March 8, 2024

Ezra Thrush, Director
Policy Office
Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

Re: Proposed Revision to State Implementation Plan
Regional Haze Best Available Retrofit Technology

Dear Mr. Thrush:

The National Parks Conservation Association, Coalition to Protect America's National Parks, Sierra Club, PennFuture, Clean Air Council, Breathe Project, and Earthjustice submit these comments regarding the Department of Environmental Protection's proposed revision to its state implementation plan regarding best available retrofit technology under the regional haze program (BART SIP). DEP published this proposal in the Pennsylvania Bulletin at 54 Pa.B. 554 (Feb. 3, 2024).

As described in the attached Report (Attachment A), this proposal has both systemic flaws, and errors in the application of BART at the Clairton Works, that must be addressed prior to submission to the U.S. Environmental Protection Agency.

DEP Arbitrarily Refused to Extend the Comment Period

DEP published this notice for comments on the revised BART SIP on February 3, 2024. On February 9, 2024, Conservation Organizations wrote to DEP requesting an extension of 21 days in the comment period deadline, from March 8 to March 29. The Organizations provided a detailed basis for their request, noting over 4,700 pages of legal and technical material in the BART SIP and its appendices published for review, not including multiple large Excel files.

On February 21, 2024, DEP denied the request for an extension. DEP wrote that the BART SIP was "past due and required to address the U.S. Court of Appeals for the Third Circuit on September 29, 2015[,]*National Parks Conservation Ass'n v. EPA*, 803 F.3d 151 (3d Cir. 2015)." DEP further wrote that the BART SIP is needed before DEP could take separate additional actions: "Since each of these actions is iterative, building upon the previous action, the Department is unable to grant your request for an extension to the public comment period."[1]

This response is arbitrary, showing no reasoned consideration of the request. DEP cites an eight-year-old court opinion that it says it is now responding to with this proposed action. Whatever DEP has done, or not done, over the eight years that have passed since 2015 and *NPCA v. EPA*, it is arbitrary for DEP to deny the public an extra 21 days to evaluate and consider the legal and technical basis of DEP's proposal after its eight-year delay. That is, DEP's own eight-year delay is not a defensible basis to deny a short extension request to the public.

The letter requesting an extension and DEP's response (Attachments B and C, respectively) are included with these comments for the record of this rulemaking.

Sincerely,

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[1] Letter from Jessica Shirley, Interim Acting Sec'y, DEP, to Caitlin Miller, Assoc. Gen. Counsel, Clean Air and Climate, Nat'l Parks Conservation Ass'n at 1 (Feb. 21, 2024).

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ATTACHMENT A

A Review of the Pennsylvania Regional Haze State Implementation Plan

Prepared by

Joe Kordzi, Consultant

On behalf of

National Parks Conservation Association and the Sierra Club

February 2024

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1 Introduction

This is a report concerning a review of a BART revision to the Pennsylvania Regional Haze State Implementation Plan (BART SIP Revision).[1] The BART Modeling was not reviewed.

2 DEP and Associated State Agencies Excessively Redacted Documents

A number of documents in Appendices B, C and E appear to be excessively and/or improperly redacted. For example, Appendix B(1) is almost totally redacted to the point that the purpose of the document cannot even be determined. No permit should have any portion redacted. There are many other examples of what appears to be excessive redacting.

The Regional Haze Rule requires documentation,[2] and excessive redaction interferes with the public's ability to review information that may be important to the state's decision making. This compromises the public participation aspect of the Regional Haze SIP process. Therefore, as DEP is the state's agent in the assembly of the Pennsylvania State SIP, it must coordinate with other independent contributors such as the Allegheny County Health Department (ACHD) and Philadelphia Air Management Services to ensure that the minimal amount of redaction is performed on documents related to the state's SIP demonstration.

3 DEP Does Not Document the Basis for its Decisions

As discussed in these comments, there are numerous instances in which DEP fails to require that its sources provide adequate documentation of claims of figures relating to cost items, technical feasibility of controls, control performance, and similar issues.

Unsupported statements do not rise to the level of documentation required by the Regional Haze Regulations. Adequate documentation for these claims is required by 40 C.F.R. § 51.308(d) and (f), which require that Pennsylvania's SIP must include "supporting documentation for all required analyses." In addition, sections 51.308(d)(3)(iii) and (f)(2)(iii) require that Pennsylvania's SIP "document the technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying to determine the emission reduction measures that are necessary to make reasonable progress in each mandatory Class I Federal area it affects."

In its 2017 revision to the Regional Haze Rule, EPA specifically emphasized the need for this type of documentation:[3]

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[1] Commonwealth of Pennsylvania, Proposed Revision To The State Implementation Plan: Regional Haze Best Available Retrofit Technology, February 2024. Herein referred to as the "BART Revision." Available here: https://greenport.pa.gov/elibrary/GetFolder?FolderID=1019352.

[2] See 40 C.F.R. § 51.308(d), (f): "To meet the core requirements for regional haze for these areas, the State must submit an implementation plan containing the following plan elements and supporting documentation for all required analyses." Also see sections 51.308(d)(3)(iii) and (f)(2)(iii): "The State must document the technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying [which includes BART] to determine the emission reduction measures that are necessary to make reasonable progress."

[3] See 82 FR 3096 (January 10, 2017).

> We are changing proposed 40 CFR 51.308(f)(2)(iv), regarding documentation requirements, ... to "document the technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying to determine the emission reduction measures that are necessary to make reasonable progress in each mandatory Class I area it affects." The purpose of this provision is to require states to document all of the information on which they rely to develop their long-term strategies, which will primarily be information used to conduct the four-factor analysis. Therefore, in addition to modeling, monitoring and emissions information, we are making it explicit that states must also submit the cost and engineering information on which they are relying to evaluate the costs of compliance, the time necessary for compliance, the energy and non-air quality impacts of compliance and the remaining useful lives of sources.

The Regional Haze Guidance reinforces this point:[4]

> As part of meeting the requirement of the Regional Haze Rule for the state to document the cost and engineering information on which the State is relying to determine the emission reduction measures that are necessary to make reasonable progress (40 CFR 51.308(f)(2)(iii)), every source-specific cost estimate used to support an analysis of control measures must be documented in the SIP. If information about a source has been asserted to be confidential, we recommend the state consult with its EPA Regional office regarding whether such confidentiality is appropriate and allowed under the CAA and if so how it can be reconciled with the need for adequate documentation of the basis for the SIP.

This documentation includes emission data for BART control cost evaluation.[5] A reviewer should not have to separately request emission data from DEP and/or one of the associated agencies that contribute to the development of this SIP (e.g., ACHD, and the Philadelphia Department of Public Health) in order to verify that reasonable values were used in BART control cost analyses. In particular, such a request was made to the ACHD for emissions for the only source undergoing a BART analysis—the United States Steel (USS) Clairton Works. Unfortunately, despite the fundamental nature of the data requested, it was not supplied in time for it to be incorporated into this report before the review period ended. This type of data must be a part of the SIP, as it is necessary in order to conduct a full review, and thus falls under the above noted documentation requirements.

DEP must therefore correct these fundamental failures in documentation in its BART SIP revision. Unless these issues are addressed, the SIP cannot be approved.

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[4] See Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, EPA-457/B-19-003 August 2019 (at 32). Hereafter referred to as "Regional Haze Guidance," or "the Guidance."

[5] See 40 C.F.R. § 51.308(e)(1) (requiring that state BART analyses include "documentation for all required analyses").

4 Aspects of PDEP's BART Selection Process Are Inadequate

In Pennsylvania's 2010 Regional Haze SIP revision, BART determinations were made for all 34 BART-eligible sources. Due to litigation and EPA's rejection of PDEP's June, 2020 revised BART determinations, PDEP again revised its BART determinations. In so doing, PDEP eliminated 12 facilities due to retirements of the BART-eligible units. The remaining 22 facilities were then informed by letters (BART SIP Revision, Appendix A) that they must do one of the following:

- Accept permit limits of 250 tpy for each of NOx, SO_2 and PM, for the combined BART-eligible sources.

- Perform dispersion visibility modeling and demonstrate having less than 0.2 deciviews (dv) impact on each Class I area.

- Perform BART analysis for each BART-eligible unit for each of NOx, PM10 and SO_2.

After these letters were sent, four more facilities demonstrated to DEP that based on additional retirements, other SIP obligations, or facility-submitted calculations they had no units that were BART-eligible, leaving 18 facilities with potentially BART-eligible units.

Following this, five more facilities requested permit limitations or a federally enforceable Consent Order and Agreement (CO&A) limiting the BART-eligible units to 250 tpy for each of NOx, SO_2 and PM, for the combined BART-eligible sources, leaving 13 facilities with potentially BART-eligible units. DEP selected a visibility threshold of 0.2 dv and required that these 13 facilities conduct BART modeling. This resulted in 12 facilities that DEP concludes are exempted from being subject to BART. This left the USS Clairton Works Plant as the only facility to undergo BART analyses.

The following comments address DEP's BART Selection Process.

4.1 PDEP Failed to Update its BART-Eligibility Selection Process

On page 6 of its BART SIP Revision, PDEP describes how it revisited the sources it previously determined were BART-eligible in its 2010 SIP. In its current BART SIP Revision, it simply assumes these same sources constitute the current universe of potential BART-eligible sources, and then proceeds to eliminate those units that have since retired, or otherwise demonstrate that some are no longer BART-eligible, as described above. However, this strategy must be updated to determine if any additional BART-eligible sources can be identified. In particular, PDEP must confirm that other BART-eligible units previously identified in the 2010 SIP as having satisfied the BART category and time interval requirements, but were eliminated due to being under the 250 tpy potential to emit cutoff, are not now included due to updated emissions.[6] For

[6] See the BART Guidelines, 70 FR 39114 (July 6, 2005): "EPA's implementing regulations define BART-eligible sources as those with the potential to emit 250 tons or more of any air pollutant. [W]e believe that States may consider federally enforceable limits or emissions limitations in State permits, which are enforceable under State law, in determining a source's ''potential to emit.''"

example, on page 20, PDEP updated the emissions for the Lehigh White Cement Plant when it eliminated that facility from being subject to BART. In the same way, it must also do so to the original potentially BART-eligible units that satisfied the category and time interval requirements, to ensure no other sources have become BART-eligible. This is particularly important since the original assessment was based on 2002 emissions, and at this point it is possible that some units have increased their emissions. In so doing, PDEP must use permitted or other federally enforceable emission limits, not actual emissions or stack testing.[7]

4.2 Inactive BART-Eligible Sources

There are a number of inactive potentially BART-eligible sources that have been shut down and removed from facility permits, but that are not demolished. DEP deems these source shut-downs permanent and federally enforceable. However, in one case—the Cemex Wampum Kiln 3 which DEP discusses on page 9 of its BART SIP Revision—DEP states it has been deactivated for more than 10 years and has been removed from the Title V permit. DEP specifies that if reactivated this source would be considered a new source under the Pennsylvania Code. It is unclear to what extent this special status may apply to other deactivated BART-eligible sources. Regardless, DEP must make it clear in its SIP that any deactivated source that is not demolished would be considered a new source, and that any claim of closure must be federally enforceable. Any such source that sought to reactivate would also be considered potentially BART-eligible and would undergo the standard BART review.

4.3 Cleveland Cliffs Butler Works

DEP states (BART SIP Revision at 14) that it exempted the Butler Works from being subject to BART due to calculations submitted by Butler Works that indicate that the combined potentially BART-eligible units collectively emit less than 250 tpy of NOx, SO_2 or PM. DEP includes a spreadsheet in Appendix E8 with those calculations. In that spreadsheet, Butler Works calculates the NOx emissions from the AOD Preheater, the No. 2 Caster, and Ladle Preheaters 1, 2, 3, and 4. In these cases, Butler Works uses NOx emission factors from Table 1.4-1 of AP-42, the NOx portion of which is reproduced below:[8]

[7] See the BART Guidelines, 70 FR 39115 (July 6, 2005): "we believe that States may consider federally enforceable limits or emissions limitations in State permits, which are enforceable under State law, in determining a source's 'potential to emit.'"

[8] Not provided in the SIP, but can be found here: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-fifth-edition-volume-i-chapter-1-external-0. See Section 1.4.

Table 1. Portion of Table 1.4-1 from
AP-42: Emission Factors for NOx from Natural Gas Combustion

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]		
Uncontrolled (Pre-NSPS)[c]	280	A
Uncontrolled (Post-NSPS)[c]	190	A
Controlled - Low NO_x burners	140	A
Controlled - Flue gas recirculation	100	D
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]		
Uncontrolled	100	B
Controlled - Low NO_x burners	50	D
Controlled - Low NO_x burners/Flue gas recirculation	32	C
Tangential-Fired Boilers (All Sizes) [1-01-006-04]		
Uncontrolled	170	A
Controlled - Flue gas recirculation	76	D
Residential Furnaces (<0.3) [No SCC]		
Uncontrolled	94	B

Butler Works selected a NOx emission factor of 100 lbs/MMscf for the above noted sources. As can be seen from the above, the table used by Butler Works is not specifically intended for preheaters, but rather various types of boilers. Butler Works does not specify which boiler type in the above table it used for its selection of its 100 lbs/MMscf NOx factor, but based on the amount of natural gas allowed for these units in its permits, it is assumed to be the uncontrolled small boiler.[9]

Butler Works' application of this AP-42 NOx emission factor to its preheaters and No. 2 Caster is undocumented and unacceptable. Butler Works has not demonstrated that emission factors developed for small boilers is applicable to its sources. Also, these emissions factors were developed in 1996 and are now quite old. Lastly, the background document for this portion of AP-42 indicates that the data sample for the 100 lbs/MMscf NOx factor for small boilers consisted of only 18 tests and had a relative standard deviation of 51.0%, indicating a high degree of data scatter.[10] Thus, it is quite possible that the NOx emissions of these sources is

[9] For instance, the note at the bottom of Table 1.4-1 in AP-42 provides a conversion from cubic feet of natural gas/hr to MMBtu, which places all of the Butler works below 100 MMBtu/hr in capacity.
[10] See https://www.epa.gov/sites/production/files/2020-09/documents/background_document_ap-42_section_1.4_natural_gas_combustion.pdf, Table 3.4-1.

much higher than what Butler Works calculates. This is especially important, since Butler Works calculates the NOx emissions for the potentially BART-eligible sources as 189 tpy, so even a slight increase of the emission factor used could cause this total to exceed the 250 tpy BART-eligibility threshold. Because this data is used to exempt these sources from BART analyses, it must be of high quality and indisputable. Therefore, DEP must reject Butler Works' demonstration and require that better quality emission data be used in its analysis.

4.4 DEP's Demonstration that Lehigh White Cement is not BART-Eligible is Inadequate

DEP (BART SIP Revision at 17) references the Lehigh White Cement Title V permit as proof that potentially BART-eligible Source Numbers 200, 121A, 123, 140, 205, 220, 230A, 300, 380 and 450 collectively emit NOx, SO_2 and PM under the 250 tpy threshold for BART eligibility. However, that permit does not appear to have adequate methods of ensuring those limitations are practically enforceable.

For example, on page 80 of the permit, DEP specifies that the combined emissions from the above cited sources shall be limited to less than 250 tons during any consecutive 12 month rolling period for each of NOx, SO_2 and PM-10. However, directly below that requirement are sections for additional testing, monitoring, recordkeeping and reporting. In each of these sections, the permit states "No additional monitoring requirements exist except as provided in other sections of this permit including Section B (Title V General Requirements)." An examination of Section B indicates some reporting requirements including a compliance certification. However, that certification is not specific as to the 250 tpy BART threshold.

In other parts of the permit, the emission limitations on these sources are not directly translatable to tpy, making the value of such a certification dubious. For example, on page 26 of that permit, the Source 200 PM limits are expressed via a formula which depends on a process factor and the charging rate in units per hour. The SO_2 limit is expressed in ppm. It is unclear if the reporting requirements that follow cover NOx, SO_2 and PM and cover the entire year (some reporting only covers May through September). On page 22 of that permit, Source 121A only appears to have a throughput limit of 100 tons/hr with no actual emission limits specified. The remaining sources have similar unspecific emission limitations. Consequently, DEP must make it clear in its SIP how the emissions of the potentially BART-eligible sources for this facility are practically enforceable or otherwise under the 250 tpy threshold for BART eligibility.

4.5 DEP's Demonstration that Energy Transfer Marketing & Terminals Marcus Hook is not BART-Eligible is Inadequate

DEP states (BART SIP Revision at 10) that all of the formerly BART-eligible sources at the Marcus Hook facility are no longer BART-eligible. It points to the facility's permit No. 23-00119 (mistakenly cited as 23-0019), stating that "ERCs were generated including from all BART-eligible sources: 10-4 FCCU (Source 101), 17-2A H-04 Heater (Source 078) and Cooling Towers (Source 111). These BART-eligible sources have since been removed from the permitted sources list." According to DEP's Emission Reduction Credit Registry System,[11]

[11] See https://www.dep.pa.gov/Business/Air/BAQ/Permits/Pages/EmissionCredit.aspx, then "Emission Reduction Credit Registry System."

ERCs (Emission Reduction Credits), expressed in tpy, can be created by a company if its emissions of certain pollutants, including volatile organic compounds and nitrogen oxides, are reduced more than what is necessary to fulfill regulatory requirements. ERCs can be generated by all facilities in reducing emissions in a variety of ways including:

- Shutdown of an existing source or facility
- Permanent curtailment in production, or hours of operation which results in actual emissions reductions
- Use of new technologies, materials, processes or equipment modifications that are not required for compliance
- Installation of improved control measures that decrease actual emissions
- Pollution prevention

Thus, generation of ERCs is not proof that the unit in question has retired—only that it has reduced its emissions below its regulatory requirements.

DEP further states that "These BART-eligible sources have since been removed from the permitted sources list." However, this assertion cannot be determined from the material present in DEP's BART SIP Revision. For instance, on pdf page 184 of Appendix J of DEP's 2010 SIP, DEP lists the 36 units that it considers BART-eligible. Each unit has an identifying number and a descriptive name with some units also having their 2002 emissions specified. It appears that in its Title V permit, the units have different unit designations.[12] PDEP must therefore clearly demonstrate that all of the previously identified 36 BART-eligible units at this facility have been retired.

4.6 DEP's Demonstration that ATI Flat Rolled Products is not BART-Eligible is Inadequate

DEP states (BART SIP Revision at 9) that a spreadsheet of the ATI source breakdown and the potential to emit totals showing that emissions are below 250 tpy for each pollutant (NOx, PM2.5 and SO_2) are included in Appendix E. An examination of that file indicates that the PM10, SO_2, and NOx emissions for various units have been totaled, but no documentation of the underlying figures has been provided. PDEP must therefore provide this information, which should demonstrate the permitted (or otherwise federally enforceable) emission limits for the units in question. This is particularly important since PDEP indicates that the NOx emissions total is 236 tpy, just below the BART-eligibility threshold of 250 tpy.

[12] See: https://files.dep.state.pa.us/RegionalResources/SERO/SEROPortalFiles/Community%20Info/SPMT/1311220[23-00119]_Issued_v1_(signed).pdf.

5 PDEP's US Steel Clairton Works BART Determination

5.1 USS's BART Analyses Lack Documentation

USS's initial BART Report, dated March 31, 2022[13] was later supplemented on October 16, 2023.[14] As the USS Supplemental BART Report is meant to supersede the previous BART Report, it was the document mainly reviewed in this report.

As indicated below, many key aspects of USS's BART analysis lack documentation. The Regional Haze Rule requires that state agencies, including DEP, document analyses and the technical basis for their haze submissions. For example, 40 C.F.R. § 51.308(d) and (f) require the following: "To meet the core requirements for regional haze for these areas, the State must submit an implementation plan containing the following plan elements and supporting documentation for all required analyses."

Also Sections 51.308(d)(3)(iii) and (f)(2)(iii) require the following: "The State must document the technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying [which includes BART] to determine the emission reduction measures that are necessary to make reasonable progress."

Therefore, PA DEP must require that all aspects of USS's BART analyses are properly documented.

5.2 PDEP Must Document USS BART Emissions

On page 2-2 of its BART Report, USS states that "[a]s discussed in Section 1.3, U. S. Steel has used the maximum annual emission rate from 2016 to 2018 as the baseline." Section 1.3 of the BART report does not discuss this, and Section 1.4 only essentially repeats this statement. DEP must provide documentation of all of the emission rates used in this BART analysis.

5.3 USS Must Provide Plant Schematics for BART Sources

To demonstrate the technical basis for its decision, DEP must require that USS indicate whether any of the units share common ducting or stacks. DEP must also require that USS provide schematics, drawings and any related material that describes the configuration of the BART-eligible units, including their proximity to each other and to exhaust ducting. DEP must then use this information to investigate whether it is technically feasible that controls for any of the BART-eligible units can be shared. Controls retrofitted to service multiple sources have the potential to improve the cost-effectiveness values (lower $/ton) compared to controls retrofitted individually to the same sources and must be evaluated if feasible. As indicated later in the

[13] Best Available Retrofit Technology (BART) Analysis, U. S. Steel – Mon Valley Works / Clairton Plant, prepared by Trinity Consultants, dated March 31, 2022. Appendix 35_D of the SIP. Hereafter referred to as the "BART Report."

[14] Transmittal letter and Engineering Analysis. Appendix 33_D of the SIP. Hereafter referred to as the "Supplemental BART Report."

report, it appears that Boilers R1 and R2 do share stacks and USS did some preliminary assessment (albeit flawed) of a shared SCR system.

5.4 USS Must Use the Proper Interest Rate in its Cost-Effectiveness Calculations

On page 21 of its BART SIP Revision, DEP stated that the NPS indicated that USS used an interest rate of 8% without justification and that either the current Bank Prime interest rate must be used in a regional haze control cost analysis, or USS must provide documentation for a firm-specific interest rate.[15] DEP replies that regardless of what interest rate is used, this factor only changes the overall calculations by a few hundred dollars and does not change the ultimate outcome. DEP must provide calculations to support this contention as this is one of the documentation requirements of the Regional Haze Rule, under Sections 51.308(d)(3)(iii) and (f)(2)(iii).

5.5 USS Must Properly Consider LNB and FGR for Its Boilers

On page 2-1 of its BART Report, USS dismisses the use of Low NOx Burners (LNBs) for use in its BART-eligible boilers, which burn natural gas and coke oven gas, by simply stating the following:

> LNBs are not technically feasible for the boilers. Burner manufacturers have indicated that replacement burners would not achieve a reduction in NOx, based upon the actual emission rates that are currently being achieved. This was also noted in the Clairton Plant's 2020 Regional Haze Four-Factor Analysis.

There is no reason why lower emitting LNBs cannot be physically retrofitted to USS's subject-to-BART boilers. Moreover, a 2006 technical report, specifically focused on LNBs for steel industry boilers that burn Coke Oven Gas (COG), like the ones employed at the Clairton Plant, concluded that LNBs are very effective at controlling NOx.[16] This paper also discusses the use of Flue Gas Recirculation (FGR) for these boilers, which USS also dismissed as infeasible. In 2000, Bethlehem Steel also demonstrated the retrofitting of a type of LNB on batch furnace, resulting in a substantial reduction in NOx of 60%.[17]

LNBs of various types have been successfully deployed on fossil fueled boilers of all types that burn a variety of fuels, including COG, for decades.[18] Consequently, there is a high likelihood

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[15] The current Bank Prime Interest Rate, which is used in all revised analyses in this report, is 8.5%: https://www.federalreserve.gov/releases/h15/.

[16] See "Development And Demonstration Of Novel Low-NOx Burners For Boilers In The Steel Industry, Final Technical Report (September 1999 to September 2006), Gas Technology Institute." Available at https://www.osti.gov/servlets/purl/896758, or https://digital.library.unt.edu/ark:/67531/metadc883988/m2/.

[17] See https://www.aceee.org/files/proceedings/2001/data/papers/SS01_Panel1_Paper35.pdf.

[18] For instance, see these references for advanced LNBs that can burn natural gas and/or COG: https://www.zeeco.com/resources/brochures/gb-low-nox-power-burner, https://www.fivesgroup.com/jp/energy-combustion/burners-systems/pillard-leangasflam, https://www.campbell-sevey.com/manufacturers/webster-combustion/, https://www.zeeco.com/resources/brochures/gb-low-nox-power-burner, https://pdf.nauticexpo.com/pdf/saacke/coke-oven-gas/31562-105826.html, and https://www.nationwideboiler.com/pdfs/brochures/webster-mini-brochure.pdf.

that advanced Ultra-Low NOx burners (ULNBs) can be retrofitted to the USS BART-eligible boilers and achieve lower NOx emissions. DEP must require that USS thoroughly investigate this control option *and provide documentation of any assertions.* If such documentation involves confidentiality claims, DEP has the obligation and means to address them.

5.6 The Clairton Works SCR Cost Analysis for Boiler No. 2 Appears Greatly Inflated and is Unacceptable

On page 24 of its BART SIP Revision, DEP references USS's Supplemental BART Report present in Appendix D.13 (presumably Appendix 33_D), which it uses to support its Boiler No. 2 SCR cost-effectiveness figures of $20,455/ton and $67,788/ton for actual and Potential to Emit (PTE) emission scenarios. The USS Supplemental BART Report consists of the following:

- A transmittal letter.

- A heavily redacted Wheelabrator SCR cost estimate. This cost estimate appears to cover all capital costs for the project except for the installation of the SCR reactor and auxiliary equipment. However, all cost figures and some other key information is redacted.

- Pictures of EPA Control Cost Manual SCR cost-effectiveness spreadsheets for the actual and PTE emission scenarios. USS has, however, altered EPA's spreadsheet to greatly increase the capital cost, the annual electrical cost, and has used a number of improper or undocumented input values that serve to worsen the cost-effectiveness calculation (higher $/ton) as described below.

5.6.1 USS Must Document its PTE and Actual Emission Scenarios

As indicated above, USS performs two (albeit highly flawed) SCR cost-effectiveness calculations: one based on "PTE" emissions and another based on "actual" emissions. In the EPA Control Cost SCR model used, when the option is selected for industrial gas boilers, historical NOx emissions are not directly entered. Rather, fuel consumption is entered. For USS's PTE case, it entered a value of 6,720,191,388 standard cubic foot (scf)/year, and for its actual case, it entered a value of 1,947,132,376 scf/year. No documentation for these figures was provided by USS, and DEP must require it. Lacking any other data, these figures were retained in the adjusted analyses that follow.

5.6.2 USS Unreasonably Increased the EPA Calculated Total Capital Investment by Almost Eleven Times

EPA's SCR Control Cost Manual includes an SCR cost-effectiveness spreadsheet.[19] This spreadsheet follows the Control Cost Manual overnight methodology, which is required to be followed in any BART analysis. Among other applications, it allows the user to select input values appropriate for calculating the SCR cost-effectiveness for gas-fired industrial boilers, so it is appropriate for use in this instance. Selection of inputs includes the boiler size, heating value

[19] See https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution. See Section 4 – NOx Controls and the file entitled, "SCR Cost Calculation Spreadsheet.xlsm."

of the fuel gas, rate of fuel consumption, boiler heat rate and everything necessary in order to tailor the cost model to the Clairton Works No. 2 Boiler.

Using USS's inputs (a number of which are improper or undocumented as discussed below) EPA's SCR model calculates a cost-effectiveness for the USS PTE scenario of $2,979/ton.[20] However, USS overwrote the calculated Total Capital Investment (TCI) generated by this model of $10,445,344 with its own value of $114,023,905, a value almost eleven times greater than that calculated by the EPA Control Cost model. It is instructive to note that in USS's initial cost-effective calculation in its BART Report (the March 31, 2022 report in Appendix 35_D), it calculated a TCI of $8,803,035 for this same control on this same source.[21]

USS also overwrote the annual electricity cost of $146,462 with its own value of $234,962. As a result of these alterations, the cost-effectiveness greatly increased from $2,979/ton to $20,455/ton. The vast majority of this increase in cost-effectiveness was due to USS's increase of the TCI.

USS explains this increase in TCI with a note to its alteration that states the following:

> TCI reflects a combination of: 1) Estimated equipment and construction costs from Wheelabrator and their 3rd party vendor; and 2) Additional costs not included in the vendor's quotation (i.e., #1 above) such as U.S. Steel estimates for staffing, engineering and ancillary costs (See "Outline of Additional Costs").

Regarding the second point, USS includes a table on pdf page 5 of Appendix 33_D, entitled "Outline of Additional Costs (Outside of Wheelabrator Scope)." This includes a long list of items including project management, engineering, various additional capital costs, labor permitting, and contingency. These costs total $4,256,000. None of these costs should have been added to EPA's capital costs. EPA's cost model includes all capital, engineering, labor, etc., as it is intended to be an "all-in" cost model. For instance, EPA states the following regarding its TCI calculation:[22]

> TCI includes direct and indirect costs associated with purchasing and installing SCR equipment. Costs include the equipment cost for the SCR system itself, the cost of auxiliary equipment, direct and indirect installation costs, additional costs due to installation such as asbestos removal, costs for buildings and site preparation, offsite facilities, land, and working capital. In general, SCR does not require buildings, site preparation, offsite facilities, land, and working capital. A more detailed discussion of capital costs can be found in Section 1, Chapter 2 of this Manual. The total project cost or TCI for the SCR is based on the approach used by EPA CAMD in the Integrated Planning Model [9], and this approach includes both the direct capital costs and the indirect capital costs. The methods presented in sections 2.4.1.1 and 2.4.1.2 for utility boilers are identical to the methods in v6 of the IPM, except that two elements have been excluded, as noted

[20] See the file entitled, "Clairton Boiler 2 PTE SCR USS-Inputs.xlsm."
[21] BART Report, Appendix 35_D, pdf page 32.
[22] See Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, June 2019, pdf page 67.

> above. The IPM does not include methods for estimating impacts to industrial boilers. Thus, the methods presented in sections 2.4.1.3 and 2.4.1.4 for industrial boilers are based on modified IPM equations; the equations were modified by replacing electricity production ratings with the corresponding typical boiler heat input capacities, as calculated using typical NPHRs, and assuming that SCR costs for industrial boilers and utility boilers that have the same heat input capacity would be the same. The capital cost equations included in the manual reflect a process contingency of 5 to 10 percent and a project contingency of 15 percent.

Thus, it appears that all of the $4,256,000 in costs included in USS's Outline of Additional Costs table are double-counting. However, this still leaves $99,322,561 in TCI unaccounted for.[23] Presumably, this is included in the Wheelabrator's SCR costs, which as discussed above is completely redacted, and therefore unavailable for review.

In summary, in comparison to EPA's Control Cost Model (and its own prior SCR cost-effectiveness calculation), USS has increased the TCI cost for the installation of an SCR system on the No. 2 Boiler *by almost eleven times*, based on some costs that are demonstrably redundant but with the majority being completely unreviewable by the public. Considering the emphasis placed on proper documentation, cited numerous times throughout this report, it is unreasonable for DEP to accept USS's gross increases to these undocumented and at least partially double-counted figures.

5.6.3 USS Wrongly Discounts SCR Efficiency

On page 2-1 of its BART Report, USS assumes an SCR control efficiency of 80% without any documentation. As DEP indicates, the NPS indicated that a higher control level corresponding to a controlled emission rate of 0.04 lbs/MMBtu should have been assumed, based on the Control Cost Manual. This level of control has been consistently and continuously achieved by many large coal-fired EGU boilers.

However, the Clairton Works boilers are not fueled by coal, and instead are fueled by COG and natural gas. DEP's BART SIP Revision does not appear to indicate the composition of the Clairton Works COG. However, USS has elsewhere indicated that its COG is composed of 40 – 60% hydrogen, 20 – 30% methane, 3 – 15% nitrogen, and 3 – 6% carbon monoxide.[24] USS has not presented any documentation to establish that an SCR system retrofitted to its boilers that burn COG should perform any worse than boilers that burn natural gas, and there is no reason to conclude that COG contains anything in its composition to suggest otherwise. Therefore, it is reasonable to judge the performance of SCR systems retrofitted to the Clairton Works boilers based on SCR systems installed on other gas-fired boilers. Below is such a comparison:[25]

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[23] That is, USS's TCI of $114,023,905 – EPA's TCI of $10,445,344 = $103,578,561. Then subtracting USS's additional costs of $4,256,000 leaves $99,322,561.

[24] See https://www.ussteel.com/documents/40705/43680/Cryogenicaly+Processed+COG+SDS.pdf/e23d9031-07b0-b221-b2e7-624dec6cdd08?t=1603230630489. Note the document indicates the composition includes COG from the Clairton Works. Percentages are expressed in weight percent.

[25] Data were downloaded from EPA's CAMP site at https://campd.epa.gov/data/custom-data-download. See the file entitled, "Best Performing Gas Boiler SCRs.xlsx."

Table 2. Best Performing EGU Gas-Fired Boiler SCR Systems.

State	Facility Name	Unit ID	Year	Operating Time Count	NOx Mass (short tons)	NOx Rate (lbs/MMBtu)
CA	Scattergood Generating Station	1	2016	7298	2.3	0.0013
CA	Scattergood Generating Station	3	2015	7768	8.6	0.0016
CA	Scattergood Generating Station	2	2020	3392	1.7	0.0018
PA	Philadelphia Refinery	150145	2017	8650	1.1	0.0018
CA	Haynes Generating Station	1	2020	1764	1.1	0.0019
PA	Trainer Refinery	53	2020	3065	0.7	0.002
CA	Haynes Generating Station	2	2019	516	0.3	0.0029
CA	Mandalay Generating Station	1	2015	1534	2.5	0.0035
PA	Trainer Refinery	34	2017	8495	3.5	0.0039
PA	Trainer Refinery	35	2014	8735	4.1	0.0039
CA	Mandalay Generating Station	2	2016	816	1.6	0.0042
IL	Ingredion Incorporated Argo Plant	B08	2023	7970	5.5	0.0044
TN	Johnsonville	AUX1	2019	3489	1.6	0.0058
TN	Johnsonville	AUX2	2021	1329	0.7	0.0059
CA	Etiwanda Generating Station	4	2014	1226	2.4	0.0061
CA	Etiwanda Generating Station	3	2014	1964	5.5	0.0063
CA	Cabrillo Power I Encina Power Station	4	2017	2686	11.5	0.0069
CA	Ormond Beach Power, LLC.	2	2021	2039	11.4	0.0069
CA	Cabrillo Power I Encina Power Station	3	2016	821	1.1	0.0077
CA	Cabrillo Power I Encina Power Station	5	2017	2778	13.3	0.0077
CA	Moss Landing Power Plant	1-Jun	2015	1171	11.5	0.0078
IL	Lemont Refinery	430B24	2022	3548	2.3	0.008
CA	Moss Landing Power Plant	1-Jul	2015	824	8.3	0.0084
IL	Lemont Refinery	431B25	2020	3523	2.3	0.0087
CA	Ormond Beach Power, LLC.	1	2020	1507	13.7	0.0088
CA	El Segundo	4	2014	1902	7.5	0.0097
IN	BP Whiting Business Unit	3SPS34	2017	3671	7.8	0.0099
CA	Pittsburg Generating Station (CA)	5	2016	616	1.9	0.0118
IL	Wood River Refinery	BLR19	2016	715	0.1	0.012
IN	BP Whiting Business Unit	3SPS31	2014	3309	12.7	0.0125
IN	BP Whiting Business Unit	3SPS32	2014	3672	13.7	0.0125
IN	BP Whiting Business Unit	3SPS33	2015	2609	6.6	0.0128

MS	David M Ratcliffe	AB-002	2016	7833	119.8	0.013
SC	INVISTA S.a.r.l. Camden Plant	3	2017	2943	2.1	0.0133
MS	David M Ratcliffe	AB-001	2015	8239	113.8	0.0135
CA	Pittsburg Generating Station (CA)	6	2016	581	1.7	0.0138
IN	BP Whiting Business Unit	3SPS36	2014	3672	15.6	0.0143
TX	Lake Hubbard	2	2016	1155	14.2	0.0145
TX	Mountain Creek Generating Station	8	2018	2575	46.5	0.0147
TX	Handley Generating Station	4	2023	2858	36.1	0.0152
TX	Handley Generating Station	5	2015	1019	9.5	0.0162
TX	Lewis Creek	1	2014	4858	66.6	0.0186
TX	Handley Generating Station	3	2023	3317	72.8	0.0192
TX	Lewis Creek	2	2017	7394	92.5	0.0194
CA	Broadway	B3	2014	2323	10.3	0.0277
TX	Cedar Bayou	CBY1	2015	4979	318.4	0.034
TX	Cedar Bayou	CBY2	2014	2566	134.4	0.0346
KY	Catlettsburg Refining, LLC	B026	2020	2809	14.5	0.0443
CA	El Centro	4	2021	4069	35.9	0.0543
TN	Holston Army Ammunition Plant	2	2023	2233	28.1	0.2704
TN	Holston Army Ammunition Plant	3	2023	2094	40.0	0.2802
TN	Holston Army Ammunition Plant	4	2023	1479	28.6	0.3979
TN	Holston Army Ammunition Plant	1	2023	1628	29.8	0.421

The above table is composed of annual average NOx emission data from EGUs from 2014 through 2023. The data was filtered to select only those units that were boilers, fired by a gas of some type, and fitted with SCR systems, and then further filtered to select only those units with operating times of 500 hours or more. The resulting data were then sorted by facility name, then unit, then NOx rate (lowest to highest). Lastly, duplicate rows were removed so that only the first occurrence of the facility and unit were kept, so the best performing SCR systems were shown only once. The resulting data was then sorted from lowest to highest annual NOx rate.

The above table clearly indicates that many gas-fired boilers fitted with SCR systems have annual NOx averages below 0.02 lbs/MMBtu, with many below 0.01 lbs/MMBtu. An SCR outlet rate of 0.03 lbs/MMBtu would represent a reduction of less than 92%.[26] Consequently, considering that BART limits should be applied on a 30 boiler operating day (BOD) average basis, a 30 BOD rate of 0.03 is more than reasonable for a gas-fired boiler, and that rate or lower should be used in a cost-effectiveness analysis.

[26] Note that SCR vendors guarantee SCR efficiencies of up to 95%: see for instance https://power.mhi.com/products/aqcs/lineup/flue-gas-denitration, and https://www.cecoenviro.com/products/selective-catalytic-reduction-scr-peerless-emissions/.

5.6.4 USS Must Use a 30-Year Equipment Life for NOx Controls

USS states on page 2-3 of its BART Report the following regarding SCR equipment life:

> A 20-year remaining-useful-life (RUL) value is assumed for all sources based on engineering estimates. This is consistent with the recently updated OAQPS CCM chapter on SCR, which states: "the equipment lifetime of an SCR system is assumed to be 30 years for power plants and 20 to 25 years for industrial boilers" and the example used in the recently updated chapter on SNCR.

First, USS does not provide the full context for its reference. On the same page of the Control Cost Manual USS references, the Control Cost Manual states "[t]hus, broadly speaking, a representative value of the equipment life for SCR at power plants can be considered as 30 years. For other sources, the equipment life can be between 20 and 30 years. The remaining life of the boiler may also be a determining factor for the system lifetime." Thus, absent documentation to the contrary, the Control Cost Manual clearly indicates that the equipment for an SCR system for a non-EGU source can range to 30 years.

Second, the characteristics of the SCR system must be evaluated: An SCR system is a simple and robust piece of equipment, consisting of a large box that houses the catalyst with no moving parts that would impact its service life. The catalyst is replaced or regenerated regularly as a maintenance item and this cost is amortized in the control cost analysis. SCR systems are thus much less complicated and require much less maintenance than the equipment they serve. Therefore, an SCR system can be expected to have a life that is at least as long as the equipment it serves. EPA has consistently assumed a 30-year equipment life for EGU scrubber retrofits, scrubber upgrades, SCR, and SNCR installations. Much of this is summarized and cited to in EPA's response to comments document for its Texas and Oklahoma Regional Haze SIP final disapproval and federal implementation plan (FIP).[27] There is no technical reason to conclude that the equipment life of SCR retrofitted to an industrial boiler should be less than that for an EGU boiler. This is especially true since these boilers burn COG and natural gas and not coal—with the latter significantly lowering catalyst life in comparison. Unless USS (1) provides adequate documentation for a shorter equipment life, or (2) is willing to enter into an enforceable consent decree or similar instrument guaranteeing a shorter equipment life and which is incorporated into the SIP, DEP must require that all of the NOx cost estimates must be done on the basis of a 30-year life.

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[27] See Response to Comments for the Federal Register Notice for the Texas and Oklahoma Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan to Address Pollution Affecting Visibility and Regional Haze; and Federal Implementation Plan for Regional Haze, Docket No. EPA-R06-OAR-2014-0754, 12/9/2015, available here: https://www.regulations.gov/document?D=EPA-R06-OAR-2014-0754-0087. See pages 240-245, 268, and 274. Also see the Texas BART FIP proposal, which conducted extensive cost determinations for scrubber upgrades, at 82 FR 930 and 938. Also see Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, June 2019, pdf page 80: "For the purposes of this cost example, the equipment lifetime of an SCR system is assumed to be 30 years for power plants."

5.6.5 USS's Assumed Catalyst Life is Too Low

In its adaptation of EPA's Control Cost SCR model in its Supplemental BART Report, USS assumes a catalyst life of 24,000 hours. This is an appropriate assumption for coal-fired SCR installations, in which the exhaust has a higher percentage of potential poisons and particulates. However, it is not an appropriate assumption for a much cleaner gas-fired SCR system, as EPA states in the Control Cost Manual:[28]

> Catalyst life is usually specified when purchasing the catalyst. For the most common SCR design, the high-dust SCR [coal-fired], a catalyst layer is typically guaranteed for 16,000 –24,000 operating hours based on information from catalyst vendors. For oil- and gas-fired units, the SCR catalyst life is assumed to be 40,000 hours, and the catalyst life for some gas-fired units has been reported to be up to 60,000 hours.

Thus, a minimum catalyst life of 40,000 hours should be assumed for gas-fired SCR retrofits.

5.6.6 USS's Ammonia Cost is Unreasonable

In its adaptation of EPA's Control Cost SCR model in its Supplemental BART Report, USS assumes a reagent (ammonia) concentration of 19% at a cost of $1.691/gallon. USS also mistakenly entered the density as being 56 lbs/ft^3, which corresponds to that of 29% ammonia. The 2019 update of EPA's Control Cost SCR model assumes as a default that ammonia will be used at a concentration of 29% and a cost of $0.293/gallon. That cost is based on the average price of ammonia as indicated in the 2017 U.S. Geological Survey Minerals Commodity Summary for Nitrogen of $270 per ton.[29] USS has not provided any documentation to support why a higher concentration of ammonia cannot be used nor has it provided any documentation for its price of ammonia. The average price of ammonia in the 2024 U.S. Geological Survey Minerals Commodity Summary for Nitrogen was $480 per ton. Thus, absent documentation to the contrary, ammonia should be assumed to be stored onsite at a concentration of 29% and cost $0.521/gallon ($0.293 x $480/$270 = $0.521).

It is instructive to note two issues that relate to USS's cost of ammonia. First, USS's initial cost-effective calculation in its BART Report (the March 31, 2022 report in Appendix 35_D), used an ammonia cost of $0.5631/gallon, based on an ammonia concentration of 19%, which is 1/3 the cost it assumed in its Supplemental BART Report.[30] Second, according to its Title V Permit, the USS Clairton Works *produces about 50 tons of anhydrous ammonia onsite per day*, as a byproduct of its coke production, which is loaded into tanker cars for transport offsite.[31] Consequently, with this ammonia produced on site, the real cost of ammonia for use in SCR or SNCR controls for any of the Clairton Works units is undoubtedly much lower than even the

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[28] See Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, June 2019, pdf page 77.

[29] See https://www.usgs.gov/centers/national-minerals-information-center/nitrogen-statistics-and-information. See the Mineral Commodity Summary for Nitrogen for 2017.

[30] BART Report, Appendix 35_D, pdf page 33.

[31] Allegheny County Health Department, Title V Operating Permit & Federally Enforceable State Operating Permit, ACHD Permit No. 0052-OP22, expires November 20, 2027. See page 5.

$0.521/gallon used in the adjusted analysis. DEP must require that USS use its real cost of ammonia in any SCR and SNCR cost-effectiveness assessments.

5.6.7 USS Used the Wrong Value for the CEPCI

In its adaptation of EPA's Control Cost SCR model in its Supplemental BART Report, USS assumes a 2023 Chemical Engineering Plant Cost Index (CEPCI) value of 708 for 2023. The CEPCI is used to properly escalate the cost items in the control cost analyses. Because the cost items in EPA's Control Cost SCR model are based on 2016 values, the current CEPCI must be used to properly escalate those cost items to the date of the analysis. At the time of this report, contrary to the Supplemental BART report, the 2023 CEPCI value is not yet available, being typically compiled in April of the following year. Therefore, the 2022 value of 816 must be used.

5.6.8 Revised USS's Boiler No. 2 SCR Cost-Effectiveness

As described above, USS has unreasonably modified EPA's SCR Control Cost Model by increasing the calculated TCI by almost eleven times and increasing the annual electricity cost. It has also used an SCR efficiency that is too low, used an SCR equipment life that is too short, used a catalyst life that is too short, used the wrong value for the CEPCI, and used an ammonia cost that is undocumented and likely too high. Correcting these inputs as described above and using the same Control Cost SCR model results in the following cost-effectiveness figures for retrofitting the No.2 Boiler with SCR for the actual and PTE emission scenarios:[32]

Table 3. Clairton SCR PTE Cost-Effectiveness Summary

Selected Input and Outputs		
Fuel type	Natural Gas	
Retrofit factor	1	
Maximum Heat Input	481	MMBtu/hour
Higher heating value (HHV) of the fuel	627	Btu/scf
Estimated actual annual fuel consumption	6,720,191,388	scf/Year
Net plant heat input rate (NPHR)	8.2	MMBtu/MW
NOx inlet	0.37	lbs/MMBtu
NOx outlet	0.03	lbs/MMBtu
Reagent	Ammonia	
Concentration of reagent as stored	29	percent
Reagent Cost	0.521	$/gallon
Plant elevation	758	feet
Desired dollar-year	2022	
Interest rate	8.5	Percent
Equipment life	30	years

[32] See the files entitled, "Clairton Boiler 2 PTE SCR-adjusted.xlsm and Clairton Boiler 2 Actual SCR-adjusted.xlsm."

Total Capital Investment (TCI)	$12,038,701	
Direct Annual Costs (DAC)	$371,434	
Indirect Annual Costs (IDAC)	$10,513,332	
Total Annual Costs (TAC) = DAC + IDAC	$1,495,588	
NOx removed	716	tons/year
Cost-effectiveness	**$2,088**	**$/ton**

Table 4. Clairton SCR Actual Cost-Effectiveness Summary

Selected Input and Outputs		
Fuel type	Natural Gas	
Retrofit factor	1	
Maximum Heat Input	481	MMBtu/hour
Higher heating value (HHV) of the fuel	627	Btu/scf
Estimated actual annual fuel consumption	1,947,132,376	scf/Year
Net plant heat input rate (NPHR)	8.2	MMBtu/MW
NOx inlet	0.37	lb/MMBtu
NOx outlet	0.03	lb/MMBtu
Reagent	Ammonia	
Concentration of reagent as stored	29	percent
Reagent Cost	0.521	$/gallon
Plant elevation	758	feet
Desired dollar-year	2022	
Interest rate	8.5	Percent
Equipment life	30	years
Total Capital Investment (TCI)	$12,038,701	
Direct Annual Costs (DAC)	$172,506	
Indirect Annual Costs (IDAC)	$10,513,332	
Total Annual Costs (TAC) = DAC + IDAC	$1,296,660	
NOx removed	208	tons/year
Cost-effectiveness	**$6,248**	**$/ton**

In both USS's PTE emissions case and its actual emissions case, installing SCR on the No. 2 Boiler is cost-effective. It is instructive to note that these figures are in 2022 dollars. If these figures were expressed in 2010 dollars to correspond with the State's first round SIP, and when these BART determinations should have been performed, these figures would be $1,355/ton and $4,217/ton, respectively.[33] Regarding this, DEP notes the following on page 25 of its BART SIP Revision in regard to USS's inflated SCR cost-effectiveness calculations:

[33] Each would be de-escalated to 2010 dollars by multiplying between the ratio of the 2010 CEPCI/2022 CEPCI, or 550.8/816.0.

> Based on a review of the analysis, DEP agrees with the U.S. Steel conclusion that the cost effectiveness of $20,455/ton NOx removed, based on permitted PTE NOx emissions (780 TPY) and $67,788/ton NOx removed, based on actual NOx emissions (226 TPY), is not reasonable for the installation of SCR on Boiler 2. DEP's determination is based on the fact that these costs are well above the range of cost-effectiveness thresholds used for the first planning period as mentioned by NPS: Arkansas and Texas ($5,000/ton), Arizona ($4,000-$6,500/ton), Nevada ($5,000–$10,000/ton), Idaho ($6,100/ton), and Colorado and Oregon ($10,000/ton). To this end, DEP agrees and concurs with the analysis and therefore, the existing SO2, NOx, and PM10 controls and limits are determined to be BART.

Thus, by DEP's own metric of acceptability, it must require that the Clairton Works Boiler be retrofitted with SCR.

5.7 The Clairton Works SNCR Cost Analysis for Boiler No. 2 Appears Greatly Inflated and is Unacceptable

On page 2-3 of its BART Report, USS states that the flue gases from the boilers have an exhaust temperature of approximately 400°F, and even strategically placing the ammonia injection further upstream would likely result only in peak temperatures of around 1,300°F. USS concludes that such a low temperature would require that additional fuel be combusted at some point to raise the temperature to the levels where SNCR will operate effectively. DEP must require that USS document that claim.

Nevertheless, USS evaluates SNCR for Boiler No. 2. However, unlike its SCR analysis for Boiler No. 2, it does not use EPA's Control Cost SNCR spreadsheet model directly, but rather bases its analysis on the equations present in the Control Cost Manual. In this report, EPA's Control Cost SNCR spreadsheet model is used, which should yield similar results on an apples-to-apples basis.

Inputs are the same as in the SCR cases (with the same caveats and questions) except for a few areas:

- USS assumes 45% control, which starting with the same 0.37 lbs/MMBtu inlet value yields an outlet of 0.204 lbs/MMBtu. This level of control is a reasonable starting value. However, SNCR performance is highly site-specific. Should SNCR be selected as BART for any of the Clairton boilers, DEP should require that the SNCR system be optimized via performance testing. EPA has previously outlined reasonable steps for optimization of wet scrubbers in its Texas FIP that could easily be adapted for use in other cases.[34] This would include the pre-approval of an upgrade plan conducted by a third-party engineering firm, followed by the performance testing itself. Following the upgrade, the emission limit would be adjusted as necessary.

[34] See 79 FR 74885.

- USS assumes that the SNCR reagent is urea, which would require that it be separately purchased, even though as noted above USS produces large quantities of anhydrous ammonia onsite. This is unreasonable, and so ammonia at 29% concentration by weight was assumed in the analysis.

- The SNCR model requires a cost for fuel. On pdf page 92 of its BART Report, USS indicates that natural gas costs it $9.44/MMBtu. This is a reasonable price for commercial Pennsylvania delivery, according to the EIA.[35] However, USS also assumes an additional annual heating energy charge of $16,117,328. Although not discussed, it is assumed to correspond to USS's claim noted above that the exhaust must be heated to bring it up in temperature for proper SNCR operation. Again, DEP must require documentation for USS's claim that installing the typical SNCR lances in the No. 2 Boiler is not possible in a location with the temperatures ranging from 1600 – 2400°F, which corresponds to the acceptable range for SNCR operation.[36] Absent such documentation, and based on the numerous examples of successful SNCR installation on boilers, this charge was not included.

The following are summaries of the cost-effectiveness figures for retrofitting the No. 2 Boiler with SNCR for the actual and PTE emission scenarios:[37]

Table 5. Clairton SNCR PTE Cost-Effectiveness Summary

Selected Input and Outputs		
Fuel type	Natural Gas	
Retrofit factor	1	
Maximum Heat Input	481	MW
HHV	627	Btu/lb
Annual MWh output	6,720,191,388	MWh
Net Plant Heat input Rate (NPHR)	8.2	MMBtu/MW
Desired SNCR efficiency	45	Percent
NOx inlet	0.37	lb/MMBtu
NOx outlet	0.2035	lb/MMBtu
Reagent	Ammonia	
Normalized Stoichiometric Ratio (NSR)	1.75	
Plant elevation	758	feet
Desired dollar-year	2022	

[35] See https://www.eia.gov/dnav/ng/hist/n3020pa3m.htm.
[36] See Control Cost Manual, Chapter 1 Selective Noncatalytic Reduction, April 2019. Available here: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution. Page 1-9.
[37] See the files entitled, "Clairton Boiler 2 PTE SNCR-adjusted.xlsm and Clairton Boiler 2 Actual SNCR-adjusted.xlsm."

Interest rate	8.5	Percent
Equipment life	30	years
Total Capital Investment (TCI)	$4,209,656	
Direct Annual Costs (DAC)	$396,583	
Indirect Annual Costs (IDAC)	$393,813	
Total Annual Costs (TAC) = DAC + IDAC	$790,396	
NOx removed	351	tons/year
Cost-effectiveness	**$2,253**	**$/ton**

Table 6. Clairton SNCR Actual Cost-Effectiveness Summary

Selected Input and Outputs		
Fuel type	Natural Gas	
Retrofit factor	1	
Maximum Heat Input	481	MW
HHV	627	Btu/lb
Annual MWh output	1,947,132,376	MWh
Net Plant Heat input Rate (NPHR)	8.2	MMBtu/MW
Desired SNCR efficiency	45	Percent
NOx inlet	0.37	lb/MMBtu
NOx outlet	0.2035	lb/MMBtu
Reagent	Ammonia	
Normalized Stoichiometric Ratio (NSR)	1.75	
Plant elevation	758	feet
Desired dollar-year	2022	
Interest rate	8.5	Percent
Equipment life	30	years
Total Capital Investment (TCI)	$4,209,656	
Direct Annual Costs (DAC)	$159,756	
Indirect Annual Costs (IDAC)	$393,813	
Total Annual Costs (TAC) = DAC + IDAC	$553,570	
NOx removed	102	tons/year
Cost-effectiveness	**$5,447**	**$/ton**

As with the SCR BART analysis, in both USS's PTE emissions case and its actual emissions case, installing SNCR on the No. 2 Boiler is cost-effective. Again, these figures are in 2022 dollars and if they were they expressed in 2010 dollars to correspond with the State's first round SIP, these figures would be $1,521/ton and $3,677/ton, respectively.

5.8 USS Must Assess a Shared SCR Retrofit for Boilers R1 and R2

In footnote 5 of its BART Report, USS states that it "performed a cost analysis for SCR assuming either individual SCR controls for Boilers R1 and R2 or a common SCR between where the exhaust streams combine and exit the shared stack. U.S. Steel has not evaluated the technical feasibility of a shared SCR at this time based on the cost effectiveness calculation result." A summary of this shared SCR analysis appears to be contained on pdf page 63 of the BART Report. Because USS has only presented a summary, it is not possible to properly critique this analysis.

An examination of emission data obtained from DEP via Pennsylvania's Right to Know Law indicates that both Boilers R1 and R2 do indeed exhaust through Stack S36. Therefore, DEP must require that this analysis be completely and thoroughly presented, including the documentation of all inputs. In particular, USS must explain why, when it assessed the installation of SCR individually on R1 and R2, it assumed 201 hours and 1,272 hours operational times, respectively, yet when it assessed a shared SCR for these boilers it assumed a total operational time of only 737 hours.

5.9 USS Must Conduct Proper Scrubber Control Cost Analyses

On page 2-6 of its BART Report, USS summarizes its boiler control cost analyses for wet and dry scrubbers. It fails to discuss how these figures were obtained except to generally reference Appendix B. The only information in Appendix B relating to the scrubber cost analysis is a single table that appears on the last page. Again, no documentation is presented to support these figures, except the note, "Costs are based on EPA's Air Pollution Control Technology Fact Sheet - Flue Gas Desulfurization (EPA-452/F-03-034), which provides ranges for capital and O&M costs, relative to heat input capacity. Costs for FGD for the boilers were estimated using the lower end of these ranges. https://www3.epa.gov/ttncatc1/dir1/ffdg.pdf." This is unacceptable and USS must actually conduct proper control cost analyses for SO_2 control devices. USS's failure to do so is inexplicable, as it utilized the Control Cost Manual's resources to conduct SCR and SNCR control cost analyses and the Control Cost Manual similarly provides resources for conducting scrubber control cost analyses. In particular, the Control Cost Manual provides a packed bed scrubber spreadsheet calculation that appears well suited to USS's boilers.[38] Alternatively, USS could avail itself of a plethora of vendors who are willing to provide quotes for various types of scrubber systems. DEP must require that USS perform proper SO_2 cost-effectiveness calculations for these boilers, as DEP cannot reasonably assess the cost of compliance—a required BART factor, without having done so. Regardless of the type of control cost analysis selected, DEP must require that this analysis be completely and thoroughly presented, including the documentation of all inputs.

[38] See https://www.epa.gov/system/files/other-files/2023-01/wetanddryscrubbers_controlcostmanualspreadsheet_January%202023.xlsm.

5.9.1 USS Must Use a 30-Year Equipment Life for SO_2 Controls

On page 2-6 of its BART Report, USS states that a 20-year equipment life was also assumed in its scrubber analyses,[39] citing to the Control Cost Manual:

> A 20-year RUL [Remaining Useful Life] value is assumed for all sources based on engineering estimates. This is consistent with the OAQPS CCM chapter on wet and dry scrubbers, which states: "we expect an equipment life of 20 to 30 years for wet FGD systems." The CCM uses 30 years in an example for an always-on and presumably base-loaded utility boiler, but controls on industrial equipment are not expected to perform and persist in a consistent manner as for utilities. EPA recognizes this fact for other technology and the Clairton boilers, particularly R1 Boiler, R2 Boiler, T1 Boiler and T2 Boiler, are not always operating, or operating at full loads.

First, USS again fails to properly cite to the Control Cost Manual. A few sentences after USS's quote of "we expect an equipment life of 20 to 30 years for wet FGD systems," and following its cited documentation attesting to the 30-year + life of known scrubber systems, the Control Cost Manual clearly states, "[g]iven these considerations, we estimate an equipment life of 30 years as appropriate for wet FGD systems." Again, as cited to above regarding the SCR equipment life, EPA has consistently assumed a 30-year equipment life for EGU scrubber retrofits, scrubber upgrades, SCR, and SNCR installations.

Regarding its concern of intermittent usage, many EGU boilers do not operate continuously and there is no information to suggest this has an impact on their equipment lives, as USS postulates. As discussed above, unless USS (1) provides adequate documentation for a shorter equipment life, or (2) is willing to enter into an enforceable consent decree or similar instrument guaranteeing a shorter equipment life and which is incorporated into the SIP, all of the SO_2 cost estimates must be done on the basis of a 30-year life.

[39] However, on the last page of Appendix B (pdf page 131), USS appears to use a 25-year equipment life.

ATTACHMENT B

February 9, 2024

Via electronic mail ecomment@pa.gov

Jessica Shirley, Interim Acting Secretary
Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 2063
Harrisburg, PA 17105-2063

Re: **Requesting Extension of Comment Period for the Proposed Revision to the State Implementation Plan (SIP); Regional Haze BART for Pennsylvania**

Dear Ms. Shirley,

On behalf of National Parks Conservation Association, Sierra Club, Earthjustice, and the Coalition to Protect America's National Parks (the "Conservation Organizations"), we request that the Pennsylvania Department of Environmental Protection ("PADEP") grant a short extension on the public comment deadline date for the Proposed Revision to the State Implementation Plan (SIP): Regional Haze Best Available Retrofit Technology ("BART SIP") currently noticed for public comment.[1] Specifically, we ask that the current Friday, March 8, 2024, deadline for comments be extended 21 days to Friday, March 29, 2024. The Conservation Organizations further request that PADEP maintain the March 7, 2024, date for the public hearing on the Haze BART SIP and request that PADEP hold that public hearing.

Pennsylvania DEP noticed the comment period on February 3, 2024 and provided interested stakeholders with approximately one month to evaluate and provide comment regarding the BART SIP and its six appendices, totaling more than 4,700 pages of legal and technical material, not including the multiple large excel files of data found in the appendices.[2] Given the scope, volume, and complexity of this information, the Conservation Organizations believe that the current comment period is not sufficient to fully analyze the potential impacts of the proposed BART SIP and provide meaningful comment. Reviewing PADEP's legal and technical analysis, conducting any analysis of our own, and developing comments will take more time than the current comment period allows.

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[1] See SIP Supplement Public Notice: https://www.pacodeandbulletin.gov/Display/pabull?file=/secure/pabulletin/data/vol54/54-5/132.html

[2] See Haze BART SIP and appendices: https://greenport.pa.gov/elibrary/GetFolder?FolderID=1019352. Note that App'x A, Final Cheswisk ACHD Letter.PDF and Final USS Clairton ACHD Letter.PDF are not currently readable.

An extension of time will not adversely impact any other party. The current comment period does not afford the Conservation Organizations, or the general public, sufficient time to adequately and thoroughly review the BART SIP and supporting technical analyses, which we have not seen before now. A limited 21-day extension of the deadline will not prejudice any regulated entity and will not materially affect PADEP's ability to submit its SIP to the U.S. EPA within a reasonable time.

Conversely, given the scope of the proposed BART SIP and supporting technical materials, the current deadline for comments will effectively preclude the Conservation Organizations from reviewing all of the relevant material, fully analyzing those voluminous files, and providing meaningful legal and technical comments. Moreover, if finalized, the proposed Haze BART SIP may adversely affect the Conservation Organizations' interests in pollution reduction, the environment, as well the health and welfare of our members and their use and enjoyment of protected national parks and wilderness areas.

We respectfully ask that you grant our request by Friday, February 16, 2024, so that we can plan our comments most efficiently.

Respectfully submitted,

Edward Stierli
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Jesse Walker, Bureau of Regulatory Counsel, jeswalker@pa.gov

ATTACHMENT C

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 21, 2024

Via electronic mail to: cmiller@npca.org

Ms. Caitlin Miller
Associate General Counsel, Clean Air and Climate
National Parks Conservation Association

Dear Ms. Miller:

The Pennsylvania Department of Environmental Protection (Department) has received your letter dated February 9, 2024, on behalf of the National Parks Conservation Association, Sierra Club, Earthjustice, and the Coalition to Protect America's National Parks (Conservation Organizations). This letter requested a 21-day extension to the 30-day public comment period for the Proposed Revision to the Regional Haze Best Available Retrofit Technology State Implementation Plan (BART SIP) published at 54 Pa. B. 554 on February 3, 2024.

As you are likely aware, this BART SIP is past due and is required to address the U.S. Court of Appeals for the Third Circuit on September 29, 2015.*National Parks Conservation Ass'n v. EPA*, 803 F.3d 151 (3d Cir. 2015). Moreover, the BART SIP is needed before the Department can propose the Regional Haze Five-Year Progress Report SIP for the first planning period, as well as the Regional Haze Second Implementation Period SIP; both of which are past due, with the latter being under a Federal Implementation Plan (FIP) clock for this September. Since each of these actions is iterative, building upon the previous action, the Department is unable to grant your request for an extension to the public comment period.

The Department appreciates you noting that two letters in Appendix A were not readable. Thank you for bringing this to our attention; the links have been corrected.

Finally, we ask that you please clarify which location of the three scheduled hearings on March 7, 2024, you are referring to in your correspondence to provide testimony, Pittsburgh, Harrisburg or Norristown. Should you have questions regarding this submission, please contact Mr. Nick Lazor, Director of the Bureau of Air Quality, by e-mail at nlazor@pa.gov or by telephone at 717.772.3952.

Sincerely,

Jessica L Shirley

Jessica Shirley
Interim Acting Secretary

cc: Mr. Edward Stierli, National Parks Conservation Association, Estierli@npca.org
Mr. Philip Francis, Jr., Coalition to Protect America's National Parks, Editor@protectnps.org
Mr. Zachary Fabish, Sierra Club, Zachary.fabish@sierraclub.org
Mr. Charles McPhedran, Earthjustice, cmcphedran@earthjustice.org