Notes: Under 'Basis Information' and 'Other Applicable Requirements'--Other--NAAQS (above on page). Top Ranking Option

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Test Method: Unspecified

Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))

Emission Limit 1: 0.0800 LB/MMBTU EACH, 12-MONTH ROLLING AVG.

Emission Limit 2: 222.6000 T/MO EACH, 12-MONTH ROLLING AVG.

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (A) Staged combustion, low-NOx burners, overfire air, and SCR.

Est. % Efficiency: 95.000

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Yes

Pollutant/Compliance Notes: Top ranking option. Under 'Basis Information' and 'Other Applicable Requirements--Other--NAAQS' (above on page).

POLLUTANT NAME: Particulate matter, filterable (FPM)

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0110 LB/MMBTU EACH, TEST/ OR 24H ROLL.AVG. IF PM CEMS

Emission Limit 2: 10.0000 OPAC EACH, 6 MIN AVG TEST /OR COMS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 168 $/ton
Incremental Cost Effectiveness: 18299 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: 3rd ranking option

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.1070 LB/MMBTU EACH, 24-H ROLL. AVG.
Emission Limit 2: 815.8000 LB/H EACH, 24-H ROLL. AVG.
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Wet flue gas desulfurization.
Est. % Efficiency: 95.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: Top ranking option. 'Other--NAAQS' (above)

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0034 LB/MMBTU EACH, TEST PROTOCOL
Emission Limit 2: 25.9000 LB/H EACH, TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: Top ranking option. 'Other--State'

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0240 LB/MMBTU EACH, TEST
Emission Limit 2: 183.0000 LB/H EACH, TEST
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 167 $/ton
Incremental Cost Effectiveness: 13093 $/ton
Compliance Verified: Yes
Pollutant/Compliance Notes: 3rd ranking option.

POLLUTANT NAME: Lead (Pb) / Lead Compounds
CAS Number: 7439-92-1
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: LB/MMBTU EACH, TEST
Emission Limit 2: 0.1300 LB/H EACH, TEST
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 168 $/ton
Incremental Cost Effectiveness: 18299 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 3rd ranking option (cost based on surrogate of PM) 'Other -- NAAQS'

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/MMBTU EACH, TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 89.000
Cost Effectiveness: 126565 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Incremental Cost Effectiveness ($/ton)=NA 4th ranking option Note: Estimated Control Efficiency is 42% - 89%. Only one value allowed to be entered on this page above.

POLLUTANT NAME: Hydrogen Fluoride
CAS Number: 7664-39-3
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.0002 LB/MMBTU EACH, TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 94.000
Cost Effectiveness: 122779 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: 3rd ranking option. Incremental Cost Effectivenss ($/ton) = NA

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 0.0200 LB/GW-H EACH, 12MO. ROLL. AVG.-CEMS
Emission Limit 2: 143.1000 LB/YR UNITS 1&4, 12MO.ROLL.-CEMS
Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) Co-benefit reduction due to SCRs, ESPs, and wet flue gas desulfurization.
Est. % Efficiency: 90.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Units 2 & 3 have a limit of 144.2 LB/YR based on a 12-month rolling time period--using CEMS. NOTE: Under 'Control Efficiency' above, it is a range from 75% to 90% depending on the fuel type. Since only one limit may be included above, 90% was used.

POLLUTANT NAME: Arsenic / Arsenic Compounds
CAS Number: 7440-38-2
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 6.3000 E-6 LB/MMBTU EACH, TEST PROTOCOL
Emission Limit 2:
Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) ESPs and wet flue gas desulfurization.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Other Case by Case basis is T-BACT which is State Rule 336.1224.

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0024 LB/MMBTU LIMIT IS FOR EACH BOILER; TEST
Emission Limit 2:
Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) ESPs and wet flue gas desulfurization
Est. % Efficiency: 97.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Limit is 0.0024 LB/MMBTU for each boiler. Test method will specify averaging time. The limit(s) were established per Rule 336.1224, state rule, known as T-BACT (Best Available Control Technology for toxics).

Process/Pollutant Information

PROCESS NAME: 4 Diesel-fired quench pumps
Process Type: 17.210 (Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel))
Primary Fuel: Diesel fuel
Throughput: 252.00 HP
Process Notes: Each pump engine is 252 HP. They are limited to emergency use and subject to NSPS Subpart IIII.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified

Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2 EACH, TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4 EACH, TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. Note: QP1 = Quench pump#1; QP2= Quench pump#2; QP3=Quench pump#3; QP4 = Quench pump#4.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2, EACH; TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4, EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option Note: QP1=Quench pump #1; QP2=Quench pump#2; QP3=Quench pump#3; QP4=Quench pump#4.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.4000 G/HP-H QP1&QP2 EACH; TEST PROTOCOL
Emission Limit 2: 0.1500 G/HP-H QP3&QP4 EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. 'Other Case-by-Case' is PM2.5 non-attainment, hybrid applicability

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 20.0000 % OPACITY 20% OPAC, 6 MIN. AVG; EACH PUMP
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking option. 20% opacity on a 6-minute average for each pump QP1, QP2, QP3, QP4.

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 2.6000 G/HP-H EACH PUMP; TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 7.8000 G/HP-H QP1&QP2 EACH; TEST PROTOCOL
Emission Limit 2: 3.0000 G/HP-H QP3&QP4 EACH; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) Good combustion practices.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Limits are as NMHC+NOx based upon NSPS Subpart IIII.

Process/Pollutant Information

PROCESS NAME: Fuel handling activities
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel: Coal
Throughput: 19.20 MTons/yr
Process Notes: Coal = 19.2 Mtons/yr PetCoke = 1.1 Mtons/yr New and existing fuel handling for bituminous coal, subbituminous coal and petroleum coke.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input; 99% was chosen.

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY TEST PROTOCOL; BACT
Emission Limit 2: 10.0000 % OPACITY TEST PROTOCOL; EXISTING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input into the table.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Fabric filters; fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input. PM10 LB/H rate varies based upon the 0.004 GR/DSCF

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) Fabric filters; fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. 'Other' = PM2.5 nonattainment, hybrid applicability PM2.5 emission rate varies based upon 0.004 GR/DSCF. Estimated efficiency is 70%-99%; however only one value is allowed to be input into the table.

Process/Pollutant Information

PROCESS NAME: Limestone, gypsum, hydrated lime handling activities

Process Type: 90.999 (Other Mineral Processing Sources)
Primary Fuel: Gypsum
Throughput: 360000.00 T/YR
Process Notes: Process is limestone, gypsum, hydrated lime handling acitivities. Limestone throughput capacity = 240,000 T/YR; Gypsum throughput capacity = 360,000 T/YR. New material handling for limestone, gypsum, hydrated lime; limestone & gypsum subject to NSPS Subpart OOO.

POLLUTANT NAME: Particulate matter, filterable (FPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input.

POLLUTANT NAME: Visible Emissions (VE)
CAS Number: VE
Test Method: Unspecified
Pollutant Group(s):
Emission Limit 1: 5.0000 % OPACITY FABRIC FILTERS; TEST PROTOCOL
Emission Limit 2: 10.0000 % OPACITY DROP POINTS; TEST PROTOCOL
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value is allowed to be input.

POLLUTANT NAME: Particulate matter, total < 10 µ (TPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER

Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. Estimated control efficiency is 70%-99%; however only one value allowed to be input. The PM10 emission rate varies and is based upon 0.004 GR/DSCF.

POLLUTANT NAME: Particulate matter, total < 2.5 µ (TPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0040 GR/DSCF TEST PROTOCOL
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER
Control Method: (A) Fabric filters, fugitive dust control plan.
Est. % Efficiency: 99.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: Top ranking options. 'Other' = PM2.5 nonattainment, hybrid applicability. Estimated control efficiency is 70%-99%; however only one value allowed to be input. PM2.5 rate varies and is based upon 0.004 GR/DSCF.

Previous Page

Facility Information

RBLC ID: TX-0554 (final)
Date Determination Last Updated: 02/03/2020
Corporate/Company Name: COLETO CREEK
Permit Number: PSDTX1118 AND 83778
Facility Name: COLETO CREEK UNIT 2
Permit Date: 05/03/2010 (actual)
Facility Contact: ROSS CRYSUP
FRS Number: 110000599692
Facility Description: Coal-fired boiler
SIC Code: 4911
Permit Type: A: New/Greenfield Facility
NAICS Code: 221112
Permit URL:
EPA Region: 6
COUNTRY: USA
Facility County: GOLIAD
Facility State: TX
Facility ZIP Code: 77960
Permit Issued By: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) (Agency Name)
MS. ANNE INMAN(Agency Contact) (512) 239-1267 anne.inman@tceq.texas.gov
Other Agency Contact Info: Sean O'Brien
512-239-1137
sean.obrien@tceq.texas.gov
Permit Notes: 83778 HAP18

Process/Pollutant Information

PROCESS NAME: Coal-fired Boiler Unit 2
Process Type: 11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel: PRB coal
Throughput: 6670.00 MMBTU/H
Process Notes: IPA Coleto Creek, L.L.C. (IPA) has proposed to install a new solid fuel-fired utility boiler, Unit 2 (CC2), at their existing Coleto Creek Power Station

(CC) which has one existing solid fuel fired boiler. CC2 will be a nominal 650 MW net (750 MW gross) boiler firing sub-bituminous coal and/or bituminous coal with a maximum heat input rate of 6,670 MMBtu/hr based on a 30 day average of the heat input. The boiler will operate burning sub-bituminous coal or a blend of that and up to 40% bituminous coal.

POLLUTANT NAME: Nitrogen Oxides (NOx)
CAS Number: 10102
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx) , Particulate Matter (PM))
Emission Limit 1: 0.0600 LB/MMBTU ROLLING 30 DAY AVG
Emission Limit 2: 0.0500 LB/MMBTU ROLLING 12 MONTH AVG
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) low-NOx burners with OFA, Selective Catalytic Reduction
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0600 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.0600 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) Spray Dry Adsorber/Fabric Filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1200 LB/MMBTU 30-DAY ROLLING
Emission Limit 2: 0.1200 LB/MMBTU 12-MONTH ROLLING
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)

Emission Limit 1: 0.0120 LB/GW-H 12-MONTH ROLLING / MIXED FUEL
Emission Limit 2: 0.0150 LB/GW-H 12-MONTH ROLLING/ PRB ONLY
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) Fabric filter with sorbent injection
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: The mercury standard is based on this formula: % sub-bituminous coal x 0.015 lb Hg/GW-hr + % bituminous coal x 0.0075 lb Hg/GW-hr

POLLUTANT NAME: Ammonia (NH3)
CAS Number: 7664-41-7
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 10.0000 PPMVD 3-HOUR ROLLING
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0120 LB/MMBTU ANNUAL / BASED ON STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate matter, total (TPM)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0250 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) fabric filter, spray dry adsorber for acid gases

Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0034 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) Good combustion practices
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0040 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) spray dry adsorber/fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrochloric Acid
CAS Number: 7647-01-0
Test Method: Unspecified
Pollutant Group(s): (Acid Gasses/Mist , Hazardous Air Pollutants (HAP) , InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0008 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: MACT
Other Applicable Requirements:
Control Method: (A) spray dry adsorber/ fabric filter
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Hydrogen Fluoride

CAS Number:	7664-39-3
Test Method:	Unspecified
Pollutant Group(s):	(InOrganic Compounds)
Emission Limit 1:	0.0005 LB/MMBTU ANNUAL / STACK TEST
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	MACT
Other Applicable Requirements:	
Control Method:	(A) spray dry adsorber/fabric filter
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	

Previous Page

Facility Information

RBLC ID:	KY-0100 (final)	**Date Determination Last Updated:**	03/15/2011
Corporate/Company Name:	EAST KENTUCKY POWER COOPERATIVE, INC	**Permit Number:**	V-05-070 R3
Facility Name:	J.K. SMITH GENERATING STATION	**Permit Date:**	04/09/2010 (actual)
Facility Contact:	859.744.4812 JERRY PURVIS [JERRY.PURVIS@EKPC.COOP]	**FRS Number:**	110017429521
Facility Description:	NEW CFB EGU BECAUSE OF A LEGAL CHALLENGE OUTSIDE OF THE TITLE V PROCEDURES, PERMITTEE AGREED TO TERMINATE CONSTRUCTION AUTHORITY FOR PROJECT. R4 TO THIS PERMIT REMOVES CONSTRUCTION AURTHORITY, AND THE PERMIT MAY NOT BE AVAILABLE FROM KENTUCKY'S WEBSITE.	**SIC Code:**	4911
Permit Type:	A: New/Greenfield Facility	**NAICS Code:**	221112
Permit URL:			
EPA Region:	4	**COUNTRY:**	USA
Facility County:			
Facility State:	KY		
Facility ZIP Code:			
Permit Issued By:	KENTUCKY DEP, DIV FOR AIR QUALITY (Agency Name) MR. RICK SHEWEKAH, MGR(Agency Contact) (502)564-3999 Sreenivas.Kesaraju@ky.gov		
Other Agency Contact Info:	TOM ADAMS OR BEN MARKIN		
Permit Notes:	BECAUSE OF A LEGAL CHALLENGE OUTSIDE OF THE TITLE V PROCEDURES, PERMITTEE AGREED TO TERMINATE CONSTRUCTION AUTHORITY FOR PROJECT. R4 TO THIS PERMIT REMOVES CONSTRUCTION AURTHORITY, AND THE PERMIT MAY NOT BE AVAILABLE FROM KENTUCKY'S WEBSITE.		

Process/Pollutant Information

PROCESS NAME:	CIRCULATING FLUIDIZED BED BOILER CFB1 AND CFB2
Process Type:	11.110 (Coal (includes bituminous, subbituminous, anthracite, and lignite))
Primary Fuel:	COAL
Throughput:	3000.00 MMBTU/H
Process Notes:	COAL AND WASTE COAL WITH NATURAL GAS FOR STARTUP THRUPUT IS PER UNIT.

POLLUTANT NAME:	Particulate matter, filterable (FPM)
CAS Number:	PM
Test Method:	Other
Other Test Method:	
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	0.0900 LB/MMBTU 30 DAY AVERAGE

Emission Limit 2: 210.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) BAGHOUSE
Est. % Efficiency: 99.900
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: PM CEMS FOR COMPLIANCE

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0900 LB/MMBTU
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) BAGHOUSE
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: METHOD 201 AND 202 FOR TOTAL PM10/2.5

POLLUTANT NAME: Carbon Monoxide
CAS Number: 630-08-0
Test Method: Other
Other Test Method:
Pollutant Group(s): (InOrganic Compounds)
Emission Limit 1: 0.1000 LB/MMBTU 30 DAY
Emission Limit 2: 300.0000 LB/H 8 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) GOOD COMBUSTION CONTROLS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: CO CEMS

POLLUTANT NAME: Sulfur Dioxide (SO2)
CAS Number: 7446-09-5
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Sulfur (SOx))
Emission Limit 1: 0.0750 LB/MMBTU 30 DAY AVERAGE
Emission Limit 2: 225.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS , OTHER

Control Method: (A) LIMESTONE INJECTION (CFB)AND A FLASH DRYER ABSORBER WITH FRESH LIME INJECTION
Est. % Efficiency: 99.100
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: LB/MMBTU LIMIT EXCLUDES STARTUP/SHUTDOWN. LBS/DAY LIMIT INCLUDES STARTUP AND SHUTDOWN

POLLUTANT NAME: Nitrogen Dioxide (NO2)
CAS Number: 10102-44-0
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Oxides of Nitrogen (NOx))
Emission Limit 1: 0.0700 LB/MMBTU 30 DAY AVERAGE
Emission Limit 2: 210.0000 LB/H 24 HOUR BLOCK
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (A) SNCR
Est. % Efficiency: 53.000
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: No
Pollutant/Compliance Notes: LBS/MMBTU EXCLUDES STARTUP.SHUTDOWN; LBS/HR INCLUDES S&S

POLLUTANT NAME: Volatile Organic Compounds (VOC)
CAS Number: VOC
Test Method: Unspecified
Pollutant Group(s): (Volatile Organic Compounds (VOC))
Emission Limit 1: 0.0200 LB/MMBTU 3-HOUR
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) GOOD COMBUSTION CONTROL
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

POLLUTANT NAME: Mercury
CAS Number: 7439-97-6
Test Method: Unspecified
Pollutant Group(s): (Hazardous Air Pollutants (HAP) , Heavy Metals , InOrganic Compounds)
Emission Limit 1: 6.0000 E-6 LB/MWH BIT COAL ON ANNUAL AVERAG
Emission Limit 2: 6.0000 E-6 LB/MWH WASTE COAL ON ANNUAL AVE
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: OTHER CASE-BY-CASE
Other Applicable Requirements: OTHER
Control Method: (A) FABRIC FILTER, SNCR
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 40 CFR 72.2 OR MERCURY CEMS. LIMIT SET TO MEET COMPLIANCE WITH STATE REGULATION. Limits are 0.000006 LB/MWH.

POLLUTANT NAME: Sulfuric Acid (mist, vapors, etc)
CAS Number: 7664-93-9
Test Method: Unspecified
Pollutant Group(s): (InOrganic Compounds , Particulate Matter (PM))
Emission Limit 1: 0.0050 LB/MMBTU 3-HR
Emission Limit 2: 15.0000 LB/H 3 HR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (A) SAME AS CONTROLS FOR PARTICULATES
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: LB/MMBTU EXCLUDES SSM LB/HR INCLUDES SSM

Process/Pollutant Information

PROCESS NAME: ASH HANDLING
Process Type: 99.120 (Ash Storage, Handling, Disposal)
Primary Fuel:
Throughput: 0
Process Notes: CFB1 FLY ASH SILO 73 TON/HR CFB1 BED ASH SILO 37 TONS/HR CFB2 FLY ASH SILO 73 TONS/HR CFB2 BED ASH SILO 37 TONS/HR

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)
CAS Number: PM
Test Method: Unspecified
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 G/DSCF 24 BLOCK
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: 0.005 GR/DSCF

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown
Pollutant/Compliance Notes: FOUR STACKS FOR FLY AND BED ASH

Process/Pollutant Information

PROCESS NAME: COAL CRUSHING AND SILO STORAGE
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)
CAS Number: PM
Test Method: EPA/OAR Mthd 201
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 0.0050 GR/DSCF
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: SIP
Control Method: (A) FABRIC FILTER
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: COAL STOCKPILE
Process Type: 90.011 (Coal Handling/Processing/Preparation/Cleaning)
Primary Fuel:
Throughput: 3000.00 T/H
Process Notes: STORAGE PILES, RAILCAR UNLOADING, EGRESS TO UNDERGROUND CONVEYOR

POLLUTANT NAME: Particulate Matter (PM)
CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1: 10.0000 OPACITY 3 MINUTE
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: NSPS
Control Method: (P) WET SUPPRESSION, DUST SUPPRESSENT LOWERING WELL AND COMPACTION.
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: LIMIT FOR PM/PM10/PM2.5

Process/Pollutant Information

PROCESS NAME: LIME SILO STORAGES

Process Type: 90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM

Test Method: Other

Other Test Method:

Pollutant Group(s): (Particulate Matter (PM))

Emission Limit 1: 0.0050 GR/DSCF

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (A) FABRIC FILTERS

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: Unknown

Pollutant/Compliance Notes: BACT FOR PM10 AND 2.5. THREE DIFFERENT TYPES OF SILOS WITH DIFFERENT PROCESS RATES. 0.30 LBS/HOUR FROM EACH FRESH LIME SILO 0.17 LBS/HOUR EACH RECYCLED LIME SILO . 0.02 LBS/HOUR FROM EACH SCRUBBER SLAKER

Process/Pollutant Information

PROCESS NAME: LIMESTONE UNLOADING

Process Type: 99.190 (Other Fugitive Dust Sources)

Primary Fuel:

Throughput: 44.00 T/H

Process Notes: LIMESTONE STORAGE PILE FUGITIVE EMISSIONS FROM UNLOADING/HANDLING

POLLUTANT NAME: Particulate matter, fugitive

CAS Number: PM

Test Method: Unspecified

Pollutant Group(s):

Emission Limit 1:

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Y

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: OTHER

Control Method: (A) WET SUPPRESSION OR DUST SUPPRESSANT

Est. % Efficiency:

Cost Effectiveness: 0 $/ton

Incremental Cost Effectiveness: 0 $/ton

Compliance Verified: No

Pollutant/Compliance Notes: SUBJECT TO STATE FUGITIVE REGULATION

Process/Pollutant Information

PROCESS NAME: COALING TOWERS

Process Type: 99.999 (Other Miscellaneous Sources)

Primary Fuel:

Throughput: 0

Process Notes:

POLLUTANT NAME: Particulate matter, filterable < 10 µ (FPM10)

CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: N/A
Control Method: (P) 0.0005% DRIFT ELIMINATORS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COOLING TECHNOLOGY INSTITUTE (CTI) ACCEPTANCE TEST CODE (ATC) #140 TO VERIFY DRIFT PERCENT ACHIEVED BY THE DRIFT ELIMINATOR

POLLUTANT NAME: Particulate matter, filterable < 2.5 µ (FPM2.5)

CAS Number: PM
Test Method: Other
Other Test Method:
Pollutant Group(s): (Particulate Matter (PM))
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: N
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (P) BACT FOR PM/PM10/PM2.5 IS 0.0005% DRIFT ELIMINATORS
Est. % Efficiency:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Compliance Verified: Unknown
Pollutant/Compliance Notes: COOLING TECHNOLOGY INSTITUTE (CTI) ACCEPTANCE TEST CODE (ATC) #140 TO VERIFY DRIFT PERCENT ACHIEVED BY THE DRIFT ELIMINATOR

Process/Pollutant Information

PROCESS NAME: HAUL ROADS
Process Type: 99.140 (Paved Roads)
Primary Fuel:
Throughput: 0
Process Notes:

POLLUTANT NAME: Particulate matter, fugitive

CAS Number: PM
Test Method: EPA/OAR Mthd 22
Pollutant Group(s):
Emission Limit 1:
Emission Limit 2:
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Y
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements: OTHER
Control Method: (A) PAVED ROADWAYS, CLEANING OR PROMPT REMOVAL OF MATERIAL, AND THE APPLICATION OF WET SUPPRESSION, AS APPLICABLE.
Est. % Efficiency:

Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	BACT REQUIRES PAVED ROADS ONLY SUBJECT TO STATE FUGITIVE REGULATION

Process/Pollutant Information

PROCESS NAME:	LIMESTONE STORAGE SILOS
Process Type:	90.019 (Lime/Limestone Handling/Kilns/Storage/Manufacturing)
Primary Fuel:	
Throughput:	40.00 T/H
Process Notes:	2 SILOS, 40 TONS PER HOUR EACH.

POLLUTANT NAME:	Particulate matter, filterable < 10 µ (FPM10)
CAS Number:	PM
Test Method:	EPA/OAR Mthd 201
Pollutant Group(s):	(Particulate Matter (PM))
Emission Limit 1:	0.0050 GR/DSCF 24 HR
Emission Limit 2:	0.5100 LB/H (EACH) 24 HR
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	NSPS
Control Method:	(A) FABRIC FILTER
Est. % Efficiency:	
Cost Effectiveness:	0 $/ton
Incremental Cost Effectiveness:	0 $/ton
Compliance Verified:	Unknown
Pollutant/Compliance Notes:	ALSO LISTED AS PM2.5 LIMIT.

Previous Page

APPENDIX E
Cost Analysis SO_2 Controls
Units 1 and 2 Dry Scrubber (NIDS)

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	Designation	Units	Value	Calculation
EPC Project?			☑ TRUE	
Unit Size	A	(MW)	**690**	<--- User Input (Greater than 50 MW)
Retrofit Factor	B		**1.00**	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	**9800**	<--- User Input
SO2 Rate	D	(lb/MMBtu)	**4**	<--- User Input (SDA FGD Estimation only valid up to 3 lb/MMBtu SO2 Rate)
Type of Coal	E		Bituminous	<--- User Input
Coal Factor	F		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	G		0.98	C/10000
Heat Input	H	(Btu/hr)	6.76E+09	A*C*1000
Capacity Factor	I	(%)	**100**	<--- User Input
Operating SO2 Removal	J	(%)	**95**	<--- User Input (Used to adjust actual operating costs)
Design Lime Rate	K	(ton/hr)	22	(0.6702*(D^2)+13.42*D)*A*G/2000 (Based on 95% SO2 removal)
Design Waste Rate	L	(ton/hr)	47	(0.8016*(D^2)+31.1917*D)*A*G/2000 (Based on 95% SO2 removal)
Aux Power **Include in VOM?** ☑	M	(%)	1.31	(0.000547*D^2+0.00649*D+1.3)*F*G
Makeup Water Rate	N	(1000 gph)	39	(0.04898*D^2+0.5925*D+55.11)*A*F*G/1000
Lime Cost	P	($/ton)	**125**	<--- User Input
Waste Disposal Cost	Q	($/ton)	**30**	<--- User Input
Aux Power Cost	R	($/kWh)	**0.06**	<--- User Input
Makeup Water Cost	S	($/kgal)	**1**	<--- User Input
Operating Labor Rate	T	($/hr)	**60**	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	**Example**	**Comments**
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = if (A>600 then (A*98000) else 637000*(A^0.716))*B*(F*G)^0.6*(D/4)^0.01	$ 66,805,000	Base module absorber island cost
BMF ($) = if (A>600 then (A*52000) else 338000*(A^0.716))*B*(G*D)^0.2	$ 47,153,000	Base module reagent preparation and waste recycle/handling cost
BMB ($) = if (A>600 then (A*138000) else 899000*(A^0.716))*B*(G*F)^0.4	$ 94,454,000	Base balance of plant costs including: ID or booster fans, piping, ductwork modifications and strengthening, electrical, etc...
BM ($) = BMR + BMF + BMB	$ 208,412,000	Total base module cost including retrofit factor
BM ($/kW) =	302	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 20,841,000	Engineering and Construction Management costs
A2= 10% of BM	$ 20,841,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 20,841,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 270,935,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**393**	Capital, engineering and construction cost subtotal per kW
B1 = 2% of CECC if EPC TRUE, else 5% of CECC	$ 5,419,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 276,354,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**401**	Total project cost per kW without AFUDC
B2 = 10% of (CECC + B1)	$ 27,635,000	AFUDC (Based on a 3 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 41,453,000	EPC fees of 15%
TPC ($) = Includes Owner's Costs and AFUDC = CECC + B1 + B2 + C1	**$ 345,442,000**	Total project cost
TPC ($/kW) = Includes Owner's Costs and AFUDC	**501**	Total project cost per kW
Fixed O&M Cost		
FOMO ($/kW yr) = (8 operators)*2080*T/(A*1000)	$ 1.45	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(BM*0.015)/(B*A*1000)	$ 4.53	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$ 0.10	Fixed O&M additional administrative labor costs

FOM ($/kW yr) = FOMO +FOMM+FOMA	**$**	**6.08**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = K*P/(A*J)/98	$	3.95	Variable O&M costs for limestone reagent
VOMW ($/MWh) = L*Q/(A*J)/98	$	2.02	Variable O&M costs for waste disposal
VOMP ($/MWh) = M*R*10	$	0.78	Variable O&M costs for additional auxiliary power required including additional fan power (Refer to Aux Power % above)
VOMM ($/MWh) = N*S/A	$	0.06	Variable O&M costs for makeup water
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**6.81**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,044,400	
Annual Heat Input MMBtu =	59,235,120	
Annual Tons SO2 Created =	118,470	at 100% S conversion
Annual Tons SO2 Removed =	112,547	at removal efficiency = 95%
Annual Tons SO2 Emission =	5,924	
Annual Avg SO2 Emission Rate, lb/MMBtu =	0.200	Value is AT or ABOVE a 0.06 floor rate

Annual Capital Recovery Factor =	**0.094**	Wet FGD	
Annual Capital Cost (Including AFUDC), $ =	32,610,000		
Annual FOM Cost, $ =	4,192,000		45,353,000
Annual VOM Cost, $ =	41,161,000		
Total Annual SCR Cost, $ =	77,963,000		

Capital Cost, $/MWh =	5.40
FOM Cost, $/MWh =	0.69
VOM Cost, $/MWh =	6.81
Total SCR Cost, $/MWh =	12.90

Capital Cost, $/ton =	290
FOM Cost, $/ton =	37
VOM Cost, $/ton =	366
Total SCR Cost, $/ton =	693

Lookup Table

	Coal	Coal Factor
1	PRB	1.05
2	Lignite	1.07
3	Bituminous	1

Aux Power

TRUE

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	Designation	Units	Value	Calculation
EPC Project?			☑ **TRUE**	
Unit Size	A	(MW)	**690**	<--- User Input (Greater than 50 MW)
Retrofit Factor	B		**1.00**	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	**9800**	<--- User Input
SO2 Rate	D	(lb/MMBtu)	**4**	<--- User Input (SDA FGD Estimation only valid up to 3 lb/MMBtu SO2 Rate)
Type of Coal	E		Bituminous	<--- User Input
Coal Factor	F		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	G		0.98	C/10000
Heat Input	H	(Btu/hr)	6.76E+09	A*C*1000
Capacity Factor	I	(%)	**100**	<--- User Input
Operating SO2 Removal	J	(%)	**95**	<--- User Input (Used to adjust actual operating costs)
Design Lime Rate	K	(ton/hr)	22	(0.6702*(D^2)+13.42*D)*A*G/2000 (Based on 95% SO2 removal)
Design Waste Rate	L	(ton/hr)	47	(0.8016*(D^2)+31.1917*D)*A*G/2000 (Based on 95% SO2 removal)
Aux Power **Include in VOM?** ☑	M	(%)	1.31	(0.000547*D^2+0.00649*D+1.3)*F*G
Makeup Water Rate	N	(1000 gph)	39	(0.04898*D^2+0.5925*D+55.11)*A*F*G/1000
Lime Cost	P	($/ton)	**125**	<--- User Input
Waste Disposal Cost	Q	($/ton)	**30**	<--- User Input
Aux Power Cost	R	($/kWh)	**0.06**	<--- User Input
Makeup Water Cost	S	($/kgal)	**1**	<--- User Input
Operating Labor Rate	T	($/hr)	**60**	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	**Example**	**Comments**
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = if (A>600 then (A*98000) else 637000*(A^0.716))*B*(F*G)^0.6*(D/4)^0.01	$ 66,805,000	Base module absorber island cost
BMF ($) = if (A>600 then (A*52000) else 338000*(A^0.716))*B*(G*D)^0.2	$ 47,153,000	Base module reagent preparation and waste recycle/handling cost
BMB ($) = if (A>600 then (A*138000) else 899000*(A^0.716))*B*(G*F)^0.4	$ 94,454,000	Base balance of plant costs including: ID or booster fans, piping, ductwork modifications and strengthening, electrical, etc...
BM ($) = BMR + BMF + BMB	$ 208,412,000	Total base module cost including retrofit factor
BM ($/kW) =	302	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 20,841,000	Engineering and Construction Management costs
A2= 10% of BM	$ 20,841,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 20,841,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 270,935,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**393**	Capital, engineering and construction cost subtotal per kW
B1 = 2% of CECC if EPC TRUE, else 5% of CECC	$ 5,419,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 276,354,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**401**	Total project cost per kW without AFUDC
B2 = 10% of (CECC + B1)	$ 27,635,000	AFUDC (Based on a 3 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 41,453,000	EPC fees of 15%
TPC ($) = Includes Owner's Costs and AFUDC = CECC + B1 + B2 + C1	**$ 345,442,000**	Total project cost
TPC ($/kW) = Includes Owner's Costs and AFUDC	**501**	Total project cost per kW
Fixed O&M Cost		
FOMO ($/kW yr) = (8 operators)*2080*T/(A*1000)	$ 1.45	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(BM*0.015)/(B*A*1000)	$ 4.53	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$ 0.10	Fixed O&M additional administrative labor costs

FOM ($/kW yr) = FOMO +FOMM+FOMA	**$**	**6.08**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = K*P/(A*J)/98	$	3.95	Variable O&M costs for limestone reagent
VOMW ($/MWh) = L*Q/(A*J)/98	$	2.02	Variable O&M costs for waste disposal
VOMP ($/MWh) = M*R*10	$	0.78	Variable O&M costs for additional auxiliary power required including additional fan power (Refer to Aux Power % above)
VOMM ($/MWh) = N*S/A	$	0.06	Variable O&M costs for makeup water
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**6.81**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,044,400	
Annual Heat Input MMBtu =	59,235,120	
Annual Tons SO2 Created =	118,470	at 100% S conversion
Annual Tons SO2 Removed =	112,547	at removal efficiency = 95%
Annual Tons SO2 Emission =	5,924	
Annual Avg SO2 Emission Rate, lb/MMBtu =	0.200	Value is AT or ABOVE a 0.06 floor rate

Annual Capital Recovery Factor =	**0.094**	Wet FGD	
Annual Capital Cost (Including AFUDC), $ =	32,610,000		
Annual FOM Cost, $ =	4,192,000		45,353,000
Annual VOM Cost, $ =	41,161,000		
Total Annual SCR Cost, $ =	77,963,000		

Capital Cost, $/MWh =	5.40
FOM Cost, $/MWh =	0.69
VOM Cost, $/MWh =	6.81
Total SCR Cost, $/MWh =	12.90

Capital Cost, $/ton =	290
FOM Cost, $/ton =	37
VOM Cost, $/ton =	366
Total SCR Cost, $/ton =	693

Lookup Table

	Coal	Coal Factor
1	PRB	1.05
2	Lignite	1.07
3	Bituminous	1

Aux Power

TRUE

APPENDIX F
Cost Analysis SO_2 Controls
Unit 3 Dry Scrubber (NIDS)

Fill in the yellow cells with the known data inputs. The resulting costs are tabulated below. Variable names are defined as outlined in the table.

Variable	Designation	Units	Value	Calculation
EPC Project?			☑ TRUE	
Unit Size	A	(MW)	710	<--- User Input (Greater than 50 MW)
Retrofit Factor	B		1.00	<--- User Input (An "average" retrofit has a factor = 1.0)
Heat Rate	C	(Btu/kWh)	9800	<--- User Input
SO2 Rate	D	(lb/MMBtu)	0.4	<--- User Input (SDA FGD Estimation only valid up to 3 lb/MMBtu SO2 Rate)
Type of Coal	E		Bituminous	<--- User Input
Coal Factor	F		1	Bit = 1.0, PRB = 1.05, Lig = 1.07
Heat Rate Factor	G		0.98	C/10000
Heat Input	H	(Btu/hr)	6.96E+09	A*C*1000
Capacity Factor	I	(%)	100	<--- User Input
Operating SO2 Removal	J	(%)	50	<--- User Input (Used to adjust actual operating costs)
Design Lime Rate	K	(ton/hr)	2	(0.6702*(D^2)+13.42*D)*A*G/2000 (Based on 95% SO2 removal)
Design Waste Rate	L	(ton/hr)	4	(0.8016*(D^2)+31.1917*D)*A*G/2000 (Based on 95% SO2 removal)
Aux Power **Include in VOM?** ☑	M	(%)	1.28	(0.000547*D^2+0.00649*D+1.3)*F*G
Makeup Water Rate	N	(1000 gph)	39	(0.04898*D^2+0.5925*D+55.11)*A*F*G/1000
Lime Cost	P	($/ton)	125	<--- User Input
Waste Disposal Cost	Q	($/ton)	30	<--- User Input
Aux Power Cost	R	($/kWh)	0.06	<--- User Input
Makeup Water Cost	S	($/kgal)	1	<--- User Input
Operating Labor Rate	T	($/hr)	60	<--- User Input (Labor cost including all benefits)

Costs are all based on 2016 dollars

Capital Cost Calcuation	**Example**	**Comments**
Includes - Equipment, intallation, buildings, foundations, electrical, and retrofit difficulty.		
BMR ($) = if (A>600 then (A*98000) else 637000*(A^0.716))*B*(F*G)^0.6*(D/4)^0.01	$ 67,177,000	Base module absorber island cost
BMF ($) = if (A>600 then (A*52000) else 338000*(A^0.716))*B*(G*D)^0.2	$ 30,614,000	Base module reagent preparation and waste recycle/handling cost
BMB ($) = if (A>600 then (A*138000) else 899000*(A^0.716))*B*(G*F)^0.4	$ 97,191,000	Base balance of plant costs including: ID or booster fans, piping, ductwork modifications and strengthening, electrical, etc...
BM ($) = BMR + BMF + BMB	$ 194,982,000	Total base module cost including retrofit factor
BM ($/kW) =	275	Base cost per kW
Total Project Cost		
A1 = 10% of BM	$ 19,498,000	Engineering and Construction Management costs
A2= 10% of BM	$ 19,498,000	Labor adjustment for 6 x 10 hour shift premium, per diem, etc…
A3 = 10% of BM	$ 19,498,000	Contractor profit and fees
CECC ($) = BM + A1 + A2 + A3	**$ 253,476,000**	Capital, engineering and construction cost subtotal
CECC ($/kW) =	**357**	Capital, engineering and construction cost subtotal per kW
B1 = 2% of CECC if EPC TRUE, else 5% of CECC	$ 5,070,000	Owners costs including all "home office" costs (owners engineering, management, and procuement activities)
TPC' ($) - Includes Owner's Costs = CECC + B1	**$ 258,546,000**	Total project cost without AFUDC
TPC' ($/kW) - Includes Owner's Costs	**364**	Total project cost per kW without AFUDC
B2 = 10% of (CECC + B1)	$ 25,855,000	AFUDC (Based on a 3 year engineering and construction cycle)
C1 = if EPC = TRUE, 15% of (CECC+B1), else 0	$ 38,782,000	EPC fees of 15%
TPC ($) = Includes Owner's Costs and AFUDC = CECC + B1 + B2 + C1	**$ 323,183,000**	Total project cost
TPC ($/kW) = Includes Owner's Costs and AFUDC	**455**	Total project cost per kW
Fixed O&M Cost		
FOMO ($/kW yr) = (8 operators)*2080*T/(A*1000)	$ 1.41	Fixed O&M additional operating labor costs
FOMM ($/kW yr) =(BM*0.015)/(B*A*1000)	$ 4.12	Fixed O&M additional maintenance material and labor costs
FOMA ($/kW yr) = 0.03*(FOMO + 0.4*FOMM)	$ 0.09	Fixed O&M additional administrative labor costs
FOM ($/kW yr) = FOMO +FOMM+FOMA	**$ 5.62**	Total Fixed O&M costs

Variable O&M Cost

VOMR ($/MWh) = K*P/(A*J)/98	$	0.18	Variable O&M costs for limestone reagent
VOMW ($/MWh) = L*Q/(A*J)/98	$	0.10	Variable O&M costs for waste disposal
VOMP ($/MWh) = M*R*10	$	0.77	Variable O&M costs for additional auxiliary power required including additional fan power (Refer to Aux Power % above)
VOMM ($/MWh) = N*S/A	$	0.05	Variable O&M costs for makeup water
VOM ($/MWh) = VOMR + VOMW + VOMP + VOMM	**$**	**1.09**	Total Variable O&M costs

Annual Capacity Factor =	**100%**	
Annual MWhs =	6,219,600	
Annual Heat Input MMBtu =	60,952,080	
Annual Tons SO2 Created =	12,190	at 100% S conversion
Annual Tons SO2 Removed =	6,095	at removal efficiency = 50%
Annual Tons SO2 Emission =	6,095	
Annual Avg SO2 Emission Rate, lb/MMBtu =	0.200	Value is AT or ABOVE a 0.06 floor rate
Annual Capital Recovery Factor =	**0.094**	Wet FGD

Annual Capital Cost (Including AFUDC), $ =	30,508,000
Annual FOM Cost, $ =	3,988,000
Annual VOM Cost, $ =	6,810,000
Total Annual SCR Cost, $ =	41,306,000
Capital Cost, $/MWh =	4.91
FOM Cost, $/MWh =	0.64
VOM Cost, $/MWh =	1.09
Total SCR Cost, $/MWh =	6.64
Capital Cost, $/ton =	5,005
FOM Cost, $/ton =	654
VOM Cost, $/ton =	1,117
Total SCR Cost, $/ton =	6,777

Lookup Table

	Coal	Coal Factor
1	PRB	1.05
2	Lignite	1.07
3	Bituminous	1

Aux Power

TRUE

APPENDIX G

Tables 2.10 thru 2.13, Appendix K

New Hampshire Regional Haze Plan Periodic Comprehensive Revision

(DRAFT 10/31/2019)

Table 2.8 IPM v5.13 Cost and Performance Assumptions for Coal to Gas Conversions

Factor	Assumption	Description
Heat Rate Penalty	+5%	Lower stack temperature and higher moisture loss reduces efficiency
Incremental Capital Cost	PC Unit: $/kW = 267*(75/MW)^0.35 Cyclone Unit: : $/kW = 374*(75/MW)^0.35	New gas burners, piping, air heater upgrade, gas recirculating fans, and control system modifications.
Incremental Fixed O&M	-33% of the FOM cost of the existing coal unit	Reduced need for maintenance materials and labor.
Incremental Variable O&M	-25% of the VOM cost of the existing coal unit	Reduced waste disposal and other miscellaneous costs.

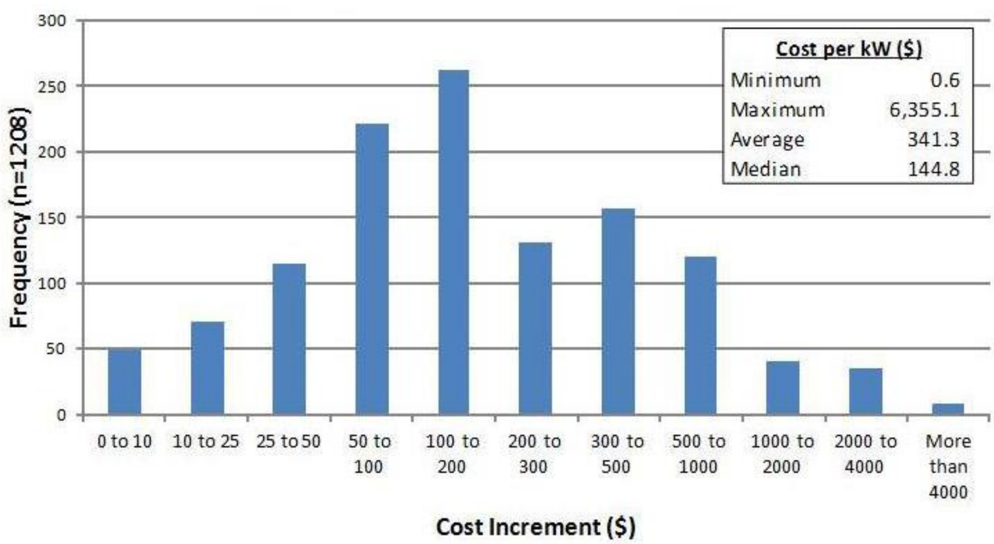
Table reference: Table 5-21, EPA, 2013.

EPA also developed estimates of the cost of extending pipeline laterals from each coal-fired boiler to the interstate national gas pipeline system. Their analysis included a number of factors including:

- Mainline pipeline flow capacity
- Required lateral capacity based on heat rate and boiler capacity
- Diameter of each lateral (calculated using the Weymouth equation)
- Cost per lateral ($90,000 per inch-mile based on recently completed projects)

Based on data for 1,208 coal-fired units EPA calculated an average cost per boiler of $341/kW of capacity. The distribution of lateral costs is shown in Figure 2.2.

Figure 2.2 Lateral Pipeline Costs per kW of Boiler Capacity



Source: Figure 5-7; EPA, 2013.