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Attachment 15

CLEAN AIR COUNCIL

Proposed Installation Permit No. 0052-I020
U.S. Steel Mon Valley Works -- Clairton Plant (Applicant)
Clairton, Pennsylvania

Allegheny County Health Department
March 17, 2020

Written Comments of Clean Air Council

Via Email: aqpermits@alleghenycounty.us

Clean Air Council ("the Council") appreciates the opportunity to submit these comments regarding the Allegheny County Health Department's proposed Installation Permit addressing the RACT II determination for the U.S. Steel Mon Valley Works -- Clairton Plant.

The Council is a non-profit environmental health organization headquartered at 135 South 19th Street, Suite 300, Philadelphia, Pennsylvania, 19103. The Council maintains an office in Pittsburgh. The Council has been working to protect everyone's right to a clean environment for over 50 years. The Council has members throughout the Commonwealth who support its mission, including members in Allegheny County.

On Monday, February 6, 2020, the Department issued a notice of the proposed permit and set a deadline of March 10, 2020 for the public comment period. That comment period was subsequently extended to March 17, 2020.

1. **<u>The Council Appreciates the Department's Lowering the Emissions Limitations for the Boilers (B001, B002, B003, and B004) Based on Stack Test Results.</u>**

The facility's boilers are subject to emissions limitations that were set forth in a RACT Order issued nearly twenty-five years ago:

> Each of the six boilers is limited to a NO_X short term emission rate of 0.54 lbs/MMBTU, ***based on the previous 1996 RACT Order I.***

Review Memorandum dated February 10, 2020, page 9 (bold italics added for emphasis). *See* Attachment 1, RACT Order No. 234, December 30, 1996, page 4 (setting forth emission limitation of 0.54 lbs/MMBTU for all the boilers). These emissions limitations are memorialized in the current Title V permit. *See* Title V Permit, March 27, 2012, pages 241 (B001), 244 (B002), 247 (R1 and R2), and 250 (T1 and T2), https://gasp-pgh.org/wp-content/uploads/2014/05/U.-S.-Steel-Clairton-Works.pdf.

The 1996 RACT Order set forth annual emissions limitations that are also memorialized in the Title V permit. *See* Attachment 1, RACT Order No. 234, page 4; *see also* Title V Permit,

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pages 242 (annual limit of 1,740 tons/year for B001), 245 (annual limit of 1,285 tons/year for B002), 248 (annual limit of 525 tons/year for R1 and R2), and 251 (annual limit of 358 tons/year for T1 and T2).

Only one of the daily emissions limitations is less than the hourly emissions limitation predicted by simply dividing the annual emissions limitation by 4.38[1] -- and that emissions limitation is 89% of the predicted value. *See id.*, pages 242 (hourly limit of 410.40 lb/hr for B001 is 103% of the predicted hourly emissions limitation of 397.26 lb/hr). 245 (hourly limit of 259.74 lb/hr for B002 is 89% of the predicted hourly emissions limitation of 293.38 lb/hr), 248 (hourly limit of 123.66 lb/hr for R1 and R2 is 103% of the predicted hourly emissions limitation of 119.86 lb/hr), and 251 (hourly limit of 84.24 lb/hr for T1 and T2 is 103% of the predicted hourly emissions limitation of 81.74 lb/hr).

The Department states that the boilers at the facility are typically operating with NO_X emission rates ranges from 0.132 to 0.2 lbs/MMBTU -- less than half the 0.54 lbs/MMBTU emissions limitations set forth in the 1996 RACT Order:

> Continuous Emission Monitors (CEMS) have been installed on Boilers 1 and 2 for NO_X and 0_2 monitoring. ***A review of CEMS data for Boilers 1 and 2 indicates that the boilers annual average NO_X emission rates are typically half or less of the permitted limits***, ***indicating that the boilers are being operated effectively for the age, types and size of these boilers***. The most recent stack test for boilers R1, R2, T1 and T2 indicate that the NO_X emission rates ranges from 0.132 to 0.2 lbs/MMBTU.

Review Memorandum, page 9 (bold italics added for emphasis). Finally, the Department states that the level of protectiveness is some of these boilers is even better than that of natural gas fired boilers:

> All test results are based on firing COG, the primary fuel. It is assumed that emission rates would be approximately equivalent while firing natural gas. ***These NO_X emission rates for boilers R1, R2, T1 and T2 are generally lower than emission rates commonly associated with packaged natural gas fired boilers that employ low NO_X burners.***

Id. (bold italics added for emphasis). However, the Department does not include information to substantiate this assertion by referencing the RACT/BACT/LAER Clearinghouse or rates of comparable facilities. The Department should provide this information in the review memorandum, for the benefit of the public.

Given the emissions performance, the Council agrees that it is appropriate for the Department to include it in its RACT II determination for this facility and memorialize it as a permit condition.

[1] 4.38 is the factor for converting tons per year into pounds per hour.

The Council appreciates the Department's lowering the emissions limitation.

2. **<u>The Department Should Provide More Substantiation for the Proposed Emissions Limitations for the Boilers</u>.**

The Department should provide more information regarding its calculations for the proposed emissions limitations for the boilers. According to the Department, the proposed emissions limitations for Boilers 1 and 2 are "based on the 2013 annual average CEM result." Review Memorandum, page 10. In contrast, the proposed emissions limitations for Boilers R1, R2, T1, and T2 are "based on the 2012 average stack test of boiler R1 and a 20% increase for variability." *Id.* The Department does not provide the actual calculations

With respect to Boilers 1 and 2, "quarterly CEM monitoring and bi-annual stack testing required by the facility's Title V operating permit conditions shall be used to comply with the proposed RACT II limit." *Id.* Presumably, each boiler could have a different past performance, as reflected by previous CEM monitoring and stack testing, and this could dictate a unique emission limit for each boiler. But the Department apparently took the results for these two boilers for one year and calculated an average. The Department should show its calculations and provide a justification for its approach.

With respect to Boilers R1, R2, T1 and T2, the Department apparently used an average stack test for one boiler (R1) for one year (2012), and then relied upon a high percent increase of 20% for variability. Again, the Department does not show the calculations themselves or the justification for this approach. In addition, it is not clear what is meant by an "average stack test." This could mean an average of multiple trials for one test or an average of multiple tests across time. The Department should explain what this means.

To be sure, stack testing and CEMs are the most preferred and highest rated emissions factors according to this reliability graph in AP-42:

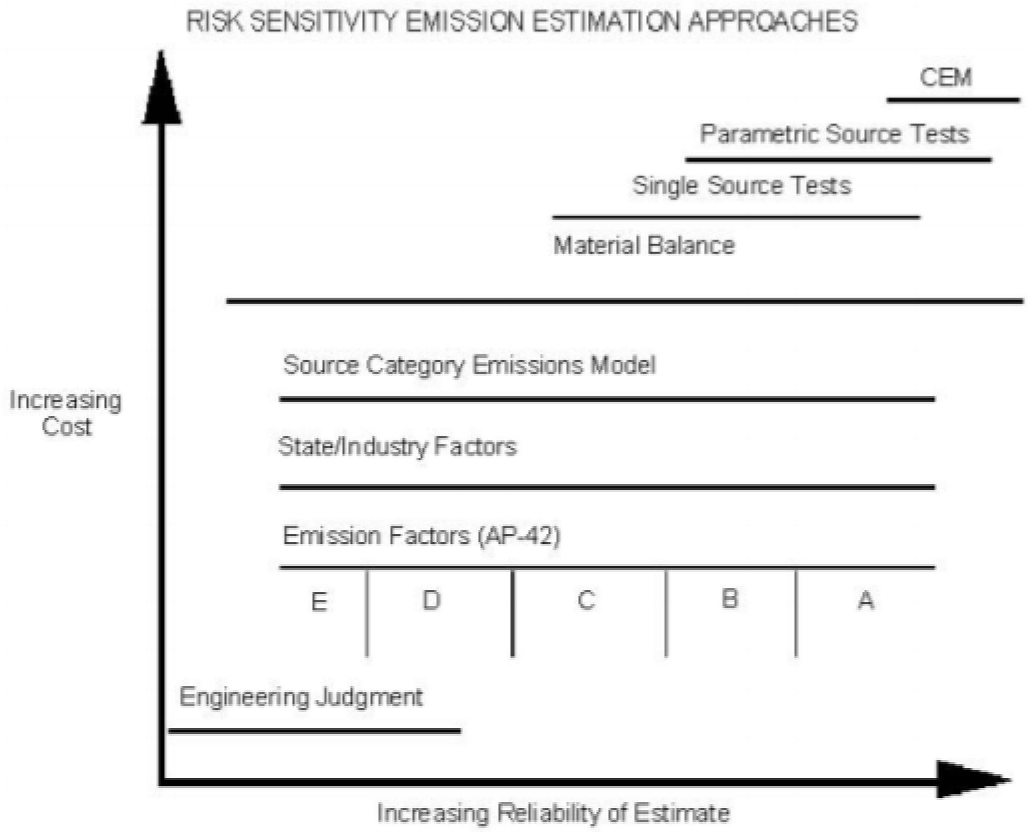

Figure 1. Approach to emission estimation.

U.S. Environmental Protection Agency, AP-42 (1995), Vol. 1, Introduction, page 4, https://www3.epa.gov/ttn/chief/ap42/c00s00.pdf.

However, AP-42 provides a caution regarding emissions variability over time, even for these sources of data:

> Data from source-specific emission tests or continuous emission monitors are usually preferred for estimating a source's emissions because those data provide the best representation of the tested source's emissions. ***However, test data from individual sources are not always available and, even then, they may not reflect the variability of actual emissions over time. Thus, emission factors are frequently the best or only method available for estimating emissions, in spite of their limitations***.

See id., page 1 (bold italics added for emphasis). Accordingly, multiple stack tests or CEM results should be used to determine these factors, from multiple timeframes.

> To assess within-source variability and the range of short-term emissions from a source, ***one needs either a number of tests performed over an extended period of time or continuous monitoring data from an individual source***. Generally, material balance data are not likely to be sufficient for assessing short-term emission variability because the accuracy of a material balance is greatly reduced for shorter time intervals. In fact, one of the advantages of a material balance approach is that it averages out all of the short-term fluctuations to provide a good long-term average.

Id., page 5 (bold italics added for emphasis).

Instead of following this recommendation, the Department used one boiler to develop emission rates for four boilers, and it used one annual average CEM result to develop emission rates for two boilers.

The Department should review and discuss more data before setting emissions limitations for these boilers.

3. <u>The Department Should Require Modeling for the Retrofit Option for the Boilers, As Contemplated in the Review Memorandum</u>.

The Department should require computer modeling for the retrofit option for the boilers, and it should include the information generated in a revised analysis of economic feasibility for this RACT II determination. In the review memorandum, the Department noted that modeling by computer simulation could be performed to actually calculate emissions reductions:

> Burner manufactures have indicated (quoted) that replacement burners would not achieve a reduction in NO_X, based upon the actual emission rates that are currently being achieved, for Boiler #2, R1, R2, T1 and T2. Boiler 1 is currently operating at or below burner manufacturer's indicated rates during ozone season. Additionally, due to the low excess air already being achieved, FGR or additional OFA will not be feasible; further suppression of excess air by these means would likely terminate the flame or pilot (which has been seen in cases like this before). Greater reduction in excess air would also lead to incomplete combustion, resulting in an increase in VOC and opacity emissions. ***In a retrofit situation, the boiler design (i.e., windbox, FD/ID fans, damper positions, burner locations, etc.) would have to be modeled by computer simulation to identify the NO_X emission rates that can be achieved through retrofitting, and whether it could actually produce lower emission rates***. Boiler/burner vendors would not quote potential emission reduction for such changes due to these

> issues. Therefore, pre-combustion controls were not reviewed further for Boilers #2, R1, R2, T1 and T2.

Id. at 9 (bold italics added for emphasis). It does not appear that the Department has required such modeling. Absent such modeling, the RACT II analysis is not complete.

4. **The Department Should Require a Leak Detection and Repair (LDAR) Plan for Fugitive Emissions of VOCs from the Coke By-Product Recovery Plant.**

Despite the existence of a gas blanketing system, there is the potential for leaks that can and should be addressed through a Leak Detection and Repair (LDAR) program -- a common control in the organic chemical manufacturing and transport industries.

The by-products recovery plant contains many valves, flanges, and points of potential leakage controlled currently by the gas blanketing system. *See* Title V Permit, page 188 (Terms and Conditions for P021, Coke By-Product Recovery Plant), page 195 (requiring 98% control for methanol storage tanks V-400 and V-410), page 200 (referencing blanketing gas in context of monitoring and inspection), page 211 (requiring records of monthly amount of natural gas received for gas blanketing system), page 214 (subjecting gas blanketing system to good engineering and air pollution practices). If implemented appropriately, even a minimal LDAR program could result in additional reductions of fugitive emissions of VOCs, due to the size and complexity of this facility.

In fact, in 2016 the Department made a determination that VOC RACT for this facility includes the following LDAR program (in addition to the continued use of a clean COG gas-blanketing system):

> The implementation of a LDAR program consistent with the corresponding standards of 40 CFR Part 61, Subpart V, codified in 40 CFR 61.242-1 through 61.247.

See Attachment 2, ERG Technical Support Document, page 69. *See* National Emission Standard for Equipment Leaks (Fugitive Emission Sources), 40 C.F.R. subpart V, https://www.law.cornell.edu/cfr/text/40/part-61/subpart-V. The Department stated that this was technically feasible. *See* Attachment 2, ERG Technical Support Document, page 68 ("it is technically feasible to implement a LDAR program that covers the BPRP [By-Product Recovery Plant] equipment."). Moreover, ERG stated that "ACHD estimated that the incremental cost-effectiveness of the implementation of a LDAR program is $6,406 per ton of VOC removed." *Id.*, page 69. This is less than $7,600, a level which the Department recognized as economically feasible in the context of a past RACT determination. *See* the Council's Comments on Proposed Permit for Neville Chemical Company, dated February 11, 2020.

Applying LDAR to this facility makes sense in terms of air quality. In a very real sense, this is a facility that manufactures chemicals. Without a discussion of a form of control that is ubiquitous in the industry, the RACT II analysis is not complete.

The Department should require the implementation of an LDAR program.

5. <u>The Department Should Require a Facility-Wide LDAR Plan for Fugitive Emissions of VOCs, Extended to the Desulfurization Plant and Control Rooms</u>.

For the reasons stated in Comment 4 above, the Department should require a facility-wide LDAR plan for all piping in service of VOCs, and that plan should extend to the Desulfurization Plant and Control Rooms.

Inspection of piping in connection with the Desulfurization Plant (as well as Control Rooms) is especially important given the catastrophic fire on December 24, 2019 that rendered that plant inoperable for over three months. According to a report in the press, this was caused by a ruptured pipe:

> ***Michael Rhoads, the plant manager at the Clairton Coke Works, said that the fire came after a pipe on the compressor ruptured***. The rupture was so significant it "sheared the bolts that held the gas piping [of the equipment] together," he told the crowd. ***"That gas piping being separated [became] the fuel source that resulted in the significant fire and the significant damage that we saw in the facility."***

Reid Frazier, The Allegheny Front, *Residents in Clairton Hear from U.S. Steel on Plant Fire, Pollution Issues* (January 23, 2019), https://www.alleghenyfront.org/residents-in-clairton-hear-from-us-steel-on-plant-fire-pollution-issues/.

A facility-wide LDAR plan should include leak detection and repair as well as other maintenance best practices to avoid leaks and other hazards. This will not only provide an air quality benefit, it will also help to protect the safety of the workplace and the community, in the aftermath of the catastrophic Christmas Eve fire.

6. <u>The Department Should Revise the Proposed Installation Permit to Include the RACT Requirements in Determinations Made by the Department in 2016</u>.

In 2016, the Department made RACT determinations for a number of emissions units at the facility. *See* Attachment 2, ERG Technical Support Document dated July 25, 2016. However, the Department does not include all those RACT requirements in the proposed installation permit. *See* Proposed Permit dated February 10, 2020, pages 20-28 (purporting to include RACT II requirements for the boilers only, but not including all RACT requirements identified for the boilers in 2016). In addition, the Department does not include all of those RACT requirements in the Title V permit, which pre-dated the 2016 RACT determination. *See* Title V Permit, March 27, 2012.

The Department should revise the proposed installation permit to include all the requirements set forth in the 2016 RACT determination.

a. Underfiring of Coke Oven Batteries

The Department made a determination that RACT for the underfiring of coke batteries B, 1, 2, 3, 13, 14, 15, 19, and 20 included an annual tune-up, among other things. *See* Attachment 2, ERG Technical Support Document, page 23. The cost of a tune-up was $161 per ton, which would clearly be cost-effective. *See id.* at 21.

b. Desulfurization Plant

The Department made a determination that RACT for the desulfurization plant included an annual tune-up, among other things. *See id.*, page 28. The cost of a tune-up was $3,200 per ton. *See id.* at 27. This is less than $7,600, a level which the Department recognized as economically feasible in the context of a past RACT determination. *See* the Council's Comments on Proposed Permit for Neville Chemical Company, dated February 11, 2020.

c. Emergency Flares

The Department made a determination that RACT for the emergency flares included a flare minimization plan, among other things. *See* Attachment 2, ERG Technical Support Document, pages 31-32. Presumably, this is cost-effective.

d. Boiler 1

The Department made a determination that RACT for Boiler 1 included an annual tune-up, among other things. *See id.*, pages 40-41. The cost of a tune-up was $60 per ton, which would clearly be cost-effective. *See id.* at 40.

In addition, ERG concluded that SCR was cost-effective at a cost of $6,000-$7,800. *See id.*, page 41, footnote a. Apparently, the Department ruled this out on the grounds of technical feasibility (with no explanation) and economic feasibility (with no supporting documentation). *See id.* This cost range overlaps with a range of cost-effectiveness identified by the Council on other recently-proposed RACT II air permits. *See* the Council's Comments on Proposed Permit for Neville Chemical Company, dated February 11, 2020.

The Department should explain why it now implies that SCR is not a technically feasible control option, whereas the 2016 technical support document says that it is technically feasible. *See* Attachment 2, ERG Technical Support Document, page 38. *See* Review Memorandum, pages 8-9.

e. Boiler 2

The Department made a determination that RACT for Boiler 2 included an annual tune-up, among other things. *See* Attachment 2, ERG Technical Support Document, pages 49-50. The cost of a tune-up was $80 per ton, which would clearly be cost-effective. *See id.* at 49.

In addition, the Department concluded that SCR was cost-effective at a cost of $5,400. *See id.* ("ACHD has determined that SCR is an economically feasible control option for Boiler 2."). The Department should explain why it now implies that SCR is not an economically feasible control option, in light of this past statement. *See* Review Memorandum, pages 8-9.

The Department should explain why it now implies that SCR is not a technically feasible control option, whereas the 2016 technical support document says that it is technically feasible. *See* Attachment 2, ERG Technical Support Document, page 46. *See* Review Memorandum, pages 8-9.

f. Boilers R1, R2, T1, T2

The Department made a determination that RACT for Boilers R1, R2, T1, T2 included an annual tune-up, among other things. *See* Attachment 2, ERG Technical Support Document, pages 58-59. The cost of a tune-up was $200 per ton (R1 and R2) and $300 per ton (T1 and T2), which would clearly be cost-effective. *See id.* at 58.

For RI and R2, the Department concluded that SCR cost $5,400 per ton. *Id.* For TI and T2, Department concluded that SCR cost $6,000 per ton. *Id.* ERG stated that "ACHD has determined that SCR is an economically feasible control option for Boilers R1 and R2." *Id.* However, ERG stated that "ACHD has determined that SCR is not an economically feasible control option for Boilers T1 and T2." *Id.* The Department should explain why it now implies that SCR is not an economically feasible control option for Boilers R1 and R2, in light of its past statement in 2016. *See* Review Memorandum, pages 8-9.

The Department should explain why it now implies that SCR is not a technically feasible control option, whereas the 2016 technical support document says that it is technically feasible. *See id.*, page 56. *See* Review Memorandum, pages 8-9.

Thank you for your consideration of the comments of the Council.

Sincerely,

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Christopher D. Ahlers, Esq.
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Attachment 1

ALLEGHENY COUNTY HEALTH DEPARTMENT

IN RE:

U.S. Steel Clairton Works	)	**PLAN APPROVAL ORDER**
400 State Street	)	**AND AGREEMENT No. 234**
Clairton, PA 15025	)	**UPON CONSENT**
	)	

AND NOW, this 30th. day of December, 1996,

WHEREAS, the Allegheny County Health Department, (hereafter referred to as "Department"), has determined that the United States Steel hereafter referred to as "USS"), Clairton, PA, Allegheny County, as the operator and the owner of a coking facility at 400 State Street, Clairton PA, 15025 (hereafter referred to as "the facility"), is a major stationary source of oxides of nitrogen volatile organic compounds, (hereafter referred to as "NO_x" and "VOCs") emissions as defined in Section 2101.20 of Article XXI, Rules and Regulations of the Allegheny County Health Department, Air Pollution Control (hereafter referred to as "Article XXI"); and

WHEREAS, the Department has determined that Section 2105.06.a. of Article XXI, entitled "Major NO_x & VOCs" is applicable to USS's operations; and

WHEREAS, USS has been in full compliance at all relevant times with all relevant requirements of Section 2105.06 of Article XXI; and

WHEREAS, USS has timely submitted to the Department all of the documents required by Section 2105.06.b of Article XXI (hereafter collectively referred to as "the Proposal"); and

WHEREAS, the Department has determined, after review, that the Proposal is complete; and

WHEREAS, the Department has further determined, after review, that the Proposal, constitutes Reasonably Available Control Technology (hereafter referred to as "RACT") for control of NO_x and VOC emissions from the facility; and

WHEREAS, the Department and USS desire to make enforceble the details of the Proposal by entry of this RACT Plan Approval Order and Agreement Upon Consent; and

WHEREAS, pursuant to Section 2109.03 of Article XXI, the Director of the Allegheny County Health Department or his designated representative may issue such orders as are necessary to aid in the enforcement of the provisions of Article XXI, notwithstanding the absence of any violation of any provision of Article XXI and of any condition causing, contributing to, or creating danger of air pollution;

NOW, THEREFORE, this day first written above, the Department, pursuant to Section 2109.03 of Article XXI, and upon agreement of the parties as hereinafter set forth, hereby issues the following RACT Plan Approval Order and Agreement upon Consent.

I. <u>ORDER</u>

1.1. The following process equipment shall be properly maintained and operated according to good engineering and air pollution control practices at all times:

A. Coke Batteries No. 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, 20 and battery B

B. Pushing Emission Control System for the batteries specified in A. above.

C. Boilers No. 1, 2, 13, 14, R1, R2, T1 and T2

D. By-Products Plant Clean Coke Oven Gas Blanketing System and all process units blanketed by this system

E. Scot Plant Incinerator

F. Wastewater Treatment Plant

1.2. Boilers no. 1, 2, 13, 14, R1, R2, T1 and T2 shall not, at any time, exceed the following NO_x emission limitations:

Boiler:	Lbs/MMBTU:	Tons/Year:
No. 1	0.54	1,740
No. 2	0.54	1,285
No. 13	0.54	282
No. 14	0.54	282
R1	0.54	525
R2	0.54	525
T1	0.54	358
T2	0.54	358

1.3. The facility shall determine initial compliance with the NO_x Lbs/MMBTU emission limitations specified in paragraph 1.2 above for boilers no. 13, 14, R1, R2 T1 and T2 by NO_x emission testing. Such testing shall be performed every two years and conducted according to U. S. EPA approved test methods and Section 2108.02 of article XXI.

1.4. Boilers no. 1 and 2 at the facility shall have properly maintained and operated Continuous Monitoring Systems or approved alternatives (hereafter referred to as "CEM"), meeting all requirements of Section 2108.03 of Article XXI at all times with the exception of emergency or planned outages, repairs or maintenance.

1.5. The NO_x emission limitations for boilers no. 1 and 2, specified in paragraph 1.2 above, shall be determined by a thirty day rolling average and by an twelve month rolling average of CEM data for the Lbs/MMBTU and Tons/Yr emission limitation respectively.

1.6 At no time shall the facility operate the By-products plant unless the clean coke oven gas blanketing system is being properly maintained and operated at all times while the plant process units blanketed by the system are emitting VOCs, with the exception of emergency or planned outages, repairs or maintenance. All VOC emissions processed by the blanketing system shall be incinerated by combustion in the facility's coke batteries or boilers or by downstream consumers.

1.7. The facility shall maintain all appropriate records to demonstrate compliance with the requirements of Section 2105.06 of Article XXI and Order No. 234. Such records shall provide sufficient data and calculations to clearly demonstrate that all requirements of this section are being met.

1.8. The facility shall retain all records required by both §2105.06 of Article XXI and Order No. 234 for at least two years and they shall be made available to the Department upon request.

II. AGREEMENT

The foregoing Order shall be enforced in accordance with and is subject to the following agreement of the parties, to wit:

2.1. The contents of this Order shall be submitted to the U.S. Environmental Protection Agency as a revision to the Commonwealth of Pennsylvania's State Implementation Plan (hereafter referred to as "SIP").

2.2. Failure to comply with any portion of this Order or Agreement is a violation of Article XXI that may subject USS to civil proceedings, including injunctive relief, by the Department.

2.3. This Order does not, in any way, preclude, limit or otherwise affect any other remedies available to the Department for violations of this Order or of Article XXI, including, but not limited to, actions to require the installation of additional pollution control equipment and the implementation of additional corrective operating practices.

2.4. USS hereby consents to the foregoing Order and hereby knowingly waives all rights to appeal said Order, and the undersigned represents that he is authorized to consent to the Order and to enter into this Agreement on behalf of USS.

2.5. USS acknowledges and understands that the purpose of this Agreement is to establish RACT for the control of emissions of NO_x and VOCs from this facility. USS further acknowledges and understands the possibility that the U.S. EPA may decide to not accept the Agreement portion of the Plan Approval Order and Agreement by Consent as a revision to the Commonwealth of Pennsylvania's SIP.

IN WITNESS WHEREOF, and intending to be legally bound, the parties hereby consent to all of the terms and conditions of the foregoing Order and Agreement as of the date of the above written.

USX CORPORATION, U.S. STEEL GROUP

By: ______________________

(signature)

Print or type Name: Thomas W. Gattke

Title: Gen'l Mgr - Coking Opns

Date: 12/16/96

ALLEGHENY COUNTY HEALTH DEPARTMENT

By: Bruce Dixon 12/30/96

Bruce W. Dixon, M.D., Director
Allegheny County Health Department

and By: Thomas J. Puzniak

Thomas J. Puzniak, Engineering Manager
Air Quality Program

Attachment 2

Allegheny County Health Department

Technical Support Document (TSD) - REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT) DETERMINATION

July 25, 2016

Source Information

Source Name:	United States Steel Corporation - Mon Valley Works Clairton Plant
Source Location:	400 State Street, Clairton, PA 15025-1855
Mailing Address:	400 State Street, Clairton, PA 15025-1855
County:	Allegheny
SIC Code:	3312
Part 70 Permit No.:	0052
Major Source:	NOx and VOC
Permit Reviewer:	ERG/BS

The Allegheny County Health Department (ACHD) has performed the following RACT analyses for United States Steel Corporation - Mon Valley Works, Clairton Plant ("Clairton") relating to its by-product recovery coke plant and ancillary operations.

Background

Allegheny County was designated marginal nonattainment for the 2008 8-hour ozone on April 30, 2012 (published in 77 FR 30160, May 21, 2012). In order to implement the 2008 NAAQS for ozone, EPA issued a proposed rulemaking in June 2013 to provide steps and standards for states to develop and submit certain materials, dependent on each state's attainment status. Although Allegheny County is designated marginal nonattainment, Pennsylvania is also a part of the Ozone Transport Region (OTR), which must meet more stringent requirements, including submitting a RACT SIP (State Implementation Plan) for EPA approval. As such, Allegheny County must re-evaluate the NOx and VOC RACT in the existing RACT SIP for the eight-hour ozone NAAQS.

ACHD requested all major sources of NOx (potential emissions of 100 tons per year or greater) and all major sources of VOC (potential emissions of 50 tons per year or greater) to reevaluate NOx and/or VOC RACT for incorporation into Allegheny County's portion of the PA SIP. This document is the result of ACHD's review of the RACT re-evaluations submitted by the subject source and supplemented with additional information as needed by ACHD.

RACT Summary

NOx and VOC RACT evaluations were conducted for several emission units at Clairton. A summary of the corresponding RACT determinations is presented in the following tables:

Table 1. NOx RACT Findings for Clairton[a]

Unit/Operation	RACT determination	NOx Potential To Emit (ton/yr)	
		Before RACT	After RACT
Underfiring from Batteries 1-3, 13-15, 19, 20, B	Lower Permit Limits Based on Records; Annual Tune-ups	5,628	3,513[b]
Desulfurization Plant	Annual Tune-ups, continued operation as permitted	31.5	4.60[c]
Emergency Flares	Continued operation as permitted	19.03[d]	19.03
Boiler 1	Annual tune-up and continue to meet permit conditions	1,740	1,740
Boiler 2	Installation of SCR, annual tune-up, and continue to meet permit conditions	1,285	133
Boilers R1 and R2 (each)	Installation of SCR, annual tune-up, and continue to meet permit conditions	525	54
Boilers T1 and T2 (each)[e]	Annual tune-up and continue to meet permit conditions	358	358

[a] LNB/ULNB at lower permit limits may also be an option. LNB/ULNB at existing permit limits results in a performance no better than that received from CEMS and stack testing. (By Doug Oleniacz)
[b] No reduction in PTE for permit since these reductions are based on tune-ups-(By Doug Oleniacz)
[c] Uses information from November 2015 stack testing. See RACT Section A of this TSD for further information. (By Doug Oleniacz)
[d] TVOP Page 253-(By Doug Oleniacz)
[e]See RACT analysis for an explanation (Bob Sidner)

Table 2. VOC RACT Findings for Clairton

Unit/Operation	RACT determination	VOC Potential To Emit (ton/yr)	
		Before RACT	After RACT
Underfiring from Batteries 1-3, 13-15, 19, 20, B	Continued operation as permitted	314[a]	314
By-Products Recovery Plant	Clean COG gas-blanketing system and LDAR program	124	2.4
Desulfurization Plant	Incineration as permitted	398	5.78[b]

[a]Worksheet "Table A-4a Underfire Stacks" of X:\Public Health Programs\Air Quality\AQ Common\AQ Documents\u\us steel clairton\permits\operating permits\draft\clairton - tvcalcs – draft.xlsx: 28 + 28 + 28 + 29.5 + 29.5 + 29.5 + 54.2 + 54.2 + 80.6 = 361.4 tpy (PTE from 2014 US Steel Clairton RACT submittal is 314.3 tpy.)

[b]See RACT analysis for an explanation [Bob Sidner)

Note that the proposed PA presumptive RACT, as currently written, does not address the COG emission units covered by these RACT evaluations/determinations. Even though several of these combustion units use natural gas as a backup fuel, the natural gas usage is much less than the COG usage[1]. Since the natural gas usage is so low relative to the COG usage, the PA Presumptive RACT limits for natural gas usage were not included in this RACT.

[1][2009-2014 emissions inventory records show natural gas usage is less than 10% of the COG usage].

RACT Evaluations

RACT is "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility." (44 FR 53761, 9/17/1979)

ACHD provided the following guidance to the major sources of NOx and VOC in Allegheny County for performing the RACT analyses:

1. The analysis shall address all reasonably possible controls of VOCs and NOx including changes in operation and work practices.

2. All control technology that is found to be technically infeasible must be accompanied by detailed and documented reason(s) as to why the technology is not feasible. General statements about the non-applicability of control technology to your industry will not be sufficient.

3. All changes in operation and work practices that are found not to be feasible require the same documentation as the controls in step #2 above.

4. All feasible control technology, changes in operation, work practices, etc. that are found to be cost prohibitive require a cost analysis demonstrating the cost per ton of pollutant controlled.

5. The analysis shall be done according to the procedures in EPA's OAQPS Cost Manual, EPA's cost spreadsheets are recommended where applicable.[1]

6. All data used in cost estimates, such as exhaust flow rates or the amount of ductwork used need proper documentation. If vendor quotes are used in the analysis for equipment costs, they are required to be supplied. Old analyses increased for inflation will not be acceptable. VATAVUK Air Pollution Control Cost Indexes shall be used with the aforementioned cost spreadsheets.

Each RACT analysis section is organized by the following 4 steps, which incorporate the guidance elements provided by Allegheny:

Step 1 – Identify Control Options (guidance element 1)
Step 2 – Eliminate Technically Infeasible Control Options (guidance elements 2 and 3)
Step 3 – Evaluate Control Options, including costs and emission reductions (guidance elements 4, 5, and 6)
Step 4 – Select RACT (guidance element 1)

[1] Available at: http://www.epa.gov/ttnecas1/costmodels.html

Source/Process Description

Clairton is the largest by-products coke plant in North America. It operates 9 coke batteries and produces (daily) approximately 10,000 tons of coke and 215 million cubic feet of coke oven gas (COG) from the destructive distillation (carbonization) of more than 16,000 tons of coal. The volatile products contained in the COG are recovered in the by-products plant. In addition to the COG, daily production of these by-products include 145,000 gallons of crude coal tar, 55,000 gallons of light oil, 35 tons of elemental sulfur, and 50 tons of anhydrous ammonia.

Clairton is located approximately 20 miles south of Pittsburgh on 392 acres along 3.3 miles of the west bank of the Monongahela River. The plant was built by St Clair Steel Company in 1901 and bought by U.S. Steel in 1904. The first coke batteries were built in 1918. The coke produced is used in the blast furnace operations in the production of molten iron for steel making.

Clairton is a major source of both NOx and VOC emissions.

Diagrams of the plant's operations are included in Clairton's Title V permit (issued March 27, 2012). A detailed description of the metallurgical coke production process with by-product recovery, including the nature and extent of air pollutant emissions is available in EPA's "Emission Factor Determination for AP-42 Section 12.2, Coke Production, Final Report" (May 2008).[2]

Producing coke in this manner generates large quantities of COG, which is used as fuel for the coke batteries (referred to as underfiring) and six boilers. Like natural gas, COG is a combustible gas with a high enough heating value to be used as fuel. However, unlike natural gas, the major combustible component of COG is hydrogen gas. In addition, COG has a heating value of about one-half that of natural gas.

Detailed descriptions of the emissions units for which a RACT evaluation was completed are provided in the following sections.

Source RACT History

In 1993, Clairton performed a RACT analysis as part of the 1-hour ozone standard requirements pursuant to Article XXI, Section 2105.06. A second RACT analysis was conducted in 2006 in response to the creation of the 8-hour ozone NAAQS.

Facility Changes since the 1993 and 2006 RACT Analyses

Over the past 15 years, U.S. Steel has undertaken a project to maximize the consumption and use of COG at Clairton. As a result, the amount of natural gas consumed by Clairton combustion units, actual NOx emissions, and fossil fuel usage for the combination of U.S. Steel facilities (Clairton, Edgar Thomson and Irvin) have been reduced.

Since completion of the 2006 RACT evaluations, the following changes have taken place at Clairton:

- Boiler 1 has been modified such that it can no longer combust coal and fuel oil.

- In 2008, a new coke battery (Battery C) was installed and replaced existing Batteries 7, 8 and 9. Battery C contains the latest emission control technology and emits less air pollution per ton of coke produced than the Batteries 7, 8, and 9. Battery C consists of 84 ovens

[2] Available at http://www.epa.gov/ttnchie1/ap42/ch12/bgdocs/b12s02_may08.pdf. Accessed December 2014.

which have a design production rate of 36.8 tons of coal charged per oven for a design coking time of 18 hours to produce 24.7 tons of blast furnace coke per oven. Battery C has a PROven (Pressure Regulated Oven) system, developed by Uhde Corporation with staged air combustion. Coke produced from Battery C is sent to a new coke screening station for rail car loading and offsite transport.

- In 2008, a Battery C Quench Tower was installed (IP 0052-I011). This tower and new settling basin are designed with a state-of-the-art Kiro-Nathaus baffle system to control particulate emissions - a first of its kind to be installed in the United States.

In 2013, two new quench towers (designated 5A and 7A-IP 0052-I014a) were installed. These towers and new settling basin are designed with a state-of-the-art Kiro-Nathaus baffle system to control particulate emissions.

Tables 3 and 4 provide a list of emissions units at the source that emit NOx and VOC, respectively. Detailed descriptions of the emissions units for which a RACT evaluation was completed are provided in the following sections.

RACT Analyses in this Document

The production of coke and coke by-products from a coke by-products recovery plant, like the Clairton plant, is comprised of numerous complex metallurgical and chemical processing systems. While by-product coke batteries are fundamentally designed and operated in a similar manner, each is unique. Those design and operating differences are the reason why coal processing rates, coke production rates, and the nature and extent of generated by-products vary considerably from plant-to-plant. For this reason, a comprehensive investigation and assessment of coke production operations was completed, and the RACT evaluations contained in this document are primarily based on the following resources:

- EPA's Alternative Control Techniques Document - NOx emissions from Iron and Steel Mills[3]
- EPA's Alternative Control Techniques Document - NOx emissions from Industrial/Commercial/Institutional Boilers[4]
- EPA's Compilation of Air Pollutant Emission Factors ("AP42")[5]
- EPA's Air Pollution Control Technology Fact Sheets[6]
- RTI International report to the EPA OAQPS titled "Evaluation of PM2.5 Emissions and Controls at Two Michigan Steel Mills and a Coke Battery" (dated February 7, 2006)[7]
- Midwest Regional Planning Organization report titled "Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (dated March 30, 2005)[8]
- RACT Revision Request for ArcelorMittal Monessen LLC (dated July 10, 2012)[9]
- Rule and Implementation Information for Coke Ovens: Pushing, Quenching and Battery Stacks (codified in 40 CFR Part 63, Subpart CCCCC)[10]

[3] Available at http://www.epa.gov/ttn/catc/dir1/iron_act.pdf. Accessed December, 2014.
[4] Available at http://www.epa.gov/ttncatc1/dir1/icboiler.pdf. Accessed December, 2014.
[5] Available at http://www.epa.gov/ttn/chief/ap42/ch12/final/c12s02_may08.pdf. Accessed December, 2014.
[6] Available at http://www.epa.gov/ttncatc1/products.html. Accessed December, 2014.
[7] Available at http://www.epa.gov/pm/measures/detroit_steel_report_final_20060207.pdf. Accessed December, 2014.
[8] Available at http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed December, 2014.
[9] Available at http://www.dep.state.pa.us/dep/deputate/airwaste/aq/plans/plans/general/13_ArcelorMittal_RACT_Revsion_Request_2012.pdf. Accessed December, 2014.
[10] Available at http://www.epa.gov/ttn/atw/coke2/coke2pg.html. Accessed November, 2014.

- Economic Impact Analysis of Final Coke Ovens NESHAP - Final Report (dated September 2002)[11]

In general, two categories of NOx emission reduction techniques were considered during the RACT evaluation process: those designed to minimize NOx generation (aka "pollution prevention"), and those designed to reduce the amount of air pollution emitted to the atmosphere by capturing and/or destroying a portion of emissions generated (aka "add-on pollution control"). Low-NOx burners and flue gas recirculation are examples of the first category, while selective catalytic reduction and thermal oxidation are examples of the second.

Table 3 lists the emissions units at Clairton with a NOx PTE, and Table 4 lists the emissions units at Clairton with a VOC PTE. A RACT evaluation has been completed for each emissions unit/operation designated with a "Yes" in the 'RACT' column. The remaining sections of this document include the respective evaluations.

Note: As indicated by Tables 3 and 4, ACHD has determined that it is not necessary to conduct a RACT evaluation for a number of emission units/operations. More specifically:

- <u>NOx and VOC RACT for Battery C:</u> Permitted in 2008 as BACT for NOx and VOC, Battery C has been designed to minimize emissions to the greatest practical extent. (The NOx and VOC emissions from Battery C are typically less than 20 percent of the corresponding emissions from any other battery at Clairton.)
    - Battery C is designed with a "PROven" (Pressure Regulated Oven) system. Developed by Uhde Corporation, the PROven system utilizes staged air combustion as a NOx pollution prevention measure. This system also regulates pressure within each oven chamber where the collector main operates under a negative pressure during coking in order to significantly reduce fugitive emissions from the ovens during charging and coking. This design was determined to be BACT for NOx and VOC in 2008.
    - Battery C is equipped with an emergency flare, determined to be VOC BACT in 2008.
    - The Battery C Quench Tower is designed as a wet-quenching system with Kiro-Nathaus chevron-style baffles and was determined to be VOC BACT in 2008.

- <u>VOC RACT for the Pushing and Quenching operations of Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20:</u> VOC emissions from these processes are already minimized through compliance with the requirements of 40 CFR Part 63, Subpart CCCCC (National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coke Ovens: Pushing, Quenching and Battery Stacks). The provisions of the NESHAP (finalized in 2003 and last amended in August 2006) to which Clairton is subject, constitute Maximum Achievable Control Technology (MACT). By definition, MACT, while designed to reduce volatile HAPs (which includes organic compounds and VOC) in this case, is at least as stringent as RACT.

  Additionally, in 2013, VOC RACT was determined for the pushing and quenching operations at Shenango Incorporated to be good engineering and air pollution control practices. Shenango operates a by-products recovery coke battery located in Allegheny County.

- <u>Light Oil Barge Loading System:</u> This system is equipped with a vapor recovery system that captures VOC emissions released during the transfer of light oil. Collected VOC are directed to the plant COG handling system. The VOC PTE of the system is less than 1.0 ton/yr and reported actual emissions are negligible. As a result, VOC RACT for the loading system has been determined to be the continued use of the vapor recovery system.

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[11] Available at http://www.epa.gov/ttnecas1/regdata/EIAs/CokeEIA_Final.pdf. Accessed December, 2014.

- VOC RACT for Boilers No. 1, 2, R1, R2, T1 and T2: Each unit currently combusts COG/natural gas and is required to be operated and maintained according to good engineering and air pollution control practices at all times. These operating and maintenance requirements were determined to be BACT for VOC in 2013 at Shenango Incorporated for its COG and natural gas fired boilers. As a result, the aforementioned BACT has been selected as VOC RACT for Clairton's boilers because RACT (by design) is less stringent than BACT, and the BACT determination was made recently.

- Miscellaneous methanol usage: Methanol is used in three ways at Clairton. First, it is injected into compressed air lines during the winter months to prevent condensate from freezing. Second, it is added to battery sealing material during winter months to prevent freezing. Finally, it is also used to wash the cryogenic process vessel packing (i.e. quartzite stones) in preparation for maintenance or turnaround activities. These activities are classified as trivial and result in fugitive VOC emissions at numerous emission points throughout the source. According to Clairton, vendors and other steel industry operators have indicated that there are no suitable material substitutions for methanol in this capacity.

- NOx and VOC RACT for all other equipment (e.g. battery charging, battery traveling hot car, battery soaking, unspecified fugitives etc.): This decision was made based on the relatively low potential emissions from these units/operations and the understanding that is it extremely unlikely that any additional controls would be technically or economically feasible.

The RACT evaluations included in this document are:

A. RACT for NOx – Underfiring of Coke Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20
B. RACT for NOx – Desulfurization Plant
C. RACT for NOx – Emergency Flares
D. RACT for NOx – Boiler 1
E. RACT for NOx – Boiler 2
F. RACT for NOx – Boilers R1, R2, T1 and T2
G. RACT for VOC – Underfiring of Coke Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20
H. RACT for VOC – By-Products Recovery Plant
I. RACT for VOC – Desulfurization Plant

Table 3 - Emission Units with a NOx PTE at Clairton[5]

Unit ID	Emissions Unit	Capacity #	Capacity Units	NOx PTE (tpy)	NOx Actuals (tpy)^^	NOx RACT
P001-P003	Underfiring from Coke Batteries 1-3	517,935	tpy coal (per battery)	1647.9	504	**yes**
P007-P009	Underfiring from Coke Batteries 13-15	545,675	tpy coal (per battery)	922.5	345	**yes**
P010, P011	Underfiring from Coke Batteries 19 and 20	1,002,290	tpy coal (per battery)	2237	1274	**yes**
P012	Underfiring from Coke Battery B	1,491,025	tpy coal (per battery)	820	362	**yes**
P046	Underfiring from Coke Battery C (1)	1,005,528	tpy coal (per battery)	461	17	no
P001-P003	Pushing from Coke Batteries 1-3	517,935	tpy coal (per battery)	NQ	16	no
P007-P009	Pushing from Coke Batteries 13-15	545,675	tpy coal (per battery)	NQ	21	no
P010, P011	Pushing from Coke Batteries 19 and 20	1,002,290	tpy coal (per battery)	NQ	24	no
P012	Pushing from Coke Battery B	1,491,025	tpy coal (per battery)	NQ	11	no
P046	Pushing from Coke Battery C	1,005,528	tpy coke (per battery)	NQ	1.6	no
P001-P003	Traveling hot car from Coke Batteries 1-3	420,822	tpy coke (per battery)	NQ	<0.1	no
P007-P009	Traveling hot car from Coke Batteries 13-15	443,361	tpy coke (per battery)	NQ	<0.1	no
P010, P011	Traveling hot car from Coke Batteries 19 and 20	814,361	tpy coke (per battery)	NQ	<0.1	no
P012	Traveling hot car from Coke Battery B	1,216,333	tpy coke (per battery)	NQ	<0.1	no
P046	Traveling hot car from Coke Battery C	816,992	tpy coke (per battery)	NQ	<0.1	no

Table 3 - Emission Units with a NOx PTE at Clairton (continued)

Unit ID	Emissions Unit	Capacity #	Capacity Units	NOx PTE (tpy)	NOx Actuals (tpy)^^	NOx RACT
P001-P003	Soaking from Coke Batteries 1-3	420,822	tpy coke (per battery)	NQ	<0.1	no
P007-P009	Soaking from Coke Batteries 13-15	443,361	tpy coke (per battery)	NQ	<0.1	no
P010, P011	Soaking from Coke Batteries 19 and 20	814,361	tpy coke (per battery)	NQ	<0.1	no
P012	Soaking from Coke Battery B	1,216,333	tpy coke (per battery)	NQ	<0.1	no
P046	Soaking from Coke Battery C	816,992	tpy coke (per battery)	NQ	<0.1	no
P019	Desulfurization plant (incinerator) (2)	6,394,800	tpy coke	31.5	1.0	**yes**
B001	Boiler No. 1 (Babcock & Wilcox) (3)	760	MMBtu/hr (COG and NG)	1740	522.89	**yes**
B002	Boiler No. 2 (Combusting Engineering) (4)	481	MMBtu/hr (COG and NG)	1285	188.8	**yes**
B005	Boiler R1 (Riley Stoker) (4)	229	MMBtu/hr (COG and NG)	525	11.54	**yes**
B006	Boiler R2 (Riley Stoker) (4)	229	MMBtu/hr (COG and NG)	525	10.58	**yes**
B007	Boiler T1 (Erie City Zurn) (4)	156	MMBtu/hr (COG and NG)	358	11.5	**yes**
B008	Boiler T2 (Erie City Zurn) (4)	156	MMBtu/hr (COG and NG)	358	10.34	**yes**
-	Emergency Flares	varies	MMBtu/hr	19	8.67	**yes**
-	Misc. portable/seasonal space heaters	varies	MMBtu/hr (total)	NQ	NQ	no

^^ Actual emissions reported in 2012.

(1) Permitted in 2008. Designed with staged air combustion for NOx control.
(2) Desulfurization plant incinerator uses oxygen firing and FGR for NOx control.
(3) Uses fuel staging and low excess air for NOx control.
(4) Uses low excess air for NOx control.
(5) From US Steel 2014 RACT Submittal. Facility May want to lower permit limits if there is a large difference between potentials and actuals

Table 4 - Emission Units with a VOC PTE at Clairton[5]

Unit ID	Emissions Unit	Capacity		VOC Control	VOC PTE	VOC Actuals	VOC RACT
		#	Units		(ton/yr)	(ton/yr)^^	
P001-P003	Underfiring from Coke Batteries 1-3	517,935	tpy coal (per battery)	-	72.9	1.98	yes
P007-P009	Underfiring from Coke Batteries 13-15	545,675	tpy coal (per battery)	-	77.1	1.37	
P010, P011	Underfiring from Coke Batteries 19 and 20	1,002,290	tpy coal (per battery)	-	94	41.85	
P012	Underfiring from Coke Battery B	1,491,025	tpy coal (per battery)	-	70	1.3	
P046	Underfiring from Coke Battery C ^	1,005,528	tpy coal (per battery)	-	5.0	0.19	no
P001-P003	Charging (and associated leaks) from Coke Batteries 1-3	517,935	tpy coal (per battery)	-	NQ	0.36*	no
P007-P009	Charging (and associated leaks) from Coke Batteries 13-15	545,675	tpy coal (per battery)	-	NQ	0.37*	
P010, P011	Charging (and associated leaks) from Coke Batteries 19 and 20	1,002,290	tpy coal (per battery)	-	NQ	0.42*	
P012	Charging (and associated leaks) from Coke Battery B	1,491,025	tpy coal (per battery)	-	NQ	0.22*	
P046	Charging (and associated leaks) from Coke Battery C ^	1,005,528	tpy coal (per battery)	-	NQ	<0.1	

Table 4 - Emission Units with a VOC PTE at Clairton (continued)

Unit ID	Emissions Unit	Capacity		VOC Control	VOC PTE	VOC Actuals	VOC RACT
		#	Units		(ton/yr)	(ton/yr)^^	
P001-P003	Pushing from Coke Batteries 1-3	420,822	tpy coke (per battery)	-	NQ	1.36	no
P007-P009	Pushing from Coke Batteries 13-15	443,361	tpy coke (per battery)	-	NQ	0.9	
P010, P011	Pushing from Coke Batteries 19 and 20	814,361	tpy coke (per battery)	-	NQ	1.0	
P012	Pushing from Coke Battery B	1,216,333	tpy coke (per battery)	-	NQ	2.7	
P046	Pushing from Coke Battery C ^	816,992	tpy coke (per battery)	-	NQ	1.5	
P001-P003	Traveling hot car from Coke Batteries 1-3	420,822	tpy coke (per battery)	-	NQ	0.13*	no
P007-P009	Traveling hot car from Coke Batteries 13-15	443,361	tpy coke (per battery)	-	NQ	0.08*	
P010, P011	Traveling hot car from Coke Batteries 19 and 20	814,361	tpy coke (per battery)	-	NQ	0.07*	
P012	Traveling hot car from Coke Battery B	1,216,333	tpy coke (per battery)	-	NQ	0.0*	
P046	Traveling hot car from Coke Battery C ^	816,992	tpy coke (per battery)	-	NQ	0.09*	
P001-P003	Soaking from Coke Batteries 1-3	420,822	tpy coke (per battery)	-	NQ	0.93*	no
P007-P009	Soaking from Coke Batteries 13-15	443,361	tpy coke (per battery)	-	NQ	0.81*	
P010, P011	Soaking from Coke Batteries 19 and 20	814,361	tpy coke (per battery)	-	NQ	1.04*	
P012	Soaking from Coke Battery B	1,216,333	tpy coke (per battery)	-	NQ	0.49*	
P046	Soaking from Coke Battery C ^	816,992	tpy coke (per battery)	-	NQ	0.25*	

Table 4 - Emission Units with a VOC PTE at Clairton (continued)

Emissions Unit	Capacity		VOC Control	VOC PTE	VOC Actuals	VOC RACT
	#	Units		(ton/yr)	(ton/yr)^^	
Quench Tower No. 1	1,553,805	tpy coal	-	NQ	5.42*	no
Quench Tower No. 5	1,637,025	tpy coal	-	NQ	6.15*	
Quench Tower No. 6 (Alternate)	1,637,025	tpy coal	-	NQ	0.0*	
Quench Tower No. 7	2,004,580	tpy coal	-	NQ	9.2*	
Quench Tower No. 8 (Alternate)	2,004,580	tpy coal	-	NQ	0.0*	
Quench Tower No. B	1,491,025	tpy coal	-	NQ	13.8*	
Quench Tower No. C ^	?	tpy coal	-	NQ	10.2*	
Quench Tower No. 5A ^	?	tpy coal	-	NQ	0.002*	
Quench Tower No. 7A ^	?	tpy coal	-	NQ	0.004*	
Unspecified fugitives from Coke Batteries 1-3	-	-	-	NQ	8.4	no
Unspecified fugitives from Coke Batteries 13-15	-	-	-	NQ	7.56	
Unspecified fugitives from Coke Batteries 19 and 20	-	-	-	NQ	6.85	
Unspecified fugitives from Coke Battery B	-	-	-	NQ	3.0	
Unspecified fugitives from Coke Battery C ^	-	-	-	NQ	<3.0	
Desulfurization plant	6,394,800	tpy coke	(1)	398	71.5*	**yes**
By-Product Recovery Plant *	8,240,605	tpy coal	(2)	124	8.0	**yes**
Light oil barge loading system	55,000,000	gal/yr	(3)	0.75	0.04*	no
Boiler No. 1 (Babcock & Wilcox)	760	MMBtu/hr (COG and NG)	-	18.31	5.58	no
Boiler No. 2 (Combusting Engineering)	481	MMBtu/hr (COG and NG)	-	11.59	2.57	

Table 4 - Emission Units with a VOC PTE at Clairton (continued)

Unit ID	Emissions Unit	Capacity		VOC Control	VOC PTE	VOC Actuals	VOC RACT
		#	Units		(ton/yr.)	(ton/yr.)^^	
B005	Boiler R1 (Riley Stoker)	229	MMBtu/hr (COG and NG)	-	5.52	0.14	no
B006	Boiler R2 (Riley Stoker)	229	MMBtu/hr (COG and NG)	-	5.52	0.12	
B007	Boiler T1 (Erie City Zurn)	156	MMBtu/hr (COG and NG)	-	3.76	0.19	
B008	Boiler T2 (Erie City Zurn)	156	MMBtu/hr (COG and NG)	-	3.76	0.19	
-	Emergency Flares	varies	MMBtu/hr	(4)	0.49	<0.1	no
-	Misc. portable/seasonal space heaters	varies	MMBtu/hr (total)	-	NQ	NQ	no
-	Miscellaneous methanol usage	-	-	-	NQ	8.17	no
-	Wastewater treatment units and aeration basins	-	-	-	NQ	1.48	no
-	Parts Washer	-	-	-	NQ	1.65	no
-	Miscellaneous paints and thinners	-	-	-	NQ	6.74	no

^ Permitted in 2008.

^^ Reported actual emissions for CY 2012 as provided by source in RACT submittal

* Reported actual emissions for CY 2013

NQ - Not quantified

(1) Desulfurization plant uses an incinerator for VOC control.

(2) The By-Products Recovery Plant uses a clean COG gas blanketing system for VOC control.

(3) The light oil loading system captures VOC emissions with a vapor recovery system.
(4) By design, the emergency flares serve as VOC control.
(5) From US Steel 2014 RACT Submittal. Facility May want to lower permit limits if there is a large difference between potentials and actuals

A. RACT for NOx – Underfiring of Coke Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20

Process/Unit description - Underfiring

Clairton operates ten by-product coke oven batteries, each consisting of 64 to 87 ovens, identified as Batteries C, B, 1, 2, 3, 13, 14, 15, 19 and 20. (As explained previously in this document, Battery C is not addressed further.)

The coking process begins with the transfer, i.e. "charge", of coal through an opening in the top of the oven. Once the oven has been filled with coal and sealed, the oven is uniformly heated. Heat is produced from the combustion of COG in one-half of the flues - a process referred to as "underfiring" - while the remaining flues transport combustion exhaust gas through a heat exchanger (called a regenerator). (Flues are located within the walls of the each coke oven. Regenerators are massive structures made of refractory brick and are located beneath the ovens and heating flues.) Underfiring exhaust gases leaving the regenerators are routed to, and ultimately emitted from, a "combustion stack". Each coking cycle typically takes between 16 to 18 hours.

In addition to producing coke, a by-product coke battery is designed and operated to collect the COG evolved from coal during the coking process. The COG escapes through an opening at the top of the oven at both ends of the coking chamber. Each opening is fitted with an offtake pipe, which routes the COG to the collection main for processing.

There are numerous underfiring/oven design configurations for by-products coke batteries that have been used, and are being used, worldwide. The underfiring systems at the Clairton batteries can be divided into three broad categories:

- Gun-flue, with one combustion air-port per burner (Wilputte batteries 1, 2 and 3);
- Gun-flue, with multiple combustion air ports per burner (Carl Still batteries 13, 14, 15 and B); and
- Underjet (Koppers-Becker batteries 19 and 20).

In gun-flue batteries, fuel gas enters the battery from the gas distribution piping into a horizontal gas duct (gas-gun) constructed of refractory brick extending the length of each wall below the oven floor elevation. Short vertical flues (risers) branch vertically off the gas-gun and lead to a replaceable refractory nozzle brick containing a sized, calibrated opening which regulates the gas flow to each of the vertical flues.

- At the batteries with one combustion air-port per burner, preheated combustion air mixes with the fuel gas at the bottom of the heating flue.
- At the batteries with multiple combustion air ports per burner a portion of the preheated combustion air mixes with the fuel gas at the bottom of the heating flue, and the remaining combustion air is "staged" (i.e., it is introduced into the flue and mixed with the partially consumed fuel at refractory ports spaced along the height of the flue). The primary reason for staging the introduction of combustion air is to maintain an even vertical temperature over the height of the flue.

Underjet batteries are built with a "basement" beneath the regenerators. Fuel gas is distributed to the individual heating flues through a system of piping in the battery basement. The fuel gas passes vertically through burner piping equipped with an orifice or metering pin to regulate the gas flow to each flue. After flowing through the metering device, the fuel gas ascends through a vertical gas duct (riser) built integrally into the regenerator and flue support walls to the base of the heating flue. The Clairton underjet batteries include a feature whereby the fuel gas entering the risers passes through a venturi nozzle designed to extract a certain quantity of flue gas (products of combustion) from the regenerator and mix it with the fuel gas as it travels to the burner. This dilution of the fuel/air mixture increases the length of the flame and, like the staged air design described above, flue gas recirculation in the underjet batteries is intended to maintain an even temperature over the height of the flue.

There are primarily two mechanisms in which NOx emissions are formed: thermal NOx and fuel NOx. Thermal NOx is generated when nitrogen reacts with oxygen (in the combustion air) in a high temperature environment. Fuel NOx is generated from oxidation of nitrogen compounds in the fuel. In a coke oven battery, the far majority of NOx emissions are generated from the combustion of COG in the underfiring heating flues. The COG that evolves in the oven does not come in contact with the underfire combustion gases.

<u>Step 1 – Identify Control Options</u>

According to information available in the aforementioned resources and Clairton's RACT submittal, NOx emissions from coke battery underfiring could, in theory, be minimized and/or controlled with:

(a) Combustion Optimization
(b) Low NOx Burners
(c) Flue Gas Recirculation
(d) Low Excess Air
(e) Staged Combustion
(f) Selective Catalytic Reduction
(g) Selective Non-Catalytic Reduction
(h) Fuel Switching

A concise description of each of these technologies is as follows:

Pollution Prevention Techniques - Combustion Modifications

(a) Combustion Optimization

Combustion optimization involves conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms and actuators) and determining if equipment needs to be cleaned or repaired. Combustion optimization also includes conducting various tests to collect data on the combustion operation. This data is then analyzed to determine the combination of settings that result in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the device).

Tune-ups are used to improve efficiency and save money, reduce combustion emissions, and to ensure safe operations. A tune-up generally involves: conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms and actuators); determining if equipment needs to be cleaned, repaired, or replaced; investigating levels of excess air and emissions of NOx and CO; evaluating temperatures and pressures; and inspecting for leakage and condensate. The data is analyzed and adjustments made to determine the combination of settings that result in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers[12], it was found that 1-5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1-5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the potential overall reduction in emissions that tune-ups of the underfiring system can achieve because the pre-tune-up status is unknown.

(b) Low NOx Burners (LNB)

LNB is a unique pollution prevention control option in the sense that it simply refers to a burner that has been designed to emit less NOx than conventional burners. LNB are usually designed to incorporate one or more combustion control techniques within the burner, such as staged combustion, fuel/air premixing, flue gas recirculation, low excess air, or a combination of these techniques. In all cases, the NOx emissions are controlled by lowering combustion zone temperatures to reduce the production of thermal NOx. [13]

(c) Flue Gas Recirculation (FGR)

FGR is a pollution prevention technique in which a portion, typically 15 to 30 percent, of the flue gas is recycled back to the primary combustion zone. This dilutes the combustion reactants, lowers the peak flame temperature and oxygen concentration of the primary combustion zone, and thereby lowers thermal NOx formation.[14]

(d) Low Excess Air (LEA)

Controlling excess air used during fuel combustion can substantially affect NOx formation by determining the amount of oxygen available for NOx reaction. At a given excess air level, NOx emissions increase as the temperature of the combustion zone increases. LEA is a burner optimization strategy in which the unit is operated at the lowest excess air level that provides efficient, reliable, safe and complete combustion.

With continuous emissions monitoring systems (CEMS) and feedback control, excess air can be accurately controlled to maintain a level that promotes optimum combustion and burning conditions in addition to lowering NOx emissions. Reducing excess air can also result in increased energy productivity - the amount of energy consumed per unit of production - which further reduces emissions.

(e) Staged Combustion

Staging of combustion air causes fuel combustion to occur in two distinct zones. In the first zone, only partial combustion is conducted in a fuel-rich, oxygen-poor flame zone. The lack of available oxygen minimizes the formation of thermal and fuel NOx. In the second, fuel-lean zone, additional (secondary) combustion air is added to complete the combustion process. The introduction of proportionally large quantities of cooler air keeps the combustion zone at a sufficiently low temperature to minimize NOx formation despite the availability of excess oxygen.

[12] Eckerlin, Dr. Herbert M. and Eric W. Soderberg, USI Boiler Efficiency Program: A Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities. Prepared for the State Energy Office, NC Department of Administration. Revised 2/25/04.
[13] Boiler Emission Guide - Reference Guide, 3rd Edition. Cleaver Brooks. (2010) Available at: http://www.cleaverbrooks.com/uploadedFiles/Internet_Content/Reference_Center/Insights/Boiler%20Emissions%20Guide.pdf. Accessed January, 2015.
[14] Alternative Control Techniques Document - NOx Emissions from Process Heaters (Revised) (EPA-453/R-93-034). 1993. Available at: http://www.epa.gov/ttn/catc/dir1/procheat.pdf. Accessed December, 2014.

Add-on Pollution Control Techniques

(f) Selective Catalytic Reduction (SCR)

SCR is an add-on control technique that controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water. The catalyst serves to lower the activation energy of these reactions, which allows the NOx conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F but typically is designed to occur between 600°F and 750°F, depending on the catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

Regenerative selective catalytic reduction (RSCR) is a combination of two well-established control technologies: regenerative thermal oxidation and SCR. By utilizing the direct contact regenerative heater technology (typically associated with an RTO), polluted air streams approximately 100-150 °F lower than otherwise required can be treated without supplemental preheating. NOx reduction takes place in SCR catalyst modules positioned above the heat transfer bed.[15]

(g) Selective Non-Catalytic Reduction (SNCR) (with Preheating)

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires a flue gas of 1700-2000 °F.[16] Units with flue gas temperatures within this range, residence times less than one second, and high levels of uncontrolled NO_x are good candidates for SNCR control.[17]

Units can be retrofitted for SNCR by installing injection nozzles through holes cut in the furnace wall. The nozzles are connected by piping to air or steam and chemical supplies. Bulk chemical storage is normally remote from the individual heater and can be used for more than one heater or boiler. The SNCR systems require rapid chemical diffusion in the flue gas. The injection point must be selected to ensure adequate flue gas residence time and to avoid tube impingement. Computer modeling can be used to develop the optimum injection points.[18]

(h) Fuel Switching

Fuel switching reduces NOx formation by reducing fuel NOx. By replacing high-nitrogen fuels with low-nitrogen fuels, the overall nitrogen available for oxidation is reduced, lowering NOx emissions. The primary fuel for the Clairton batteries is COG. However, under rare circumstances, stabilized natural gas may be used as underfiring fuel.

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[15] RSCR system to Reduce NOx Emissions from Boilers. Abrams, Richard and Faia, Robert. Proceedings of the 17th Annual North American Waste-to-Energy Conference (2009). Available at http://www.seas.columbia.edu/earth/wtert/sofos/nawtec/nawtec17/nawtec17-2363.pdf. Accessed February 2015.

[16] Northeast States For Coordinated Air Use Management (NESCAUM), and Praveen Amar. Applicability and Feasibility of NO_x, SO_2, and PM Emissions Control Technologies for Industrial Commercial, and Institutional Boilers. November, 2008 (Revised January 2009). http://www.nescaum.org/documents/ici-boilers-20081118-final.pdf. Accessed January, 2015.

[17] U.S. EPA. Air Pollution Control Technology Fact Sheet; Selective Non-Catalytic Reduction (EPA-452/F-03-031). 2003. http://www.epa.gov/ttncatc1/dir1/fsncr.pdf. Accessed January, 2015.

[18] Id.

For example, a battery may be placed into "idle hot" condition because of market demand or other circumstances. During that time, the production of COG might be less than what is required for both the operating and idle batteries, so stabilized natural gas would be used to supply the deficit.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from the underfiring of Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20. In summary, it was determined that, besides periodic tune-ups, there are no technically feasible control options.

(b - e) Low NOx Burners (LNB), Flue Gas Recirculation (FGR), Low Excess Air (LEA) and Staged Combustion (or any other form of combustion modifications):

The underfiring process, by virtue of its design, is ill-suited for retrofit emission reductions techniques for the following reasons:

- While other combustion processes (e.g. that of a boiler) can be highly tuned (via changes to over- and under- fire air, air-to-fuel ratios, exhaust recirculation etc.) to reduce emissions or accommodate changes in back pressure (created by add-on pollution control), a coke battery's underfiring system cannot. While the principle of all coke ovens is the same, each coke oven and oven operation is unique due to wide variations in the geometry of the combustion chambers, the combustion variables of fuel and air mixtures, temperature, humidity, and other factors.[19]

- With burners and heating/exhaust flues distributed throughout the battery oven walls and infrastructure, an entire battery would need to be dismantled and rebuilt to accommodate modifications to the underfiring system. Even if such an endeavor was completed, there is little information available regarding the effectiveness of the NOx control that would be achieved.

- Batteries are typically operated with relatively high excess combustion air with a flue gas O_2 range of approximately 8 to 12 percent. Excess air in coke ovens is needed to maintain compliance with other battery stack emissions regulations, and to assure complete combustion of the COG that can be subject to heating value variability.

- The underfiring process has a very large volumetric exhaust flow rate (approximately 56,000-102,000 dscf/min) and relies on certain flame temperatures and flame lengths to adequately produce coke products. Modifications to the underfiring system are likely to compromise requisite flame, air flow characteristics, system backpressure, and the quality of the coke produced.

- Clairton's standard operating procedures optimize the balance among oven wall protection and repair, combustion stack emissions and minimizing excess air. In doing so, the existing combustion optimization process functions as a fuel conservation method.

- Staged combustion for a coke battery underfiring process has been successfully designed and utilized by Battery C. However, that battery was originally designed with the pollution prevention technology and permitted for construction in 2008.

[19] Id.

- Staged combustion and FGR have been successfully applied to an existing coke battery underfiring process at the EES Coke production plant in Detroit, Michigan. However, the controls were incorporated into a new design of the battery when it was reconstructed in 1992.

- It is not possible to reduce the temperature of the preheated combustion air or the fuel. All of the batteries are constructed of refractory brick, and the regenerators are beneath the ovens and heating flues and are an integral part of the structure. Fuel passing through the gun-flues in Batteries 1-3, 13-15 and B or the risers in Batteries 19 and 20 is heated by the surrounding ovens, heating flues and regenerators. Revising the path of the fuel gas or combustion air to the burners would require complete reconstruction of the battery.

As a result, pollution prevention/combustion modifications - LNB, FGR, LEA and staged combustion - are not technically feasible control options for Batteries B, 1, 2, 3, 13, 14, 15, 19 and 20.

Add-on Pollution Controls (SCR and SNCR)

The regenerators in COG-fired coke batteries increase fuel consumption efficiency by at least 35%[20]. This massive fuel savings directly translates to significant avoided emissions. However, in doing so, regenerators present design obstacles to post combustion NOx control. Air flow reversals occur every 20-30 minutes in typical batteries, and Clairton's batteries are operated with these industry-norm reversing cycles. The reversals result in step changes in temperature and flow to the battery underfiring stack. Air flow is actually stopped for the short period of time when the reverse occurs.

(f) Selective Catalytic Reduction (SCR)

Clairton's coke battery combustion and exhaust system does not operate with exhaust gas temperatures and airflows in the range where SCR can be effectively utilized. The average flue gas temperature of the combustion stack is approximately 493 °F; between 100 and 300 degrees cooler than what would be needed to ensure effective operation of an SCR.[21] Because of the massive exhaust airflow, preheating the exhaust would require additional fuel combustion that would significantly offset the emissions reductions achieved by the SCR.

According to literature research and discussions with vendors, it was determined that regenerative SCR (RSCR) has primarily been utilized to control NOx from relatively small biomass-fired boilers. There is no evidence that RSCR has been applied to a coke battery underfiring system.

In addition, the retroactive installation of a post-combustion NOx control, like SCR, would likely increase back pressure on the system and cause combustion process control to become erratic. This kind of process upset would likely result in increased emissions, poor coke quality and potentially compromise the integrity of the battery and the Clairton's ability to operate it safely. As a result, SCR is not technically feasible.

(g) Selective Non-Catalytic Reduction (SNCR)

There are no known applications, demonstrated or commercially operational, of SNCR to a coke oven battery underfiring/combustion system. In addition, there appears to be no

[20] *Coke Battery Heating, Theory and Practice*. USS Research Laboratory. 1982.
[21] Technical support document to Clairton's Title V permit.

evidence indicating that this pairing of control technology and operations has ever been studied. SNCR requires both a sufficient exhaust temperature and enough residence time at that temperature to allow the injected ammonia to mix with the exhaust gas and allow the NOx reduction reactions to come to completion. While it may be possible to construct a battery reheat system that elevates the exhaust gas temperature to the requisite SNCR temperature window, and provide sufficient residence time for the NOx reduction reactions, doing so would result in an overall reduction in thermal efficiency and would likely result in the generation of more emissions than would be reduced by the SNCR.

As a result, SNCR is not technically feasible.

(h) Fuel Switching

Natural gas must be first "stabilized" to match the characteristics of COG to be used as a primary fuel for underfiring. This is accomplished by adding air to the natural gas thus maintaining the same Wobbe index (Heating Value + Square root of specific gravity). Under similar combustion conditions for the batteries, NOx emissions from the combustion of natural are expected to exceed that of COG.

In addition, for every 1 MMBtu of natural gas that would be used to displace 1 MMBtu of COG for underfiring, the corresponding amount of COG would need to be flared (a wasteful scenario that would effectively double the NOx emissions from a coke battery).

As a result, using natural gas as the primary fuel for underfiring is not a feasible NOx control option.

The aforementioned control technology evaluations and assessments are substantiated by the following research:

- A review of the RACT-BACT-LAER-Clearinghouse (RBLC) database (Process Codes 81.112 and 81.190) and other publications indicates that an underfiring process at a by-product recovery coke plant has never been retrofitted with combustion modifications for NOx control, nor been equipped with any add-on NOx control.

In summary, the only technically feasible approach to reducing NOx emissions from battery underfiring (aside from completing periodic tune-ups) is to decommission a battery and construct a new one that is designed to emit lower levels of NOx. To do so would not only be cost prohibitive but is beyond the scope and authority of the RACT process.

Step 3 - Evaluate Control Options

Considering the design, operation and exhaust characteristics of the underfiring systems, periodic tune-ups have been determined to be the only technically feasible control option other than lowering permit limits based on emissions inventories or stack testing. As a result, this option was evaluated further.

Table 5 - Potential NOx Reductions from Technically Feasible Control Options – Underfiring

Technically Feasible Control Option	Estimated Control Efficiency	Potential NOx Emissions Reductions (ton/yr)[22]	Estimated Post-control NOx emissions (ton/yr.)
Tune ups	2%	6.15-22.4 (per battery)	301.4-1,096 (per battery)

[22] Determined as the boiler allowable PTE (ton/yr.) x Estimated control efficiency (%)

Using information provided by Clairton and collected by ACHD, an estimate of the costs associated with periodic tune-ups was completed - see Appendix A. The estimate is based on information provided in the following report: "USI Boiler Efficiency Program a Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities" February, 2004.[23]

Table 6. Economic Analysis of Technically Feasible Control Options – Underfiring (combined for all batteries)

Technically Feasible Control Option	Total Capital Investment for All Batteries($)	Total Annualized Cost for All Batteries ($/yr)	Potential NOx Removal for All Batteries (ton/yr)	Cost Effectiveness ($/ton NOx removed)
Tune ups	$58,500	$18,100	112.6	$161

2014 US Steel RACT submittal (0052c2014-04-17ract) Pages 32-33 PTEs are shown below:

- Battery 1 – 549.3 tpy
- Battery 2 – 549.3 tpy
- Battery 3 – 549.3 tpy
- Battery 13–307.5 tpy
- Battery 1 – 307.5 tpy
- Battery 15–307.5 tpy
- Battery 19–1118.7 tpy
- Battery 20–1118.7 tpy
- Battery B –820.1 tpy

These 2014 US Steel RACT submittal PTEs above are approximately the same as the TVOP PTEs for underfiring in worksheet "Table A-4a Underfire Stacks" of X:\Public Health Programs\Air Quality\AQ Common\AQ Documents\u\us steel clairton\permits\operating permits\draft\clairton – tv-calcs – draft.xlsx

TVOP application "0052op2001-03-02app" PTEs are shown below:

- Page 73 - Battery 1 – 564.8 tpy
- Page 103 – Battery 2 – 564.8 tpy
- Page 129 – Battery 3 – 564.8 tpy
- Page 242 – Battery 13 – 471.05 tpy
- Page 272 – Battery 14 – 471.05 tpy
- Page 299 – Battery 15 – 471.05 tpy
- Page 326 – Battery 19 – 2041.41 tpy
- Page 357 – Battery 20 – 2041.41 tpy
- Page 386 – Battery B – 722.55 tpy

These 2001 permit application PTEs above are higher than US Steel Clairton's 2014 RACT submittal "0052c2014-04-17ract" except for Battery B. Battery B is 820.1 tpy in the RACT submittal. However, these 2001 permit application PTEs are much older than those in both the 2014 RACT submittal from US Steel Clairton and the TVOP PTEs for underfiring.

[23] Available at http://infohouse.p2ric.org/ref/49/48741.pdf. Accessed April 2015.

With regards to emissions inventory and/or testing records, the potential emissions from underfiring for these batteries could be as follows:

265.63 tpy NOx for Battery 1; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 169.54 tpy (2010), 192.13 tpy (2011), 188.41 tpy (2012), 176.30 tpy (2013), and 183.35 tpy (2014). The actual emissions in the 2014 RACT submittal are 168.41 tpy. Page 19 of stack test report 0052str2013-11-06 1-2 combustion shows average test run of 230.98 tpy. Limit is average test run plus 15% = 230.98 tpy * 115% = 265.63 tpy]

175.40 tpy NOx for Battery 2; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 199.16 tpy (2010), 181.10 tpy (2011), 178.85 tpy (2012), 130.89 tpy (2013), and 136.62 tpy (2014). The actual emissions in the 2014 RACT submittal are 178.85 tpy. Page 21 of stack test report 0052str2013-11-06 1-2 combustion shows an average test run of 152.52 tpy. Limit is average test run plus 15% = 152.52 tpy * 115% = 175.40 tpy.]

230.50 tpy NOx for Battery 3; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 200.42 (2010), 198.62 (2011), 136.77 (2012), 135.06 (2013), and 148.34 (2014). The actual emissions in the 2014 RACT submittal are 136.77 tpy. Page 22 of stack test report 0052str2010-07-12battery 3 has an emission factor of 68.5 lbs NOx/hr. Assuming 8760 hrs/yr, this equates to 300.03 tpy. Limit is highest emissions inventory from the past five years times 115% = 200.42 * 115% = 230.50 tpy.]

201.83 tpy NOx for Battery 13; (I used stack test as limit for battery 13-15) [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 126.35 (2010), 129.75 (2011), 119.49 (2012), 107.80 (2013), and 110.45 (2014). The actual emissions in the 2014 RACT submittal are 119.48 tpy. Page 16 of stack test report 0052str2013-06-13batteries13-14 revised shows an average of 175.5 tpy. Limit is 175.5 tpy * 115% = 201.83 tpy]

166.41 tpy NOx for Battery 14; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 118.48 (2010), 121.81 (2011), 113.54 (2012), 98.92 (2013), and 99.16 (2014). The actual emissions in the 2014 RACT submittal are 113.53 tpy. Page 18 of stack test report 0052str2013-06-13batteries13-14 revised shows an average of 144.7 tpy. Limit is 144.7 tpy * 115% = 166.41]

174.82 tpy NOx for Battery 15; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 148.02 (2010), 152.02 (2011), 111.82 (2012), 75.36 (2013), and 51.26 (2014). The actual emissions in the 2014 RACT submittal are 111.82 tpy. Page 23 of stack test report 0052str2010-11-12battery15stack has an emission factor of 48.2 lbs NOx/hr. This equates to 211.12 tpy. Limit is highest inventory value from the past five years times 115% = 152.02 tpy * 115% = 174.82 tpy]

889.5 tpy NOx for Battery 19; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 344.24 (2010), 339.26 (2011), 773.45 (2012), 685.72 (2013), and 661.38 (2014). The actual emissions in the 2014 RACT submittal are 773.45 tpy. Page 24 of stack test report 0052str2011-01-24battery19stack has an emission factor of 134 lbs NOx/hr. This equates to 586.92 tpy. Limit is highest inventory value from the past five years times 115% = 773.45 tpy * 115% = 889.5 tpy]

941.9 tpy NOx for Battery 20; [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 555.04 (2010), 546.23 (2011), 500.38 (2012), 522.24 (2013), and 581.21 (2014). The actual emissions in the 2014 RACT submittal are 500.38 tpy. Page 24 of stack test report 0052str2011-01-24battery20stack has an emission factor of 187 lbs NOx/hr. This equates to 819.06 tpy. Limit = 819.06 tpy * 115% = 941.9 tpy.]

<u>466.78 tpy NOx for Battery B;</u> [ACHD NOx emissions inventories by year are as follows (NG and COG emissions combined): 444.43 (2010), 371.80 (2011), 361.91 (2012), 488.87 (2013), and 362.50 (2014). The actual emissions in the 2014 RACT submittal are 381.91 tpy. Page 18 of stack test report <u>0052str2013-09-16combustion stack</u> shows 315.31 tpy. <u>Limit is average of emissions inventory values times 115% = 466.78 tpy]</u>

Step 4 – Select RACT

ACHD has determined that NOx RACT for the Underfiring of Coke Batteries B, 1, 2, 3, 13, 14, 15, 19, and 20 is:

1) Total NOx emissions for all batteries combined shall not exceed 3,513 tons per consecutive twelve month period.
2) The Underfiring systems must be properly maintained and operated at all times according to good engineering and air pollution control practices for minimizing emissions. [40 CFR 63.7300(a)]
3) An annual tune-up pursuant to the provisions of §2105.06.d.2, which requires that the tune-up include, at a minimum:

    - Inspection, adjustment, cleaning, or replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
    - Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NOX, and to the extent practicable minimize emissions of CO; and
    - Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

Additionally, the following records must be maintained for each adjustment conducted in the annual tune-up:

- The date of the adjustment procedure;
- The name of the Service Company and technicians;
- The operating rate or load after adjustment;
- The CO and NOx emission rates before and after adjustment;
- The excess oxygen rate after adjustment; and
- Other information required by the applicable operating permit.

The source may petition ACHD to reduce the frequency of the tune-ups to biennially, if there is not a significant change in the NOx and CO emission rate between subsequent years following a tune-up.

B. RACT for NOx – Desulfurization Plant (DP)

Process/Unit description – Desulfurization Plant

Large quantities of COG are produced in the ovens during the coking process. The evolved COG exits the battery ovens through standpipes is spray-cooled to precipitate tar and condense various vapors and routed to the collection main. The collected COG is routed to the By-Products Recovery Plant (BPRP), where a variety of valuable organic compounds are extracted, and then further processed by the Desulfurization Plant (DP) where hydrogen sulfide (H2S) and other sulfur compounds are removed. Sulfur dioxide (SO2) emissions are generated from the oxidation of H2S present in COG when it is combusted.

Desulfurization processes vary considerably from coke production plant to coke plant. At Clairton, the DP primarily consists of two Claus Plants (one primary and one backup) and the Shell Claus Off-gas Treatment (SCOT) Plant. The Claus Plant converts a large portion of the H2S and other sulfur compounds in the treated COG to elemental sulfur which is sold. The treated COG exiting the Claus Plant is then routed to the SCOT Plant where it is processed and separated into three gas streams: a treated/low sulfur COG stream, a concentrated H2S stream and an acid off-gas stream. The H2S stream is returned/recycled to the Claus Plant for further sulfur removal and recovery. The acid off-gas stream is incinerated by the SCOT Plant Incinerator.

The concentration of H2S in the COG exiting the DP is typically reduced to approximately 10 grains per 100 dry standard cubic feet (dscf) of COG, or approximately 0.045 percent sulfur.

The SCOT Plant Incinerator is a regenerative-type unit that is designed with and uses oxygen-firing and FGR for NOx control. [This is listed in the 2014 US Steel RACT submittal, however ACHD records do not indicate the DP has such controls. Confirm this with the facility).

The unit's NOx PTE is 31.5 ton/year, and actual NOx emissions are approximately 1 ton/year [US Steel Clairton RACT submittal "0052c2014-04-17ract].

Source testing conducted in November of 2015 shows emissions of approximately 4.60 tpy. [Page 18 of "0052str2016-01-25scot" shows the highest test run was 1.05 lb/hr of NOx. 1.05 lb/hr * 8760 hrs/yr * ton/2,000 lbs = 4.60 tpy]

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, NOx emissions from the SCOT incinerator could, in theory, be controlled with:

(a) Combustion Optimization
(b) Low NOx Burners
(c) Flue Gas Recirculation
(d) Selective Catalytic Reduction
(e) Selective Non-Catalytic Reduction

A concise description of each of these technologies is as follows:

Pollution Prevention Techniques - Combustion Modifications

(a) Combustion Optimization

Combustion optimization involves conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms, and actuators) and determining if equipment needs to be cleaned or repaired. Combustion optimization also includes conducting various tests to collect data on the combustion operation. This data is then analyzed to determine the combination of settings that result in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the device).

Tune-ups are used to improve efficiency and save money, reduce combustion emissions, and to ensure safe operations. A tune-up generally involves: conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, tilt mechanisms, and actuators); determining if equipment needs to be cleaned, repaired, or replaced; investigating levels of excess air and emissions of NOx and CO; evaluating temperatures and pressures; and inspecting for leakage and condensate. The data is analyzed and adjustments are made to determine the combination of settings that result in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers[24], it was found that 1-5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1-5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the potential overall reduction in emissions that tune-ups of the SCOT Incinerator can achieve because the pre-tune-up status is unknown.

(b) Low NOx Burners (LNB)

LNB is a unique pollution prevention control option in the sense that it simply refers to a burner that has been designed to emit less NOx than conventional burners. LNB are usually designed to incorporate one or more combustion control techniques within the burner, such as staged combustion, fuel/air premixing, flue gas recirculation, low excess air, or a combination of these techniques. In all cases, the NOx emissions are controlled by lowering combustion zone temperatures to reduce the production of thermal NOx.[25]

(c) Flue Gas Recirculation (FGR)

FGR is a pollution prevention technique in which a portion, typically 15 to 30 percent, of the flue gas is recycled back to the primary combustion zone. This dilutes the combustion reactants, lowers the peak flame temperature and oxygen concentration of the primary combustion zone, and thereby lowers thermal NOx formation.[26]

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[24] Eckerlin, Dr. Herbert M. and Eric W. Soderberg, USI Boiler Efficiency Program: A Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities. Prepared for the State Energy Office, NC Department of Administration. Revised 2/25/04.

[25] Boiler Emission Guide - Reference Guide, 3rd Edition. Cleaver Brooks. (2010) Available at: http://www.cleaverbrooks.com/uploadedFiles/Internet_Content/Reference_Center/Insights/Boiler%20Emissions%20Guide.pdf. Accessed January, 2015.

[26] Alternative Control Techniques Document - NOx Emissions from Process Heaters (Revised) (EPA-453/R-93-034). 1993. Available at: http://www.epa.gov/ttn/catc/dir1/procheat.pdf. Accessed December, 2014.

Add-on Pollution Control Techniques

(d) Selective Catalytic Reduction (SCR)

SCR is an add-on control technique that controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water. The catalyst serves to lower the activation energy of these reactions, which allows the NOx conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F, but typically is designed to occur between 600°F and 750°F, depending on the catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

(e) Selective Non-Catalytic Reduction (SNCR)

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires a flue gas of 1700-2000 °F.[27] Units with flue gas temperatures within this range, residence times less than one second, and high levels of uncontrolled NO_x are good candidates for SNCR control.[28]

Units can be retrofitted for SNCR by installing injection nozzles through holes cut in the furnace wall. The nozzles are connected by piping to air or steam and chemical supplies. Bulk chemical storage is normally remote from the individual heater and can be used for more than one heater or boiler. The SNCR systems require rapid chemical diffusion in the flue gas. The injection point must be selected to ensure adequate flue gas residence time and to avoid tube impingement. Computer modeling can be used to develop the optimum injection points.[29]

[27] Northeast States For Coordinated Air Use Management (NESCAUM), and Praveen Amar. Applicability and Feasibility of NO_x, SO_2, and PM Emissions Control Technologies for Industrial Commercial, and Institutional Boilers. November, 2008 (Revised January 2009). http://www.nescaum.org/documents/ici-boilers-20081118-final.pdf. Accessed January, 2015.
[28] U.S. EPA. Air Pollution Control Technology Fact Sheet; Selective Non-Catalytic Reduction (EPA-452/F-03-031). 2003. http://www.epa.gov/ttncatc1/dir1/fsncr.pdf. Accessed January, 2015.
[29] Id.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from the SCOT incinerator. In summary, it was determined that periodic tune ups, SCR, and SNCR (with preheating of the exhaust gas) are technically feasible control options.

Conversely, LNB and FGR are not additional technically feasible because:

- The SCOT Incinerator burner nozzles, oxygen and fuel feed, and combustion chambers are already inherently designed for NOx reduction. Modifications to these components are not possible without impact on emission reduction performance of other pollutants; which could cause a violation of the performance requirements.
- The incinerator is a regenerative-type unit that already employs FGR as part of its design.

Step 3 - Evaluate Control Options. The SCOT Incinerator's exhaust ranges from 1,500-2,000 ºF. A heat exchanger could be utilized to lower the exhaust temperature to a point that would accommodate SCR. Likewise, a heat exchanger could be utilized to ensure that the exhaust temperature remained high enough to accommodate SNCR. However, with actual NOx emissions of approximately 1 ton/year, any additional form of add-on pollution control would be cost prohibitive. A review of the RBLC and coke plant permits substantiates this conclusion; SCR and SNCR have not been utilized to reduce NOx emissions from desulfurization plant activities like that at Clairton.

Considering the design, operation, and exhaust characteristics of the SCOT Incinerator system, periodic tune-ups have been determined to be the only feasible control option. As a result, this option was evaluated further.

Table 7 - Potential NOx Reductions from Technically Feasible Control Options – SCOT Incinerator

Technically Feasible Control Option	Estimated Control Efficiency	Potential NOx Emissions Reductions (ton/yr)[30]	Estimated Post-control NOx PTE (ton/yr)
Tune ups	2%	0.63	30.82

Table 8. Economic Analysis of Technically Feasible Control Options – SCOT Incinerator

Technically Feasible Control Option	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Potential NOx Removal (ton/yr)	Cost Effectiveness ($/ton NOx removed)
Tune ups	$6,500	$2,000	0.63	$3,200

Using information provided by Clairton and collected by ACHD, an estimate of the costs associated with periodic tune-ups was completed - see Appendix A. The estimate is based on information provided in the following report: "USI Boiler Efficiency Program a Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities" February, 2004.[31]

[30] Determined as the boiler allowable PTE (ton/yr) x Estimated control efficiency (%)
[31] Available at http://infohouse.p2ric.org/ref/49/48741.pdf. Accessed April 2015.

Step 4 – Select RACT

ACHD has determined that NOx RACT for the Desulfurization Plant SCOT incinerator is new NOx limits of 1.05 lb/hr and 4.60 tpy and compliance with the other current requirements established by Clairton's Title V permit enhanced by annual tune-ups. More specifically, the flare shall be installed, maintained, and operated in accordance with manufacturer specifications, and good engineering and air pollution control practices for minimizing emissions.

ACHD has determined that NOx RACT for the Desulfurization Plant SCOT Incinerator is:

1) NOx emissions shall not exceed 4.60 tons per consecutive twelve month period.
2) The SCOT Incinerator shall be installed, maintained and operated in accordance with manufacturer specifications, and good engineering and air pollution control practices for minimizing emissions. [§2105.03 and 2105.06.d.6]
3) An annual tune-up pursuant to the provisions of §2105.06.d.2, which requires that the tune-up include, at a minimum:

    - Inspection, adjustment, cleaning, or replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
    - Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NOX, and to the extent practicable minimize emissions of CO; and
    - Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

Additionally, the following records must be maintained for each adjustment conducted in the annual tune-up:

- The date of the adjustment procedure;
- The name of the service company and technicians;
- The operating rate or load after adjustment;
- The CO and NOx emission rates before and after adjustment;
- The excess oxygen rate after adjustment; and
- Other information required by the applicable operating permit.

The source may petition ACHD to reduce the frequency of the tune-ups to biennially, if there is not a significant change in the NOx and CO emission rate between subsequent years following a tune-up.

C. RACT for NOx – Emergency Flares

Process/Unit description – Emergency Flares

Clairton operates a several emergency flares (EFs) that combust excess de-sulfurized COG that cannot be used as fuel in its boilers or for battery underfiring. In this capacity, an EF primarily functions a VOC control and a safety device. Without them, excess COG would accumulate near ground level and create a significant fire/explosion hazard.

According to the Technical Support Document to Clairton's Title V permit, the emergency flares are open flares, i.e., are not enclosed, and operate with a VOC destruction efficiency of 99 percent.

Step 1 – Identify Control Options

ACHD reviewed Clairton's RACT submittal and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's RACT/BACT/LAER Clearinghouse (RBLC), EPA's *Compilation of Air Pollutant Emission Factors*[32], and EPA's Standards of Performance for Petroleum Refineries[33] to determine the available controls for flares.

Since add-on controls are not available for open flares, EPA performed flare studies as part of the development of new source performance standards for refineries (40 CFR 60, Subpart J) in 2012. Based on the EPA's flare studies, with the exception of the original design of flares or retrofit of flares with heavy opacity generation, changes or retrofits of existing flares do not normally result in a quantifiable reduction of NOx. In general, reductions of emissions from flares are based on good engineering practices and on minimization of fuel burned. These controls are discussed below:

(a) Good Engineering Practices

Good engineering practices are utilized to ensure emissions from the flare system are minimized. In general, owners or operators of flares are trained to monitor the flares to ensure that they are operated and maintained in conformance with their designs, ensuring that flares are operated in a smokeless manner with no visible emissions. These practices also ensure that operators maintain presence of the pilot flame when the gas is routed to the flare.

(b) Flare Minimization Plan

A flare minimization plan (FMP) incorporates measures identified to reduce flare emissions by reducing the frequency and magnitude of flaring events ("prevention measures"). In general, a FMP ensures that the flare is operated in such a manner that minimizes all flaring and that no vent gas is combusted except during emergencies, shutdowns, startups, turnarounds, or essential operational needs. Prevention measures identified usually address flaring as a result of planned major maintenance, including startup and shutdown; flaring that may be reasonably expected to occur due to issues of gas quality or quantity;

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[32] AP-42, Chapter 13.5 – Industrial Flares (September 1991). Available at: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s05.pdf. Accessed January 28, 2015.

[33] 40 CFR 60, Subpart Ja – Standards of Performance for Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced After May 14, 2007 (as last updated September 12, 2012). Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=222ed662fc535aa19e0acb4937942218&node=sp40.7.60.j_0a&rgn=div6. Accessed January 28, 2015.

and flaring caused by recurrent failure of air pollution control equipment, process equipment, or processes.

A FMP generally includes a description and technical information for each flare, a description of the equipment or procedures implemented within the last five years or planned to reduce flaring, and a description of prevention measures needed to perform certain facility activities without flaring. FMPs are usually updated on an annual basis to include any new prevention measures identified as a result of an investigation into the cause of flaring events that have occurred in the prior year.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from the EFs.

(a) Good engineering practices

Good engineering practices (GEP) include the operation and maintenance of the flares in accordance with the flare design, including any manufacturer's specifications and accepted best practices. Such practices are recommended for optimal performance and are generally used throughout the industry.

In general, owners or operators of flares are trained to monitor the flares to ensure that they are operated and maintained in conformance with their designs. These practices also ensure that operators maintain presence of the pilot flame when the gas is routed to the flare. While it is understood that GEP are generally used to minimize flare emissions and comply with applicable regulatory requirements (e.g. ensuring that flares are operated in a smokeless manner with no visible emissions), a quantifiable relationship between the use of GEP and flare emissions is not available. As a result, this control measure is not evaluated further.

(b) Flare minimization plan (FMP)

A flare minimization plan (FMP) incorporates measures identified to reduce flare emissions by reducing the frequency and magnitude of flaring events ("prevention measures"). In general, a FMP ensures that the flare is operated in such a manner that minimizes all flaring and that no vent gas is combusted except during emergencies, shutdowns, startups, turnarounds, or essential operational needs. Prevention measures identified usually address flaring as a result of planned major maintenance, including startup and shutdown; flaring that may be reasonably expected to occur due to issues of gas quality or quantity; and flaring caused by recurrent failure of air pollution control equipment, process equipment, or processes.

As a result, a FMP is considered a technically feasible NOx control option for the EFs.

Step 3 - Evaluate Control Options

FMPs do not result in specific NOx emissions reductions from a flare but instead reduce the flow to the flare that generates NOx. ACHD believes that it is in Clairton's best interest to minimize the amount of COG flared because:

- As the primary fuel for boilers and battery underfiring, flared COG represents the loss of a valuable resource.
- The potential or expected NOx emissions reductions attributed to a FMP cannot be estimated because the corresponding reductions depend on Clairton's ability to minimize

the use of the flare. As a result, the pollution reduction and cost-effectiveness of a FMP cannot be quantified for a flare that is used as a means to control VOC emissions and protect personnel/property.

- Clairton is already subject to ACHD Article XXI §2105.06.d.6, which designates RACT (for incinerators used primarily for air pollution control) as the installation, maintenance, and operation of the source in accordance with manufacturer's specifications.

The costs associated with the implementation of a FMP at Clairton are not anticipated to be significant. As described previously in this document, minimizing flared COG is already a standard operating practice for Clairton.

Step 4 – Select RACT

ACHD has determined that NOx RACT for the Emergency Flares is the development and implementation of a flare minimization plan. The flare minimization plan must include (requirements for the flare management plan are modeled after SCAQMD Rule 1118 and 40 CFR part 60, subpart J[a (40 CFR 60.103a (a)): [Note: The requirements for the flare management plan are modeled after SCAQMD Rule 1118 and 40 CFR part 60, subpart Ja (40 CFR 60.103a(a))- Bob Sidner]:

(A) A listing of all process units and ancillary equipment connected to the flare for each affected flare, including:

1. A complete description and technical specifications for each flare and associated knock-out pots, surge drums, water seals and flare gas recovery systems;
2. Detailed process flow diagrams of all upstream equipment and process units venting to each flare, identifying the type and location of all control equipment;

(B) An evaluation of the baseline flow to the flares, not including pilot gas flow or purge gas flow. Separate baseline flow rates may be established for different operating conditions provided that the management plan includes:

1. A primary baseline flow rate that will be used as the default baseline for all conditions except those specifically delineated in the plan;
2. A description of each special condition for which an alternate baseline is established, including the rationale for each alternate baseline, the daily flow for each alternate baseline and the expected duration of the special conditions for each alternate baseline.
3. Procedures to minimize discharges to the affected flare during each special condition.

(C) A description of the equipment, processes and procedures installed or implemented within the last five years to reduce flaring; and a description of any equipment, processes or procedures the owner or operator plans to install or implement to eliminate or reduce flaring for:

1. Planned, turnarounds and other scheduled maintenance, based on an evaluation of these activities during the previous five years;
2. Essential operational needs and the technical reason for which the vent gas cannot be prevented from being flared during each specific situation, based on supporting documentation on flare gas recovery systems, excess gas storage and gas treating capacity available for each flare; and
3. Emergencies, including procedures that will be used to prevent recurring equipment breakdowns and process upset, based on an evaluation of the adequacy of maintenance schedules for equipment, process and control instrumentation.

(D) The facility must follow the flare minimization plan and operate all flares in such a manner that minimizes all flaring except during emergencies, shutdowns, startups, turnarounds or essential operational needs.

(E) The plan should be updated periodically to account for changes in the operation of the flares, such as new connections to the flares or the installation of a flare gas recovery system, but the plan need be re-submitted to the Department only if the owner or operator adds an alternative baseline flow rate, revises an existing baseline, or installs a flare gas recovery system.

In addition, the flares shall be installed, maintained, and operated in accordance with manufacturer specifications, and good engineering and air pollution control practices for minimizing emissions.

D. RACT for NOx – Boiler 1 (B001)

Process/Unit description – Boiler 1

Clairton uses a combination of six boilers to produce steam for various operations at the plant. Each boiler combusts COG as its primary fuel and natural gas as its secondary/backup fuel. When the previous RACT study was completed in 1996, all of Clairton's boilers, including Boiler 1 were capable of firing coal and fuel oil. Since that time, the boilers have undergone two noteworthy changes. First, each boiler is currently only permitted to fire COG or natural gas. Second, automation upgrades have been completed which have resulted in more-efficient boiler operation and lower emissions.

Boiler 1 has a heat input capacity of 760 MMBtu/hr (HHV) and is the only cyclone-type unit at the plant. Boiler 1 is the only base-loaded boiler; continuously operated at 50-75% rated load throughout the year to satisfy the plant's primary steam demands and is only shutdown for annual maintenance.

Pursuant to Condition V.AA.1 of Clairton's Title V permit:

- NOx emissions from Boiler 1 are limited to 0.54 lb/MMBtu, 410.40 lb/hr and 1,740 tons per twelve consecutive month period.
- Boiler 1 shall have properly maintained and operated Continuous Monitoring Systems or approved alternatives for continuously monitoring the NOx concentration in the exhaust gas, meeting all the requirements of §2108.03 at all times with the exception of emergency or planned outages, repairs, or maintenance.
- Boiler 1 shall be properly maintained and operated according to good engineering and air pollution control practices at all times.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, NOx emissions from Boiler 1 could, in theory, be controlled with:

(a) Combustion Optimization
(b) Reduced Air Preheat
(c) Low Excess Air
(d) Staged Combustion - Air Staging
(e) Staged Combustion - Fuel Staging
(f) Fuel Re-burn
(g) Water/Steam Injection
(h) Flue Gas Recirculation
(i) Low NOx Burners
(j) Selective Catalytic Reduction
(k) Selective Non-Catalytic Reduction
(l) Oxidant Injection with Absorption
(m) Non Thermal Plasma Reactor
(n) Fuel Switching

These control measures have been organized into six categories: combustion optimization, staged combustion, additions to combustion air or fuel, burner replacement, post combustion controls, and fuel switching.

Pollution Prevention Techniques - Combustion Modifications

Boiler operation can be optimized to reduce NOx emissions by modifying boiler control settings. Sources can conduct a combustion optimization evaluation to determine the optimal settings for operating the boiler to address NOx emissions, as well as other factors. Alternatively, sources can specifically reduce the air preheat and/or the level of excess air to reduce NOx.

(a) Combustion Optimization

Combustion optimization involves conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms and actuators) and determining if equipment needs to be cleaned or repaired. Also, combustion optimization includes conducting various tests to collect data on the boilers operation. This data is then analyzed to determine the combination of settings that results in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

Tune-ups are used to improve efficiency, save money, reduce combustion emissions, and to ensure safe operations. A tune-up generally involves: conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms and actuators); determining if equipment needs to be cleaned, repaired, or replaced; investigating levels of excess air and emissions of NOx and CO; evaluating temperatures and pressures; and inspecting for leakage and condensate. The data is analyzed and adjustments are made to determine the combination of settings that results in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers[34], it was found that 1-5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1-5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the overall reduction in emissions that tune-ups can achieve because the pre-tune-up status is unknown.

(b) Reduced Air Preheat (RAP)

Boiler combustion air can be preheated using boiler exhaust to improve boiler efficiency. However, the technique can inherently increase NOx emissions because flame temperature is increased (relative to an identical boiler without preheating). Air preheaters are typically used on coal stoker grate water-tube boilers with a heat input capacity greater than 100 MMBtu/hr.[35]

RAP is a technique in which the primary combustion zone peak temperature is lowered by reducing the preheating of combustion air. One notable advantage of this strategy is that no significant capital expenses for new or modified hardware are required.

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[34] Eckerlin, Dr. Herbert M. and Eric W. Soderberg, USI Boiler Efficiency Program: A Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities. Prepared for the State Energy Office, NC Department of Administration. Revised 2/25/04.
[35] Id.

(c) Low Excess Air (LEA)

Controlling excess air used during fuel combustion can substantially affect NOx formation by determining the amount of oxygen available for NOx reaction. At a given excess air level, NOx emissions increase as the temperature of the combustion zone increases. LEA is a burner optimization strategy in which the combustion unit is operated at the lowest excess air level allowable (i.e. a level that provides efficient, reliable, safe and complete combustion). The reduction in excess air typically reduces NOx emissions by 10% (in natural gas-fired units) and reduces the total flue gas flow and improves heat transfer.[36] With CEMS and feedback control, excess air can be accurately controlled to maintain a level that promotes optimum combustion and burning conditions in addition to lowering NOx emissions. Reducing excess air can also result in increased energy productivity (the amount of energy consumed per unit of production) which further reduces emissions.

Precise implementation of LEA is necessary to avoid incomplete combustion that may result in a decrease in energy efficiency, a decrease in steam temperature, and a significant increase in CO emissions. Without a strict control system, these characteristics can also lead to corrosion, opacity concerns, and even fires in air preheaters and ash hoppers (where applicable). One notable advantage of this strategy is that significant capital expenses for new or modified hardware are not required.

Staged Combustion

Staged combustion relies on the reduction of the peak flame zone temperature (and/or oxygen levels) to reduce NOx formation, and is achieved by delaying or staging the addition of combustion air.

(d) Air Staging

Air staging can be carried out using overfire air (OFA) or two-stage combustion. With air staged combustion, the combustion air is controlled and distributed to create different combustion zones. The flame temperature is consequently reduced, which reduces the NOx created. In the first zone, the air is sparingly distributed to create an initial sub-stoichiometric fuel rich zone. In the second zone above the first, the air is generously introduced to complete the combustion in a high excess air, low temperature zone, reducing thermal NOx formation.

(e) Fuel Staging

Staged fuel combustion can be accomplished using burners out of service (BOOS), biasing the fuel flow to specific burners (a.k.a., biased firing), and fuel re-burning. These methods create different zones of fuel burning, such as fuel rich and fuel lean zones, within the combustion unit by shutting off fuel flow, diverting fuel from specific burners, or by controlling air and fuel injection zones. Separating the combustion zones reduces the flame temperature, thereby reducing NOx. BOOS and biasing the fuel flow to specific burners cannot be conducted on boilers with only one burner because these are techniques that use multi-burners. Staged fuel combustion can achieve up to 50% NOx reduction.

(f) Fuel Re-burn

Fuel re-burning is a staged fuel combustion technique where fuel is introduced downstream of the primary combustion chamber to create a secondary combustion zone. However,

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[36] Cleaver Brooks Boiler Emission Guide - Reference Guide. 3rd Edition. Available at http://www.cleaverbrooks.com/uploadedFiles/Internet_Content/Reference_Center/Insights/Boiler%20Emissions%20Guide.pdf. Accessed February 2015.

with fuel re-burning, the NOx formed in the primary combustion area is destroyed in the re-burn area. The additional fuel is often natural gas. Emission reductions of up to 60% are possible.[37]

Additions to Combustion Air or Fuel

Boiler operation can be optimized to reduce NOx emissions by injecting flue gases, water (or steam), oxygen, or other materials into the combustion zone or the fuel. This addition reduces NOx formation by altering the stoichiometric ratio of the combustion reactants. Typically, injected components (e.g. flue gas or steam) dilutes the combustion zone and reduces the temperature of the combustion zone and reduces the formation of thermal NOx. When oxygen is added, it displaces an equivalent amount of air and therefore reduces the amount of nitrogen available for NOx formation.

(g) Water/Steam Injection (WSI)

As the name suggests, WSI involves the injection of water (or steam) into the primary combustion zone to reduce peak flame temperature and decreases NOx formation. More specifically, this process dilutes the combustion gas stream and functions as a heat sink; i.e. a portion of the available thermal energy is used to vaporize the water and raise the vaporized water temperature to the combustion temperature. WSI is a proven technology for oil-fired, coal-fired boilers, and combustion turbines, with a NOx reduction potential of up to 80% in natural gas-fired units.[38]

(h) Flue Gas Recirculation (FGR)

FGR is a technique in which a portion of the (inert) flue gas is recycled back to primary combustion zone. As a result, it reduces the formation of thermal NOx by lowering peak flame temperature and reducing the concentration of oxygen. FGR typically reduces emissions of NOx in a natural gas boiler by about 53 to 74%.[39]

Burner Replacement

(i) Low NOx Burners (LNB)

LNB is a unique pollution prevention control option in the sense that it simply refers to a burner that has been designed to emit less NOx than conventional burners. LNB are usually designed to incorporate one or more combustion control techniques within the burner such as staged combustion, fuel/air premixing, flue gas recirculation, low excess air, or a combination of these techniques. In all cases, the NOx emissions are controlled by lowering combustion zone temperatures to reduce the production of thermal NOx. [40]

LNB is a relative term in the sense that is has evolved over time. For example, a 25-year old combustion unit "equipped with LNB" may have a NOx emission rate of approximately 50 ppm, while a new unit "equipped with LNB" may have a NOx emission rate of less than 30 ppm.[41] LNB technology is available from many manufacturers and applicable to all

[37] Northeast States For Coordinated Air Use Management (NESCAUM), and Praveen Amar. Applicability and Feasibility of NOx, SO2, and PM Emissions Control Technologies for Industrial Commercial, and Institutional Boilers. November, 2008 (Revised January 2009). http://www.nescaum.org/documents/ici-boilers-20081118-final.pdf. Accessed February 2015.
[38] Id.
[39] Id.
[40] Id.
[41] Id.

fuels. Low NOx burners typically achieve NOx reductions of 2 to 71 percent over conventional burners.[42]

Add-on Pollution Control Techniques

(j) Selective Catalytic Reduction (SCR)

SCR is an add-on control technique that controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water. The catalyst serves to lower the activation energy of these reactions, which allows the NOx conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F but typically is designed to occur between 600°F and 750°F, depending on the catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

(k) Selective Non-Catalytic Reduction (SNCR)

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires a flue gas of 1700-2000 °F.[43] Units with flue gas temperatures within this range, residence times less than one second, and high levels of uncontrolled NO_x are good candidates for SNCR control.[44]

Units can be retrofitted for SNCR by installing injection nozzles through holes cut in the furnace wall. The nozzles are connected by piping to air or steam and chemical supplies. Bulk chemical storage is normally remote from the individual heater and can be used for more than one heater or boiler. The SNCR systems require rapid chemical diffusion in the flue gas. The injection point must be selected to ensure adequate flue gas residence time and to avoid tube impingement. Computer modeling can be used to develop the optimum injection points.[45]

(l) Oxidant Injection with Absorption

This technique involves two stages. First, an oxidant (ozone or hydrogen peroxide) is injected and mixed into the exhaust of a combustion unit. NOx within the air flow is oxidized to its water-soluble higher valence states (e.g. NO_3). Second, a gas absorber is subsequently used to remove the water-soluble NOx from the gas stream. Water, hydrogen peroxide, or an alkaline fluid typically function as the absorbent.[46]

(m) Non Thermal Plasma Reactor

Ammonia, methane, or hexane may be used as reducing agents to react with NOx in exhaust gas within an electron beam generated plasma. Ionized reducing agents are created by a transient high voltage which reacts with NOx for a removal of greater than 94 percent.[47]

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[42] Id.
[43] Id.
[44] U.S. EPA. Air Pollution Control Technology Fact Sheet; Selective Non-Catalytic Reduction (EPA-452/F-03-031). 2003. http://www.epa.gov/ttncatc1/dir1/fsncr.pdf. Accessed January, 2015.
[45] Id.
[46] U.S. EPA. Technical Bulletin; Nitrogen Oxides, Why and How They Are Controlled (EPA 456/F-99-006R). November: 1999. Available at http://www.epa.gov/ttncatc1/dir1/fnoxdoc.pdf, accessed January 2015.
[47] Id.

Fuel Switching

(n) Fuel Switching - Natural Gas

Fuel switching reduces NOx formation by reducing fuel NOx. By replacing high-nitrogen fuels with low-nitrogen fuels, the overall nitrogen available for oxidation is reduced, lowering NOx emissions. The primary fuel for the Clairton batteries is COG. However, under rare circumstances, stabilized natural gas may be used as underfiring fuel.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from Boiler 1. In summary, it was determined that SCR and SNCR are technically feasible control options, the economic feasibility of which is evaluated in Step 3.

(b)-(f) Various Types of Combustion Modifications and (i) Low NOx Burners

In response to the 1996 RACT process, Boiler 1 has been tuned and modified for optimal efficiency. Specifically, Boiler 1 already uses fuel staging (a form of staged combustion) and low excess air to reduce the NOx generated by the unit. More specifically, Boiler 1's bottom burners operate with a fuel rich combustion zone and the top burners operate with a fuel lean combustion zone.

A review of 2013 CEMS data (for Boiler 1 and Boiler 2) indicates that each boiler's average annual NOx emission rate is typically <50% of the permitted 0.54 lb/MMBtu NOx emission limit. Manufacturers of burners have indicated (i.e. quoted) that replacement LNB would not reduce NOx emissions beyond what is currently being achieved. [NOTE: LNBs are listed here as infeasible with respect to the current permit limit].

Achieving further NOx reductions from combustion modifications or boiler tuning are not expected to be feasible. A retrofit of boiler design would need to be modeled and analyzed using computer simulation to determine if NOx emission reductions could be achieved and to what extent. For this reason, combined with the existing NOx control measures (staged combustion and low excess air), boiler consultants and vendors contacted by US Steel would not provide quotes for any form of combustion modifications or controls.

As a result, additional combustion modifications including the addition of LNB are considered to be technically infeasible control options for reducing NOx emissions.

(g) Water/Steam Injection

Water/steam injection (WSI) has been proven to reduce NOx emissions but does so with significant operational drawbacks, namely: reduced thermal efficiency, reduced steam production, and increased equipment corrosion. For these reasons, WSI has been primarily used on gas turbines where the reduction in thermal efficiency (and the resulting increase in fuel consumption) is much less than that which would be experienced by a steam boiler.

WSI is considered to be a technically infeasible control option for reducing NOx emissions.

(h) Flue Gas Recirculation (FGR)

Operation of Boiler 1 has been tuned for low excess air to reduce NOx emissions. Further suppression/reduction of air by any means would likely terminate the flame, and even the pilot, leading to incomplete combustion. If that scenario was to occur, VOC and opacity emissions would increase and likely result in permit violations.

As a result, FGR is considered to be a technically infeasible control option for reducing NOx emissions.

(n) Fuel switching

COG has already been determined to be the ideal primary fuel for each boiler at Clairton.

(l) – (m) Oxidant Injection with Absorption and Non-Thermal Plasma Reactor

There is no evidence that oxidant injection with absorption or a non-thermal plasma reactor has been successfully used with an industrial/commercial/institutional boiler, let alone a COG-fired boiler. As a result, oxidant injection with absorption and non-thermal plasma reactor are considered to be undemonstrated technologies and technically infeasible control options for reducing NOx emissions.

Step 3 - Evaluate Control Options

Periodic tune-ups, SCR, and SNCR have been determined to be technically feasible control options considering the exhaust characteristics of Boiler 1 and the demonstrated effectiveness of various technologies on other boiler systems. As a result, these options were evaluated further.

NOx emissions from Boiler 1 are limited to 0.54 lb/MMBtu, 410.40 lb/hr, and 1,740 tons per twelve consecutive month period. The following table presents the estimated control efficiency and potential NOx reductions of the technically feasible control options.

Table 9 - Potential NOx Reductions from Technically Feasible Control Options for Boiler 1

Technically Feasible Control Option	Estimated Control Efficiency	Potential NOx Emissions Reductions (ton/yr)[48]	Estimated Post-control NOx emissions (lb/MMBtu)
Tune ups	2%	35	<0.54
SCR	90%	1,566	0.054
SNCR	45%	783	0.297

Using information provided by US Steel and collected by ACHD, a thorough economic analysis of SCR and SNCR was conducted - see Appendix A. The assessment for tune-ups is based on information provided in the following report: "USI Boiler Efficiency Program a Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities" February, 2004.[49] The SCR and SNCR analyses consider the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, and nearly all calculated values used to determine costs, were

[48] Determined as the boiler allowable PTE (ton/yr) x Estimated control efficiency (%)
[49] Available at http://infohouse.p2ric.org/ref/49/48741.pdf. Accessed April 2015.

determined using the methodology described in the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001) and other technical resources available in the EPA Clean Air Technology Center.

Calendar year 1998 data was the basis of the cost estimates and appropriately updated using the Chemical Engineering Plant Cost Index (an accepted approach for RACT/BACT/BART analyses). While other indices were considered, such as the Consumer Price Index and the Producers Price Index, the Chemical Engineering Plant Cost Index was the most comprehensive fit for the collection of equipment and structures covered by this analysis.

Since COG and blast furnace gas (BFG) are already fully used by the US Steel processes, fuel costs were based on the purchase of natural gas for any supplemental heat. Natural gas pricing was based on the U.S. Energy Information Administration and natural gas pricing for industrial users in Pennsylvania (latest available report). Electric costs were also based upon this reference. Cost figures were also supplemented by use of other published documents, such as the previously referenced Midwest States BART document for Iron and Steel Mills, as well as vendor provided information (where available). Certain items used in the analysis were based on site-specific or U.S. Steel specific information, such as the interest rate on capital, natural gas cost, ammonia costs, and vendor quotes.

Annualized costs are based on an interest rate of 7%, and an equipment life of 15 years. The basis of cost-effectiveness, used to evaluate control options, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost analysis is provided the following table:

Table 10. Economic Analysis of Technically Feasible Control Options for Boiler 1[a]

Technically Feasible Control Option	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Potential NOx Removal (ton/yr)	Cost Effectiveness ($/ton NOx removed)
Tune ups	$6,500	$2,000	35	$60
SCR	$13,224,600	$10,853,500	1,566	$6,900
SNCR	$3,652,000	$29,965,700	783	$38,300

The large annualized cost for both SCR and SNCR is dominated by the significant increase in supplemental natural gas that would be consumed. The requisite fuel consumption is necessary to heat the boiler exhaust to the minimum SCR and SNCR operating temperatures.

With a calculated cost-effectiveness of more than $38,000 per ton of NOx removed, ACHD has determined that SNCR is not an economically feasible control option for Boiler 1. With a calculated cost effectiveness of $6,900 per ton of NOx removed, ACHD has determined that SCR is not an economically feasible control option for Boiler 1.

Step 4 – Select RACT

ACHD has determined that NOx RACT for Boiler 1 is:

1. Continued compliance with permit conditions.
2. An annual tune-up pursuant to the provisions of §2105.06.d.2, which requires that the tune-up include, at a minimum:

- Inspection, adjustment, cleaning, or replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
- Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NOX, and to the extent practicable minimize emissions of CO; and
- Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

Additionally, the following records must be maintained for each adjustment conducted in the annual tune-up:

- The date of the adjustment procedure;
- The name of the service company and technicians;
- The operating rate or load after adjustment;
- The CO and NOx emission rates before and after adjustment;
- The excess oxygen rate after adjustment; and
- Other information required by the applicable operating permit.

The source may petition ACHD to reduce the frequency of the tune-ups to biennially, if there is not a significant change in the NOx and CO emission rate between subsequent years following a tune-up.

[a] NOTE: ERG's NOx RACT evaluation for Boilers 1, 2, R1, R2, T1 and T2 determined that SCR was cost effective at $6,000 - $7,800 per ton of NOx removed (based on PTE). However, according to the Title V TSD, the 2012 NOx RACT determinations completed by ACHD state that SCR is not technically feasible (no explanation) for Boilers 1 and 2, and not economically feasible for Boilers R1, R2, T1 and T2 (no supporting documentation). Given that actual emissions for Boilers R1, R2, T1 and T2 are approximately 3% of PTE, Clairton can easily accept more stringent NOx limits to make SCR cost prohibitive by a large margin. The same scenario applies to Boiler 1 and 2, but to a lesser extent. As a result, the NOx RACT evaluations do not include proposed RACT limits. Ultimately, ERG expects Clairton to accept more stringent NOx limits that cause SCR to be cost prohibitive (like SNCR) and consequently make RACT equal to annual tune-ups.

E. RACT for NOx – Boiler 2

Process/Unit description – Boiler 2

Clairton uses a combination of six boilers to produce steam for various operations at the plant. Each boiler combusts COG as its primary fuel and natural gas as its secondary/backup fuel. Boiler 2 has a heat input capacity of 481 MMBtu/hr (HHV) and is the only four-wall-fired-type unit at the plant. It is also the only swing-loaded boiler; continuously operated at varying load throughout the year to satisfy the plant's primary steam demands and is only shutdown for annual maintenance.

Pursuant to Condition V.BB.1 of Clairton's Title V permit:

- NOx emissions from Boiler 2 are limited to 0.54 lb/MMBtu, 259.74 lb/hr, and 1,285 tons per twelve consecutive month period.
- Boiler 2 shall have properly maintained and operated Continuous Monitoring Systems or approved alternatives for continuously monitoring the NOx concentration in the exhaust gas, meeting all the requirements of §2108.03 at all times with the exception of emergency or planned outages, repairs or maintenance.
- Boiler 2 shall be properly maintained and operated according to good engineering and air pollution control practices at all times.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, NOx emissions from Boiler 2 could, in theory, be controlled with:

(a) Combustion Optimization
(b) Reduced Air Preheat
(c) Low Excess Air
(d) Staged Combustion - Air Staging
(e) Staged Combustion - Fuel Staging
(f) Fuel Re-burn
(g) Water/Steam Injection
(h) Flue Gas Recirculation
(i) Low NOx Burners
(j) Selective Catalytic Reduction
(k) Selective Non-Catalytic Reduction
(l) Oxidant Injection with Absorption
(m) Non Thermal Plasma Reactor
(n) Fuel Switching

These control measures have been organized into six categories: combustion optimization, staged combustion, additions to combustion air or fuel, burner replacement, post combustion controls, and fuel switching.

Pollution Prevention Techniques - Combustion Modifications

Boiler operation can be optimized to reduce NOx emissions by modifying boiler control settings. Sources can conduct a combustion optimization evaluation to determine the optimal settings for operating the boiler to address NOx emissions as well as other factors. Alternatively, sources can specifically reduce the air preheat and/or the level of excess air to reduce NOx.

(a) Combustion Optimization

Combustion optimization involves conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms, and actuators) and determining if equipment needs to be cleaned or repaired. Also, combustion optimization includes conducting various tests to collect data on the boilers operation. This data is then analyzed to determine the combination of settings that result in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

Tune-ups are used to improve efficiency and save money, reduce combustion emissions, and to ensure safe operations. A tune-up generally involves: conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms, and actuators); determining if equipment needs to be cleaned, repaired, or replaced; investigating levels of excess air and emissions of NOx and CO; evaluating temperatures and pressures; and inspecting for leakage and condensate. The data is analyzed and adjustments are made to determine the combination of settings that results in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers[50], it was found that 1-5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1-5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the overall reduction in emissions that tune-ups can achieve because the pre-tune-up status is unknown.

(b) Reduced Air Preheat (RAP)

Boiler combustion air can be preheated using boiler exhaust to improve boiler efficiency. However, the technique can inherently increase NOx emissions because flame temperature is increased (relative to an identical boiler without preheating). Air preheaters are typically used on coal stoker grate water-tube boilers with a heat input capacity greater than 100 MMBtu/hr.[51]

RAP is a technique in which the primary combustion zone peak temperature is lowered by reducing the preheating of combustion air. One notable advantage of this strategy is that no significant capital expenses for new or modified hardware are required.

(c) Low Excess Air (LEA)

Controlling excess air used during fuel combustion can substantially affect NOx formation by determining the amount of oxygen available for NOx reaction. At a given excess air level, NOx emissions increase as the temperature of the combustion zone increases. LEA is a burner optimization strategy in which the combustion unit is operated at the lowest excess air level allowable (i.e. a level that provides efficient, reliable, safe, and complete combustion). The reduction in excess air typically reduces NOx emissions by 10% (in natural gas-fired units), reduces the total flue gas flow, and improves heat transfer.[52] With CEMS and feedback control, excess air can be accurately controlled to maintain a level

[50] Id.
[51] Id.
[52] Id.

that promotes optimum combustion and burning conditions in addition to lowering NOx emissions. Reducing excess air can also result in increased energy productivity (the amount of energy consumed per unit of production) which further reduces emissions.

Precise implementation of LEA is necessary to avoid incomplete combustion that may result in a decrease in energy efficiency, a decrease in steam temperature, and a significant increase in CO emissions. Without a strict control system, these characteristics can also lead to corrosion, opacity concerns, and even fires in air preheaters and ash hoppers (where applicable). One notable advantage of this strategy is that significant capital expenses for new or modified hardware are not required.

Staged Combustion

Staged combustion relies on the reduction of the peak flame zone temperature (and/or oxygen levels) to reduce NOx formation and is achieved by delaying or staging the addition of combustion air.

(d) Air Staging

Air staging can be carried out using overfire air (OFA) or two-stage combustion. With air staged combustion, the combustion air is controlled and distributed to create different combustion zones. The flame temperature is consequently reduced, which reduces the NOx created. In the first zone, the air is sparingly distributed to create an initial sub-stoichiometric fuel rich zone. In the second zone above the first, the air is generously introduced to complete the combustion in a high excess air, low temperature zone, reducing thermal NOx formation.

(e) Fuel Staging

Staged fuel combustion can be accomplished using burners out of service (BOOS), biasing the fuel flow to specific burners (a.k.a., biased firing), and fuel re-burning. These methods create different zones of fuel burning, such as fuel rich and fuel lean zones within the combustion unit by shutting off fuel flow, diverting fuel from specific burners, or by controlling air and fuel injection zones. Separating the combustion zones, reduces the flame temperature, thereby reducing NOx. BOOS and biasing the fuel flow to specific burners cannot be conducted on boilers with only one burner because these are techniques that use multi-burners. Staged fuel combustion can achieve up to 50% NOx reduction.

(f) Fuel Re-burn

Fuel re-burning is a staged fuel combustion technique where fuel is introduced downstream of the primary combustion chamber to create a secondary combustion zone. However, with fuel re-burning, the NOx formed in the primary combustion area is destroyed in the re-burn area. The additional fuel is often natural gas. Emission reductions of up to 60% are possible.[53]

Additions to Combustion Air or Fuel

Boiler operation can be optimized to reduce NOx emissions by injecting flue gases, water (or steam), oxygen, or other materials into the combustion zone or the fuel. This addition reduces NOx formation by altering the stoichiometric ratio of the combustion reactants. Typically, injected components (e.g. flue gas or steam) dilutes the combustion zone, reduces the temperature of the combustion zone, and reduces the formation of thermal NOx. When oxygen

[53] Id.

is added, it displaces an equivalent amount of air and therefore reduces the amount of nitrogen available for NOx formation.

(g) Water/Steam Injection (WSI)

As the name suggests, WSI involves the injection of water (or steam) into the primary combustion zone to reduce peak flame temperature and decrease NOx formation. More specifically, this process dilutes the combustion gas stream and functions as a heat sink; i.e. a portion of the available thermal energy is used to vaporize the water and raise the vaporized water temperature to the combustion temperature. WSI is a proven technology for oil-fired, coal-fired boilers, and combustion turbines, with a NOx reduction potential of up to 80% in natural gas-fired units.[54]

(h) Flue Gas Recirculation (FGR)

FGR is a technique in which a portion of the (inert) flue gas is recycled back to primary combustion zone. As a result, it reduces the formation of thermal NOx by lowering peak flame temperature and reducing the concentration of oxygen. FGR typically reduces emissions of NOx in a natural gas boiler by about 53 to 74%.[55]

Burner Replacement

(i) Low NOx Burners (LNB)

LNB is a unique pollution prevention control option in the sense that it simply refers to a burner that has been designed to emit less NOx than conventional burners. LNB are usually designed to incorporate one or more combustion control techniques within the burner, such as staged combustion, fuel/air premixing, flue gas recirculation, low excess air, or a combination of these techniques. In all cases, the NOx emissions are controlled by lowering combustion zone temperatures to reduce the production of thermal NOx. [56]

LNB is a relative term in the sense that is has evolved over time. For example, a 25-year old combustion unit "equipped with LNB" may have a NOx emission rate of approximately 50 ppm, while a new unit "equipped with LNB" may have a NOx emission rate of less than 30 ppm.[57] LNB technology is available from many manufacturers and applicable to all fuels. Low NOx burners typically achieve NOx reductions of 2 to 71 percent over conventional burners.[58]

Add-on Pollution Control Techniques

(j) Selective Catalytic Reduction (SCR)

SCR is an add-on control technique that controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water. The catalyst serves to lower the activation energy of these reactions, which allows the NOx conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F but typically is designed to occur between 600°F and 750°F

[54] Id.
[55] Id.
[56] Id.
[57] Id.
[58] Id.

depending on the catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

(k) Selective Non-Catalytic Reduction (SNCR)

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires a flue gas of 1700-2000 °F.[59] Units with flue gas temperatures within this range, residence times less than one second, and high levels of uncontrolled NO_x are good candidates for SNCR control.[60]

Units can be retrofitted for SNCR by installing injection nozzles through holes cut in the furnace wall. The nozzles are connected by piping to air or steam and chemical supplies. Bulk chemical storage is normally remote from the individual heater and can be used for more than one heater or boiler. The SNCR systems require rapid chemical diffusion in the flue gas. The injection point must be selected to ensure adequate flue gas residence time and to avoid tube impingement. Computer modeling can be used to develop the optimum injection points.[61]

(l) Oxidant Injection with Absorption

This technique involves two stages. First, an oxidant (ozone or hydrogen peroxide) is injected and mixed into the exhaust of a combustion unit. NOx within the air flow is oxidized to its water-soluble higher valence states (e.g. NO_3). Second, a gas absorber is subsequently used to remove the water-soluble NOx from the gas stream. Water, hydrogen peroxide, or an alkaline fluid typically function as the absorbent.[62]

(m) Non Thermal Plasma Reactor

Ammonia, methane, or hexane may be used as reducing agents to react with NOx in exhaust gas within an electron beam generated plasma. Ionized reducing agents are created by a transient high voltage which reacts with NOx for a removal of greater than 94 percent.[63]

Fuel Switching

(n) Fuel Switching - Natural Gas

Fuel switching reduces NOx formation by reducing fuel NOx. By replacing high-nitrogen fuels with low-nitrogen fuels, the overall nitrogen available for oxidation is reduced, lowering NOx emissions. The primary fuel for the Clairton batteries COG. However, under rare circumstances, stabilized natural gas may be used as underfiring fuel.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from Boiler 2. In summary, it was determined that SCR and SNCR are technically feasible control options, the economic feasibility of which is evaluated in Step 3.

[59] Id.
[60] Id.
[61] Id.
[62] Id.
[63] Id.

(b)-(f) Various Types of Combustion Modifications and (i) Low NOx Burners

Boiler 2 is equipped with oxygen sensors that allow Clairton to closely control air-to-fuel ratios in the units. Results from stack testing indicates that the boilers are already operating at a low excess air rate; a form of NOx control.

A review of 2013 CEMS data Boiler 2 indicated that the boiler's average annual NOx emission rate is typically <50% of the permitted 0.54 lb/MMBtu NOx emission limit; a rate commonly associated with packaged natural gas-fired boilers equipped with LNB. Burner manufacturers have indicated (i.e. quoted) that replacement LNB would not reduce NOx emissions beyond what is currently being achieved by the boilers at Clairton. Therefore, LNBs considered infeasible.

Achieving further NOx reductions from combustion modifications is not expected to be feasible. A retrofit of boiler design would need to be modeled and analyzed using computer simulation to determine if NOx emission reductions could be achieved and to what extent. For this reason, combined with the existing NOx control measures, boiler consultants and vendors contacted by US Steel would not provide quotes for any form of combustion modifications or controls.

As a result, additional combustion modifications, including the addition of LNB, are considered to be technically infeasible control options for reducing NOx emissions.

(g) Water/Steam Injection

Water/steam injection (WSI) has been proven to reduce NOx emissions but does so with significant operational drawbacks, namely: reduced thermal efficiency, reduced steam production, and increased equipment corrosion. For these reasons, WSI has been primarily used on gas turbines where the reduction in thermal efficiency (and the resulting increase in fuel consumption) is much less than that which would be experienced by a steam boiler.

WSI is considered to be a technically infeasible control option for reducing NOx emissions.

(h) Flue Gas Recirculation (FGR)

Operation of Boiler 2 has been tuned for low excess air. Further suppression/reduction of air by any means would likely terminate the flame, and even the pilot, leading to incomplete combustion. If that scenario was to occur, VOC and opacity emissions would increase and likely result in permit violations.

As a result, FGR is considered to be a technically infeasible control option for reducing NOx emissions.

(n) Fuel switching

COG has already been determined to be the ideal primary fuel for each boiler at Clairton.

(l) – (m) Oxidant Injection with Absorption and Non-Thermal Plasma Reactor

There is no evidence that oxidant injection with absorption, or a non-thermal plasma reactor, has been successfully used with an industrial/commercial/institutional boiler, let alone a COG-fired boiler. As a result, oxidant injection with absorption and non-thermal plasma reactor are considered to be undemonstrated technologies and technically infeasible control options for reducing NOx emissions.

Step 3 - Evaluate Control Options

Periodic tune-ups, SCR, and SNCR have been determined to be technically feasible control options considering the exhaust characteristics of Boiler 2 and the demonstrated effectiveness of various technologies on other boiler systems. As a result, these options were evaluated further.

NOx emissions from Boiler 2 are limited to 0.54 lb/MMBtu, 259.74 lb/hr and 1,285 tons per twelve consecutive month period. The following table presents the estimated control efficiency and potential NOx reductions of the technically feasible control options.

Table 11 - Potential NOx Reductions from Technically Feasible Control Options for Boiler 2

Technically Feasible Control Option	Estimated Control Efficiency	Potential NOx Emissions Reductions (ton/yr)[64]	Estimated Post-control NOx emissions (lb/MMBtu)
Tune ups	2%	25.7	<0.54
SCR	90%	1,157	0.054
SNCR	45%	578	0.297

Using information provided by US Steel and collected by ACHD, a thorough economic analysis of SCR and SNCR was conducted - see Appendix A. The assessment for tune-ups is based on information provided in the following report: "USI Boiler Efficiency Program a Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities" (February, 2004).[65] The SCR and SNCR analyses consider the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, and nearly all calculated values used to determine costs, were determined using the methodology described in the “EPA Air Pollution Control Cost Manual, Sixth Edition” (document # EPA 452-02-001) and other technical resources available in the EPA Clean Air Technology Center.

Calendar year 1998 data was the basis of the cost estimates and appropriately updated using the Chemical Engineering Plant Cost Index; an accepted approach for RACT/BACT/BART analyses. While other indices were considered such as the Consumer Price Index, Producers Price Index, the Chemical Engineering Plant Cost Index was the most comprehensive fit for the collection of equipment and structures covered by this analysis.

Since COG and blast furnace gas (BFG) are already fully used by the US Steel processes, fuel costs were based on the purchase of natural gas for any supplemental heat. Natural gas pricing was based on the U.S. Energy Information Administration and natural gas pricing for industrial users in Pennsylvania (latest available report). Electric costs were also based upon this reference. Cost figures were also supplemented by use of other published documents, such as the previously referenced Midwest States BART document for Iron and Steel Mills, as well as vendor provided information (where available). Certain items used in the analysis were based on site-specific or U.S. Steel specific information, such as the interest rate on capital, natural gas cost, ammonia costs and vendor quotes.

[64] Determined as the boiler allowable PTE (ton/yr) x Estimated control efficiency (%)
[65] Id.

Annualized costs are based on an interest rate of 7%, and an equipment life of 15 years. The basis of cost-effectiveness, used to evaluate control options, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost analysis is provided the following table:

Table 12. Economic Analysis of Technically Feasible Control Options for Boiler 2 [See Comment in Boiler 1 RACT.]

Technically Feasible Control Option	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Potential NOx Removal (ton/yr)	Cost Effectiveness ($/ton NOx removed)
Tune ups	$6,500	$2,000	25.7	$80
SCR	$9,342,200	$6,244,400	1,157	$5,400
SNCR	$2,893,100	$16,665,200	578	$28,800

The large annualized cost for both SCR and SNCR is dominated by the significant increase in supplemental natural gas that would be consumed. The requisite fuel consumption is necessary to heat the boiler exhaust to the minimum SCR and SNCR operating temperatures.

With a calculated cost-effectiveness of more than $28,000 per ton of NOx removed, ACHD has determined that SNCR is not an economically feasible control option for Boiler 2. With a calculated cost-effectiveness of approximately $5,400 per ton of NOx removed, ACHD has determined that SCR is an economically feasible control option for Boiler 2.

Step 4 – Select RACT

ACHD has determined that NOx RACT for Boiler 2 is:

1. Installation of a SCR.
2. NOx emissions shall not exceed 133 tons per consecutive twelve month period and continued compliance with other permit conditions.
3. An annual tune-up pursuant to the provisions of §2105.06.d.2, which requires that the tune-up include, at a minimum:

- Inspection, adjustment, cleaning, or replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
- Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NOX, and to the extent practicable minimize emissions of CO; and
- Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

Additionally, the following records must be maintained for each adjustment conducted in the annual tune-up:

- The date of the adjustment procedure;
- The name of the service company and technicians;
- The operating rate or load after adjustment;
- The CO and NOx emission rates before and after adjustment;
- The excess oxygen rate after adjustment; and
- Other information required by the applicable operating permit.

The source may petition ACHD to reduce the frequency of the tune-ups to biennially, if there is not a significant change in the NOx and CO emission rate between subsequent years following a tune-up.

F. RACT for NOx – Boilers R1 (B005), R2 (B006), T1 (B007), and T2 (B008)

Process/Unit description – Boilers R1, R2, T1, and T2

Clairton uses a combination of six boilers to produce steam for various operations at the plant. Each boiler combusts COG as its primary fuel and natural gas as its secondary/backup fuel. Boilers R1, R2, T1, and T2 are packaged wall-fired-type units with heat input capacities of 229, 229, 156, and 156 MMBtu/hr, respectively. When either Boiler 1 or 2 are down, the four remaining boilers (R1, R2, T1, and T2) are operated to provide the required steam demands. Annual outages are planned during periods of lower steam demand (e.g. summer) so that less steam is required throughout the plant during annual outages; typically boilers R1, R2, and T1 operate near rated load and T2 is operated as a swing load.

Boilers R1 and R2 are identical. Boilers T1 and T2 are identical. Boilers R1/R2 and T1/T2 differ by design only in rated heat input capacity. As a result, the following RACT evaluation covers the four boilers collectively.

Pursuant to Conditions V.BB.1 and V.CC.1 of Clairton's Title V permit:

- NOx emissions from Boiler R1 are limited to 0.54 lb/MMBtu, 123.66 lb/hr, and 525 tons per twelve consecutive month period.
- NOx emissions from Boiler R2 are limited to 0.54 lb/MMBtu, 123.66 lb/hr, and 525 tons per twelve consecutive month period.
- NOx emissions from Boiler T1 are limited to 0.54 lb/MMBtu, 84.24 lb/hr, and 358 tons per twelve consecutive month period.
- NOx emissions from Boiler T2 are limited to 0.54 lb/MMBtu, 84.24 lb/hr, and 358 tons per twelve consecutive month period.
- Boilers R1, R2, T1, and T2 shall be properly maintained and operated according to good engineering and air pollution control practices at all times.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, NOx emissions from Boilers R1, R2, T1, and T2 could, in theory, be controlled with:

(a) Combustion Optimization
(b) Reduced Air Preheat
(c) Low Excess Air
(d) Staged Combustion - Air Staging
(e) Staged Combustion - Fuel Staging
(f) Fuel Re-burn
(g) Water/Steam Injection
(h) Flue Gas Recirculation
(i) Low NOx Burners
(j) Selective Catalytic Reduction
(k) Selective Non-Catalytic Reduction
(l) Oxidant Injection with Absorption
(m) Non Thermal Plasma Reactor
(n) Fuel Switching

These control measures have been organized into six categories: combustion optimization, staged combustion, additions to combustion air or fuel, burner replacement, post combustion controls, and fuel switching.

Pollution Prevention Techniques - Combustion Modifications

Boiler operation can be optimized to reduce NOx emissions by modifying boiler control settings. Sources can conduct a combustion optimization evaluation to determine the optimal settings for operating the boiler to address NOx emissions, as well as other factors. Alternatively, sources can specifically reduce the air preheat and/or the level of excess air to reduce NOx.

(a) Combustion Optimization

Combustion optimization involves conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms, and actuators) and determining if equipment needs to be cleaned or repaired. Also, combustion optimization includes conducting various tests to collect data on the boilers' operation. This data is then analyzed to determine the combination of settings that results in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

Tune-ups are used to improve efficiency and save money, reduce combustion emissions, and to ensure safe operations. A tune-up generally involves: conducting an evaluation of existing equipment (such as oxygen probes and other instrumentation, burners, dampers, heat transfer surfaces, tilt mechanisms, and actuators); determining if equipment needs to be cleaned, repaired, or replaced; investigating levels of excess air and emissions of NOx and CO; evaluating temperatures and pressures; and inspecting for leakage and condensate. The data is analyzed and adjustments are made to determine the combination of settings that results in optimal combustion with respect to NOx and CO emissions, opacity, efficiency, and sustainable operation of the boiler (i.e., elimination of combustion operations that excessively deteriorate the boiler).

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers[66], it was found that 1-5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1-5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the overall reduction in emissions that tune-ups can achieve because the pre-tune-up status is unknown.

(b) Reduced Air Preheat (RAP)

Boiler combustion air can be preheated using boiler exhaust to improve boiler efficiency. However, the technique can inherently increase NOx emissions because flame temperature is increased (relative to an identical boiler without preheating). Air preheaters are typically used on coal stoker grate water-tube boilers with a heat input capacity greater than 100 MMBtu/hr.[67]

RAP is a technique in which the primary combustion zone peak temperature is lowered by reducing the preheating of combustion air. One notable advantage of this strategy is that no significant capital expenses for new or modified hardware are required.

(c) Low Excess Air (LEA)

Controlling excess air used during fuel combustion can substantially affect NOx formation by determining the amount of oxygen available for NOx reaction. At a given excess air

[66] Id.
[67] Id.

level, NOx emissions increase as the temperature of the combustion zone increases. LEA is a burner optimization strategy in which the combustion unit is operated at the lowest excess air level allowable; i.e. a level that provides efficient, reliable, safe, and complete combustion. The reduction in excess air typically reduces NOx emissions by 10% (in natural gas-fired units), reduces the total flue gas flow, and improves heat transfer.[68] With CEMS and feedback control, excess air can be accurately controlled to maintain a level that promotes optimum combustion and burning conditions in addition to lowering NOx emissions. Reducing excess air can also result in increased energy productivity (the amount of energy consumed per unit of production) which further reduces emissions.

Precise implementation of LEA is necessary to avoid incomplete combustion, which may result in a decrease in energy efficiency, a decrease in steam temperature, and a significant increase in CO emissions. Without a strict control system, these characteristics can also lead to corrosion, opacity concerns, and even fires in air preheaters and ash hoppers (where applicable). One notable advantage of this strategy is that significant capital expenses for new or modified hardware are not required.

Staged Combustion

Staged combustion relies on the reduction of the peak flame zone temperature (and/or oxygen levels) to reduce NOx formation, and is achieved by delaying or staging the addition of combustion air.

(d) Air Staging

Air staging can be carried out using overfire air (OFA) or two-stage combustion. With air staged combustion, the combustion air is controlled and distributed to create different combustion zones. The flame temperature is consequently reduced, which reduces the NOx created. In the first zone, the air is sparingly distributed to create an initial sub-stoichiometric fuel rich zone. In the second zone above the first, the air is generously introduced to complete the combustion in a high excess air, low temperature zone, reducing thermal NOx formation.

(e) Fuel Staging

Staged fuel combustion can be accomplished using burners out of service (BOOS), biasing the fuel flow to specific burners (a.k.a., biased firing), and fuel re-burning. These methods create different zones of fuel burning, such as fuel rich and fuel lean zones, within the combustion unit by shutting off fuel flow, diverting fuel from specific burners, or by controlling air and fuel injection zones. Separating the combustion zones reduces the flame temperature, thereby reducing NOx. BOOS and biasing the fuel flow to specific burners cannot be conducted on boilers with only one burner because these are techniques that use multi-burners. Staged fuel combustion can achieve up to 50% NOx reduction.

(f) Fuel Re-burn

Fuel re-burning is a staged fuel combustion technique where fuel is introduced downstream of the primary combustion chamber to create a secondary combustion zone. However, with fuel re-burning, the NOx formed in the primary combustion area is destroyed in the re-burn area. The additional fuel is often natural gas. Emission reductions of up to 60% are possible.[69]

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[68] Id.
[69] Id.

Additions to Combustion Air or Fuel

Boiler operation can be optimized to reduce NOx emissions by injecting flue gases, water (or steam), oxygen, or other materials into the combustion zone or the fuel. This addition reduces NOx formation by altering the stoichiometric ratio of the combustion reactants. Typically, injected components (e.g. flue gas or steam) dilutes the combustion zone and reduces the temperature of the combustion zone, and reduces the formation of thermal NOx. When oxygen is added, it displaces an equivalent amount of air and therefore reduces the amount of nitrogen available for NOx formation.

(g) Water/Steam Injection (WSI)

As the name suggests, WSI involves the injection of water (or steam) into the primary combustion zone to reduce peak flame temperature and decrease NOx formation. More specifically, this process dilutes the combustion gas stream and functions as a heat sink; i.e. a portion of the available thermal energy is used to vaporize the water and raise the vaporized water temperature to the combustion temperature. WSI is a proven technology for oil-fired, coal-fired boilers, and combustion turbines, with a NOx reduction potential of up to 80% in natural gas-fired units.[70]

(h) Flue Gas Recirculation (FGR)

FGR is a technique in which a portion of the (inert) flue gas is recycled back to primary combustion zone. As a result, it reduces the formation of thermal NOx by lowering peak flame temperature and reducing the concentration of oxygen. FGR typically reduces emissions of NOx in a natural gas boiler by about 53 to 74%.[71]

Burner Replacement

(i) Low NOx Burners (LNB)

LNB is a unique pollution prevention control option in the sense that it simply refers to a burner that has been designed to emit less NOx than conventional burners. LNB are usually designed to incorporate one or more combustion control techniques within the burner such as staged combustion, fuel/air premixing, flue gas recirculation, low excess air, or a combination of these techniques. In all cases, the NOx emissions are controlled by lowering combustion zone temperatures to reduce the production of thermal NOx. [72]

LNB is a relative term in the sense that is has evolved over time. For example, a 25-year old combustion unit "equipped with LNB" may have a NOx emission rate of approximately 50 ppm while a new unit "equipped with LNB" may have a NOx emission rate of less than 30 ppm.[73] LNB technology is available from many manufacturers and applicable to all fuels. Low NOx burners typically achieve NOx reductions of 2 to 71 percent over conventional burners.[74]

[70] Id.
[71] Id.
[72] Id.
[73] Id.
[74] Id.

Add-on Pollution Control Techniques

(j) Selective Catalytic Reduction (SCR)

SCR is an add-on control technique that controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water. The catalyst serves to lower the activation energy of these reactions, which allows the NOx conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F but typically is designed to occur between 600°F and 750°F, depending on the catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

(k) Selective Non-Catalytic Reduction (SNCR)

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires a flue gas of 1700-2000 °F.[75] Units with flue gas temperatures within this range, residence times less than one second, and high levels of uncontrolled NO_x are good candidates for SNCR control.[76]

Units can be retrofitted for SNCR by installing injection nozzles through holes cut in the furnace wall. The nozzles are connected by piping to air or steam and chemical supplies. Bulk chemical storage is normally remote from the individual heater and can be used for more than one heater or boiler. The SNCR systems require rapid chemical diffusion in the flue gas. The injection point must be selected to ensure adequate flue gas residence time and to avoid tube impingement. Computer modeling can be used to develop the optimum injection points.[77]

(l) Oxidant Injection with Absorption

This technique involves two stages. First, an oxidant (ozone or hydrogen peroxide) is injected and mixed into the exhaust of a combustion unit. NOx within the air flow is oxidized to its water-soluble higher valence states (e.g. NO_3). Second, a gas absorber is subsequently used to remove the water-soluble NOx from the gas stream. Water, hydrogen peroxide, or an alkaline fluid typically function as the absorbant.[78]

(m) Non Thermal Plasma Reactor

Ammonia, methane, or hexane may be used as reducing agents to react with NOx in exhaust gas within an electron beam generated plasma. Ionized reducing agents are created by a transient high voltage which reacts with NOx for a removal of greater than 94 percent.[79]

[75] Id.
[76] Id.
[77] Id.
[78] Id.
[79] Id.

Fuel Switching

(n) Fuel Switching - Natural Gas

Fuel switching reduces NOx formation by reducing fuel NOx. By replacing high-nitrogen fuels with low-nitrogen fuels, the overall nitrogen available for oxidation is reduced, lowering NOx emissions. The primary fuel for the Clairton batteries is COG. However, under rare circumstances, stabilized natural gas may be used as underfiring fuel.

Step 2 – Eliminate Technically Infeasible Control Options

Each control option listed in Step 1 was evaluated to determine if it represents a technically feasible means of controlling NOx emissions from Boilers R1, R2, T1, and T2. In summary, it was determined that SCR and SNCR are technically feasible control options, the economic feasibility of which is evaluated in Step 3.

(b)-(f) Various Types of Combustion Modifications and (i) Low NOx Burners

Boilers R1, R2, T1 and T2 are equipped with oxygen sensors that allow Clairton to closely control air-to-fuel ratios in the units. Results from stack testing indicates that the boilers are already operating at a low excess air rate; a form of NOx control.

Recent stack tests for boilers R1, R2, T1, and T2 indicate that the NOx emission rates for the units range from 0.13 to 0.20 lb/MMBtu; rates commonly associated with packaged natural gas-fired boilers equipped with LNB. Burner manufacturers have indicated (i.e. quoted) that replacement LNB would not reduce NOx emissions beyond what is currently being achieved by the boilers at Clairton (Therefore, LNBs are listed here as technically infeasible.

Achieving further NOx reductions from combustion modifications or boiler tuning are not expected to be feasible. A retrofit of boiler design would need to be modeled and analyzed using computer simulation to determine if NOx emission reductions could be achieved and to what extent. For this reason, combined with the existing NOx control measures, boiler consultants and vendors contacted by US Steel would not provide quotes for any form of combustion modifications or controls.

As a result, additional combustion modifications (including the addition of LNB) are considered to be technically infeasible control options for reducing NOx emissions.

(g) Water/Steam Injection

Water/steam injection (WSI) has been proven to reduce NOx emissions but does so with significant operational drawbacks, namely: reduced thermal efficiency, reduced steam production, and increased equipment corrosion. For these reasons, WSI has been primarily used on gas turbines where the reduction in thermal efficiency (and the resulting increase in fuel consumption) is much less than that which would be experienced by a steam boiler.

WSI is considered to be a technically infeasible control option for reducing NOx emissions.

(h) Flue Gas Recirculation (FGR)

Operation of each boiler (R1, R2, T1, and T2) has been tuned for low excess air to reduce NOx emissions. Further suppression/reduction of air by any means would likely terminate the flame, and even the pilot, leading to incomplete combustion. If that scenario was to occur, VOC and opacity emissions would increase and likely result in permit violations.

As a result, FGR is considered to be a technically infeasible control option for reducing NOx emissions.

(n) Fuel switching

COG has already been determined to be the ideal primary fuel for each boiler at Clairton.

(l) – (m) Oxidant Injection with Absorption and Non-Thermal Plasma Reactor

There is no evidence that oxidant injection with absorption, or a non-thermal plasma reactor, has been successfully used with an industrial/commercial/institutional boiler, let alone a COG-fired boiler. As a result, oxidant injection with absorption and non-thermal plasma reactor are considered to be undemonstrated technologies and technically infeasible control options for reducing NOx emissions.

Step 3 - Evaluate Control Options

Periodic tune-ups, SCR, and SNCR have been determined to be technically feasible control options considering the exhaust characteristics of the boilers (R1, R2, T1, and T2) and the demonstrated effectiveness of various technologies on other boiler systems. As a result, these control options were evaluated further.

The following table presents the estimated control efficiency and potential NOx reductions of the technically feasible control options.

Table 13 - Potential NOx Reductions from Technically Feasible Control Options for Boilers R1, R2, T1 and T2

Technically Feasible Control Option	Estimated Control Efficiency	Potential NOx Emissions Reductions (ton/yr)[80]	Estimated Post-control NOx emissions (lb/MMBtu)[a]
Boilers R1 and R2 (figures are per boiler)			
Tune ups	2%	10.5	<0.54
SCR	90%	473	0.054
SNCR	45%	236	0.297
Boilers T1 and T2 (figures are per boiler)			
Tune ups	2%	7.2	<0.54
SCR	90%	322	0.054
SNCR	45%	161	0.297

[a] Using permit lb/hr * (100%-control efficiency %)/capacity in MMBTU/hr

Using information provided by US Steel and collected by ACHD, a thorough economic analysis of SCR and SNCR was conducted - see Appendix A. The assessment for tune-ups is based on information provided in the following report: "USI Boiler Efficiency Program a Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated

[80] Determined as the boiler allowable PTE (ton/yr) x Estimated control efficiency (%)

Facilities" February, 2004.[81] The SCR and SNCR analyses consider the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, and nearly all calculated values used to determine costs, were determined using the methodology described in the “EPA Air Pollution Control Cost Manual, Sixth Edition” (document # EPA 452-02-001) and other technical resources available in the EPA Clean Air Technology Center.

Calendar year 1998 data was used as the basis of the cost estimates and appropriately updated using the Chemical Engineering Plant Cost Index; an accepted approach for RACT/BACT/BART analyses. While other indices were considered, such as the Consumer Price Index, Producers Price Index, the Chemical Engineering Plant Cost Index was the most comprehensive fit for the collection of equipment and structures covered by this analysis.

Since COG and blast furnace gas (BFG) are already fully used by the US Steel processes, fuel costs were based on the purchase of natural gas for any supplemental heat. Natural gas pricing was based on the U.S. Energy Information Administration, natural gas pricing for industrial users in Pennsylvania (latest available report). Electric costs were also based upon this reference. Cost figures were also supplemented by use of other published documents, such as the previously referenced Midwest States BART document for Iron and Steel Mills, as well as vendor provided information (where available). Certain items used in the analysis were based on site-specific or U.S. Steel specific information, such as the interest rate on capital, natural gas cost, ammonia costs and vendor quotes.

Annualized costs are based on an interest rate of 7% and an equipment life of 15 years. The basis of cost-effectiveness, used to evaluate control options, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost analysis is provided the following table:

Table 14. Economic Analysis of Technically Feasible Control Options for Boilers T1, T2, R1 and R2 [See Comment in Boiler 1 RACT].

Technically Feasible Control Option	Total Capital Investment ($)	Total Annualized Cost ($/yr)	Potential NOx Removal (ton/yr)	Cost Effectiveness ($/ton NOx removed)
Boilers R1 and R2 (figures are per boiler)				
Tune ups	$6,500	$2,000	10.5	$200
SCR	$4,764,000	$2,475,800	473	$5,200
SNCR	$2,015,500	$5,788,400	236	$24,500
Boilers T1 and T2 (figures are per boiler)				
Tune ups	$6,500	$2,000	7.2	$300
SCR	$4,210,600	$1,931,300	322	$6,000
SNCR	$1,682,500	$4,441,600	161	$27,600

The large annualized cost for SNCR is dominated by the significant increase in supplemental natural gas that would be consumed. This requisite fuel consumption is necessary to heat the boiler exhaust to the minimum SCR and SNCR operating temperatures.

[81] Id.

With a calculated cost-effectiveness of more than $24,000 per ton of NOx removed, ACHD has determined that SNCR is not an economically feasible control option for Boilers R1, R2, T1 and T2. With a calculated cost-effectiveness of $5,200 per ton of NOx removed, ACHD has determined that SCR is an economically feasible control option for Boilers R1 and R2. With a calculated cost-effectiveness of $6,000 per ton of NOx removed, ACHD has determined that SCR is not an economically feasible control option for Boilers T1 and T2.

Step 4 – Select RACT

ACHD has determined that NOx RACT for Boilers R1, R2, T1, and T2 is:

1. Installation of SCR on boilers R1 and R2. NOx emissions for each boiler shall not exceed 54 tons per consecutive twelve month period. Continued compliance with other permit conditions.
2. Boilers T1 and T2 continue to comply with current permit conditions.
3. An annual tune-up pursuant to the provisions of §2105.06.d.2, which requires that the tune-up include, at a minimum:

- Inspection, adjustment, cleaning, or replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
- Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NOX, and to the extent practicable minimize emissions of CO; and
- Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

Additionally, the following records must be maintained for each adjustment conducted in the annual tune-up:

- The date of the adjustment procedure;
- The name of the service company and technicians;
- The operating rate or load after adjustment;
- The CO and NOx emission rates before and after adjustment;
- The excess oxygen rate after adjustment; and
- Other information required by the applicable operating permit.

The source may petition ACHD to reduce the frequency of the tune-ups to biennially, if there is not a significant change in the NOx and CO emission rate between subsequent years following a tune-up.

G. RACT for VOC – Underfiring of Coke Batteries B, 1, 2, 3, 13, 14, 15, 19, and 20

Process/Unit description – Underfiring

Clairton currently operates ten by-product coke oven batteries, each consisting of 64 to 87 ovens, identified as Batteries C, B, 1, 2, 3, 13, 14, 15, 19, and 20. (As explained previously in this document, Battery C is not addressed further.)

The coking process begins with the transfer, i.e. "charge", of coal through an opening in the top of the oven. Once the oven has been filled with coal and sealed, the oven is uniformly heated. Heat is produced from the combustion of COG in one-half of the flues (a process referred to as "underfiring") while the remaining flues transport combustion exhaust gas through a heat exchanger (called a regenerator). (Flues are located within the walls of the each coke oven. Regenerators are massive structures made of refractory brick and are located beneath the ovens and heating flues.) Underfiring exhaust gases leaving the regenerators are routed to, and ultimately emitted from, a "combustion stack". Each coking cycle typically takes between 16 to 18 hours.

In addition to producing coke, a by-product coke battery is designed and operated to collect the COG evolved from coal during the coking process. The COG escapes through an opening at the top of the oven at both ends of the coking chamber. Each opening is fitted with an offtake pipe, which routes the COG to the collection main for processing. VOC emissions from underfiring are primarily the result of incomplete COG combustion.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, EPA's CTG document for Volatile Organic Emissions from Stationary Sources [82], EPA's "Control Technologies for Hazardous Air Pollutants",[83] VOC emissions from coke battery underfiring could, in theory, be controlled with:

(a) Thermal Oxidation
(b) Carbon Adsorption
(c) Condensation
(d) Routing to a Boiler
(e) Routing to a Flare
(f) Combustion/Performance Optimization

A concise description of each of these technologies is as follows:

(a) Thermal Oxidation (TO)

Thermal oxidizers are refractory lined enclosures with one or more burners in which the waste gas stream is routed through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidizers typically operate at 1200 to 2100° Fahrenheit with residence times typically ranging from 0.5 to

[82] Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.
[83] Control Technologies for Hazardous Air Pollutants, EPA 625/6-86/014, September 1986. Available at: http://nepis.epa.gov/Adobe/PDF/20013494.PDF. Accessed January 28, 2015.

2 seconds. An efficient thermal oxidizer design must provide adequate residence time for complete combustion, sufficiently high temperatures for VOC destruction, and adequate velocities to ensure proper mixing without quenching combustion. The type of burners and their arrangement affect combustion rates and residence time; the more thorough the contact between the flame and VOC, the shorter the time required for complete combustion. Natural gas is required to ignite the flue gas mixtures and maintain combustion temperatures. Typically, a heat exchanger upstream of the oxidizer uses the heat content of the oxidizer flue gas to preheat the incoming VOC-laden stream to improve the efficiency of the oxidizer. Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation. Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.[84]

(b) Carbon Adsorption

Carbon adsorption is a process by which VOC is retained on a granular carbon surface, which is highly porous and has a very large surface-to-volume ratio. Organic vapors retained on the adsorbent are thereafter desorbed and both the adsorbate and absorbent are recovered. Carbon adsorption systems operated in two phases: adsorption and desorption. Adsorption is rapid and removes most of the VOC in the stream. Eventually, the adsorbent becomes saturated with the vapors and the system's efficiency drops. Regulatory considerations dictate that the adsorbent be regenerated or replaced soon after efficiency begins to decline. In regenerative systems, the adsorbent is reactivated with steam or hot air and the absorbate (solvent) is recovered for reuse or disposal. Non-regenerative systems require the removal of the adsorbent and replacement with fresh or previously regenerated carbon. Removal efficiencies of 95 to 99 percent can be achieved using carbon adsorption.[85] The effectiveness of carbon adsorption is largely dependent on available carbon sites.

(c) Condensation

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the latter, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners, carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of VOCs. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated

[84] Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 2015.

[85] Carbon Adsorption for Control of VOC Emissions: Theory and Full Scale System Performance (EPA-450/3-88-012). Available at: http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91009Z7B.txt. Accessed February 2015.

condenser is directly related to the lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors but are greater than 96% for the removal of saturated VOC.

(d) Routing to Boiler

Fireboxes of boilers can be potential afterburners for control of VOC if the temperature, turbulence, and flame contact are adequate to burn the combustible contaminant. Typically, emission streams are controlled in boilers or process heaters and used as supplemental fuel only if they have sufficient heating value (greater than 150 Btu/scf). If the waste VOC has appreciable heating value, the firebox must be specially designed to take advantage of the heat potential. When used as emission control devices, boilers or process heaters can provide destruction efficiencies of greater than 95 percent at little cost.[86]

There are some limitations in the application of boilers as emission control devices. Since these units are intended to provide heat or steam that is essential to process operations, they can only be used to control those emission streams that will not reduce their performance or reliability. Variations in stream flow rate and/or heating value, or the presence of corrosive compounds in the emission stream, could adversely affect the performance of a boiler or process heater.

(e) Routing to a Flare

Flares are typically applied when the heating value of the waste gases cannot be recovered economically because of intermittent or uncertain flow, or when process upsets occur. In general, flare performance depends on factors such as flare gas velocity, emission stream heating value, residence time in the combustion zone, waste gas/oxygen mixing, and flame temperature. If conditions in the flame zone are optimal, a non-assisted flare may achieve a VOC destruction efficiency of 98 percent or greater.[87] It may be necessary to add supplementary fuel to the emission stream to achieve this destruction efficiency if the net heating value of the emission stream is less than 300 Btu/scf. For assisted flares such as steam-assisted or air-assisted units, combustion efficiencies may be lower.

Flares are usually unsuitable for the treatment of dilute gas streams because the costs of supplemental fuel needed to attain the minimum combustion temperature are prohibitive. Unlike afterburners, flares have no heat recovery capability that could produce credits for heat generated from combustion. Flares are also generally less effective than other devices in controlling organic vapors.[88]

(f) Combustion/Performance Optimization

Operating and maintenance (O&M) practices have a significant impact on combustion unit performance, including VOC emissions, reliability, and operating costs. Each of these parameters change over the life of the unit, and some deterioration of equipment is unavoidable. VOC emissions can be minimized by adjusting the fuel to air ratio and burner configuration for optimum fuel combustion. (For facilities with NOx limitations, these adjustments may also consider minimization of NOx emissions.) Routine inspection, maintenance, and tuning extends the life of the equipment and ensures the equipment is performing optimally. In general, an annual tune-up includes:

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[86] *Id.*
[87] *Id.*
[88] *Id*.

- Inspection of the burner(s), and cleaning or replacement of any components of the burner(s) as necessary;
- Inspection of the flame pattern, as applicable, and adjustment of the burner(s) as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available;
- Inspection of the system controlling the air-to-fuel ratio, as applicable, and ensure that it is correctly calibrated and functioning properly; and
- Optimization of total emissions of CO, which is used as surrogate for combustion efficiency. This optimization should be consistent with the manufacturer's specifications, if available, and with any NO_X requirement to which the unit is subject.

An energy efficiency assessment (aka energy efficiency audit) typically serves as the foundation for combustion unit efficiency improvements by providing an evaluation of actual performance relative to its design and potential. Every cubic foot of fuel saved from the implementation of one or more efficiency improvements directly results in reduced emissions. An energy assessment is performed by a qualified energy assessor and generally includes:

- A visual inspection of the system.
- An evaluation of operating characteristics, specifications of energy using systems, operating and maintenance procedures, and unusual operating constraints.

An energy assessment provides valuable information on improving energy efficiency. The Department of Energy (DOE) conducted energy assessments at selected manufacturing facilities and determined that facilities can reduce fuel/energy use by 10 to 15 percent by using best practices to increase their energy efficiency. Many best practices serve as pollution prevention measures because they reduce the amount of fuel combusted which directly translates to emissions reductions.[89]

<u>Step 2 – Eliminate Technically Infeasible Control Options</u>

According to information available in the aforementioned resources and Clairton's RACT submittal, <u>there are no technically feasible control options for further reducing VOC emissions from coke battery underfiring</u>. This determination is based on the following information:

- From a pollution prevention standpoint, the VOC emissions from underfiring process are minimized through compliance with the requirements of 40 CFR Part 63, Subpart CCCCC (National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coke Ovens: Pushing, Quenching and Battery Stacks). The provisions of the NESHAP finalized in 2003 and last amended in August 2006 to which Clairton is subject, constitute Maximum Achievable Control Technology (MACT). By definition, MACT - while designed to reduce volatile HAPs (which includes organic compounds and VOC) in this case is at least as stringent as RACT.

- As a fuel combustion process, the underfiring of Coke Battery No. 1 produces a high volumetric exhaust flow rate relative to the amount of VOC emitted. The corresponding VOC concentration in the stack exhaust is too low for any form of add-on VOC control to be suitable. A review of the RBLC (Process Codes 81.112 and 81.190) substantiates this fact; add-on VOC controls have not been applied to coke battery underfiring.

[89] From proposed National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers. (75 FR 31907, June 4, 2010).

Step 3 - Evaluate Control Options

Not applicable.

Step 4 – Select RACT

ACHD has determined that VOC RACT for the underfiring of Batteries B, 1, 2, 3, 13, 14, 15, 19, and 20 is the current requirements established by Clairton's Title V permit. More specifically, Clairton must comply with the applicable requirements of 40 CFR Part 63, Subpart CCCCC.

H. RACT for VOC – By-Products Recovery Plant

Process/Unit description – By-Products Recovery Plant

Large quantities of raw COG, approximately 225 million cubic feet per day, are produced in the Clairton coke battery ovens. The evolved COG exits the battery ovens through standpipes, is spray-cooled to precipitate tar and condense various vapors and routed to the collection main. The collected COG is routed to the By-Products Recovery Plant (BPRP), where a variety of valuable organic compounds are extracted.

According to the Technical Support Document to Clairton's Title V permit:

> COG is composed of water vapor, tar, light oils (primarily benzene, toluene, and xylene), heavy hydrocarbons, and other chemical compounds. The raw COG exiting the ovens is shock cooled by spraying recycled flushing liquor in the gooseneck. This spray cools the gas and precipitates tar, condenses various vapors, and serves as the carry medium for the condensed compounds. Additional cooling of the gas in the final coolers precipitates most of the remaining tar. After leaving the final coolers, the gas carries approximately three-fourths of the ammonia and 95 percent of the light oil originally present in the raw coke oven gas. This gas enters the PhosAm Absorber where the ammonia is removed and further processing produces anhydrous ammonia. The remaining stream which contains light oil and other compounds is further processed to produce a light oil product. The daily production of these by-products includes approximately 145,000 gallons of crude coal tar, 55,000 gallons of light oil, 50 tons of anhydrous ammonia, and 35 tons of elemental sulfur (produced in the Desulfurization Plant). Emissions of volatile organics from storage tanks and other equipment in the BPRP are controlled by a gas blanketing system. The carrier gas in the blanketing system is clean COG. Storage tank atmospheric vents and other equipment are connected to this blanketing system where the collected organic vapors are mixed with the coke oven gas. This aggregated coke oven gas is used as fuel for boilers, furnaces and other fuel burning equipment at the Clairton Works and the Irvin and Edgar Thomson Plants.
>
> The BPRP (identified as permitted process P021) consists of the following number and type of equipment: main axial compressors, main regenerators, main vacuum machines, light oil vacuum machines, 8-light oil condensers, 3-cooler separators, light oil regenerators, 3-light oil tanks, final cooler demister wash, super-still light oil decanter, light oil blow down tank, 2-light oil decanters (V-604 & 605), 6-light oil storage tanks (T59 – T64), 9-tar storage tanks (3TA 41-49), 22-tar Decanters (3TA 12-23, 25-28, & 30-35), 3-wastewater surge tanks, 2-wastewater settling tanks, wastewater ammonia still feed tank, methanol storage tank–V-400 (50,000 gallons), foul methanol storage tank-V-410 (50,000 gallons), and methanol/MEA storage tank-V430 (20,000 gallons).

The BPRP gas blanketing system has an estimated VOC control efficiency of 98 percent and is used to comply with the requirements of 40 CFR Part 61, Subpart L.

Pursuant to Clairton's Title V permit, VOC RACT for the BPRP is currently proper operation and maintenance of the plant in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, VOC emissions from the entire BPRP could, in theory, be controlled with:

(a) Thermal Oxidization
(b) Carbon Adsorption
(c) Catalytic Oxidization
(d) Refrigerated Condensation
(e) Flaring
(f) Leak Detection and Repair (LDAR) program

A concise description of each of these technologies is as follows:

(a) Thermal Oxidation

Thermal oxidizers are refractory lined enclosures with one or more burners in which the waste gas stream is routed through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidizers typically operate at 1200 to 2100 degrees Fahrenheit with residence times typically ranging from 0.5 to 2 seconds. An efficient thermal oxidizer design must provide adequate residence time for complete combustion, sufficiently high temperatures for VOC destruction, and adequate velocities to ensure proper mixing without quenching combustion. The type of burners and their arrangement affect combustion rates and residence time; the more thorough the contact between the flame and VOC, the shorter the time required for complete combustion. Natural gas is required to ignite the flue gas mixtures and maintain combustion temperatures. Typically, a heat exchanger upstream of the oxidizer uses the heat content of the oxidizer flue gas to preheat the incoming VOC-laden stream to improve the efficiency of the oxidizer. Thermal oxidizers can achieve a wide range of efficiencies and usually achieve VOC vapor removal efficiencies in excess of 95 percent.[90]

Thermal Oxidation can be used over a fairly wide range of organic vapor concentrations. However, concentration of the organics in the waste gas must be substantially below the lower explosive limit of the compound being controlled. Accounting for economic factors, thermal oxidation performs best at inlet concentrations from approximately 1500 to 3000 ppmv, because the heat of combustion of the hydrocarbon gases is sufficient to sustain the requisite temperature. Otherwise, the emissions reductions benefit of the oxidizer is somewhat offset by the emissions created by the supplemental fuel required. While air stream pretreatment is generally not required, thermal oxidation is generally not recommended for controlling gas streams containing halogen (or sulfur) containing compounds because of the resulting formation of corrosive gases (e.g. hydrogen chloride) and/or SO2.[91]

(b) Carbon Adsorption

Carbon adsorption is a process by which VOC is retained on a granular carbon surface (the adsorbent), which is highly porous and has a very large surface-to-volume ratio. Eventually, the adsorbent becomes saturated with the vapors and the system's efficiency drops. Regulatory considerations dictate that the adsorbent be regenerated or replaced soon after efficiency begins to decline. Compounds with high molecular weights greater than 50 and a boiling point greater than 50 degrees C are typically good candidates for adsorption. In regenerative systems, carbon adsorption systems operated in two phases: adsorption and desorption. Adsorption is rapid and removes most of the VOC in the stream. Desorption is the process by which the adsorbent is reactivated (typically with

[90] Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January, 2015.
[91] Air Pollution Control Technology Fact Sheet - Thermal Incinerator (EPA-452/F-03-022). Available at http://www.epa.gov/ttn/catc/dir1/fthermal.pdf. Accessed January, 2015.

steam or hot air) and an absorbate (a solvent appropriate for the VOC) is used to collect the retained VOC. The absorbate is then recovered for reuse or disposal. VOC compounds that are difficult to desorb from the carbon media will significantly reduce VOC control effectiveness. In non-regenerative systems, the adsorbent is simply removed and replaced with fresh or previously regenerated carbon. Removal efficiencies of 90 to 99 percent can be achieved using carbon adsorption.[92]

(c) Catalytic Oxidation

Catalytic oxidizers are similar to thermal oxidizers in that the units are enclosed structures that use heat to oxidize the combustible materials. However, in a catalytic oxidizer, a catalyst is used to lower the operating temperature needed to oxidize the VOCs by lowering the activation energy for oxidation. When a preheated gas stream is passed through a catalytic oxidizer, the catalyst bed initiates and promotes the oxidation of the VOC without being permanently altered itself. Note that steps must be taken to ensure complete combustion. The types of catalysts used include platinum, platinum alloys, copper chromate, copper oxide, chromium, manganese, and nickel. These catalysts are deposited in thin layers on an inert substrate (usually a honeycomb shaped ceramic). VOC destruction efficiency is dependent upon a number of factors, including VOC composition and concentration, operating temperature, and the velocity of the gas passing through the bed. As the velocity increases, VOC destruction efficiency decreases. As temperature increases, VOC destruction efficiency increases. Catalytic oxidation is therefore most suited for air streams with low exhaust volumes, with little variation in the type and concentration of VOC, and where catalyst poisons or other fouling containments (e.g. silicone, sulfur, particulates etc.) are not present. Catalytic oxidation has been used effectively with very low VOC inlet loadings (around 1 ppmv). As with other types of incinerators, concentration of the organics in the waste gas must be substantially below the lower explosive limit of the compound being controlled. Catalytic oxidizers typically achieve greater than or equal to 98% VOC reduction.[93]

(d) Refrigerated Condensation

A refrigerated condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. A refrigerated condenser works best on emission streams containing high concentrations of VOC. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a condenser is directly related to the lowest temperature that can be achieved in the condenser. Condensation is feasible for air streams with a high VOC concentration of few organic compounds. The greater the number of VOC components, the lower the temperature that must be maintained to achieve effective condensation. Removal efficiencies typically range from 50-98%.[94]

(e) Flaring

Flaring is an open-air combustion process typically applied when the heating value of the air stream cannot be recovered economically because of intermittent or uncertain flow, or

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[92] Carbon Adsorption for Control of VOC Emissions: Theory and Full Scale System Performance (EPA-450/3-88-012). Available at: http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91009Z7B.txt. Accessed February, 2015.
[93] Air Pollution Control Technology Fact Sheet - Catalytic Incinerator (EPA-452/F-03-018). Available at http://www.epa.gov/ttn/catc/dir1/fcataly.pdf. Accessed January, 2015.
[94] Air Pollution Control Technology Fact Sheet - Refrigerated Condensers for Control of Organic Air Emissions (EPA-456/R-01-004). Available at http://www.epa.gov/ttn/catc/dir1/refrigeratedcondensers.pdf. Accessed January, 2015.

when process upsets occur. In general, flare performance depends on a number of factors, including gas velocity, emission stream heating value, residence time in the combustion zone, waste gas/oxygen mixing, and flame temperature. If conditions in the flame zone are optimal, a non-assisted flare may achieve a VOC destruction efficiency of 98 percent or greater. It may be necessary to add supplementary fuel to the emission stream to achieve this destruction efficiency if the net heating value of the emission stream is less than 300 Btu/scf. For assisted flares such as steam-assisted or air-assisted units, combustion efficiencies may be lower.

Flares are typically unsuitable for the treatment of dilute gas streams because the costs of supplemental fuel needed to attain the minimum combustion temperature are prohibitive. Unlike afterburners, flares have no heat recovery capability that could produce credits for heat generated from combustion. Flares are also generally less effective than other devices in controlling organic vapors.[95]

(f) Leak Detection and Repair (LDAR) Program

A LDAR program is a work practice designed to identify leaking equipment so that emissions can be reduced through repairs. A component that is subject to LDAR requirements must be monitored at specified regular intervals to determine whether or not it is leaking. Any leaking component must then be repaired or replaced within a specified time frame. Emissions reductions from implementing an LDAR program potentially reduce product losses, increase safety for workers and operators, decrease exposure of the surrounding community, reduce emissions fees, and help facilities avoid enforcement actions. In general, elements of an LDAR program include the identification of components, leak detection activities, monitoring, repair, and recordkeeping. LDAR programs are required by many federal, state, and local regulations.[96]

Step 2 – Eliminate Technically Infeasible Control Options

VOC emissions from the BPRP are mostly fugitive in nature and are emitted in insignificant-to-small quantities from a very large number of emission points. The estimated VOC PTE of the various equipment encompassed by the BPRP (including VOC-containing storage tanks) is 124 ton/yr. [This is from the 2014 US Steel Clairton RACT submittal. This is comparable to the 121 tpy shown in the TVOP permit calcs: X:\Public Health Programs\Air Quality\AQ Common\AQ Documents\u\us steel clairton\permits\operating permits\draft\clairton – tv-calcs – draft.xlsx], and reported actual VOC emissions are approximately 8 ton/yr. Without a primary VOC-laden air stream capable of being contained and collected, none of the identified control technologies can be used. As a result, there are no technically feasible add-on control options for further reducing VOC emissions from the by-products plant. A review of the RBLC (Process Code 81.190) and coke plant permits substantiates this conclusion; add-on controls have not been utilized to reduce VOC emissions from coke by-product recovery operations.

However, it is technically feasible to implement a LDAR program that covers the BPRP equipment.

Step 3 - Evaluate Control Options

The BPRP has a VOC PTE of 124 ton/yr. and reported actual (CY 2012) VOC emissions of 8.0 tons/yr., indicating that the existing gas blanketing system has an estimated VOC control efficiency of up to 94 percent. As the only technically feasible control option identified, ACHD evaluated whether the implementation of an LDAR program (in addition to the gas blanketing system) was economically feasible.

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[95] Id.

[96] Leak Detection and Repair Compliance Assistance Guidance: A Best Practices Guide. (U.S. EPA) Available at http://www2.epa.gov/sites/production/files/2014-02/documents/ldarguide.pdf Accessed January 2015.

Using guidelines from Chapter 1 of the EPA Cost Manual, ACHD estimated that the incremental cost-effectiveness of the implementation of a LDAR program is $6,406 per ton of VOC removed - See Appendix A.

The analysis estimates the costs associated with initial set-up and implementation, including but not limited to identification and tagging of components, monitoring, and database development. It also estimates the annual costs, including but not limited to labor and insurance, are based on an interest rate of 7% and a program re-evaluation frequency of 10 years.

All costs, and nearly all calculated values used to determine costs, were determined using the methodology described in the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001) and other technical resources available in the EPA Clean Air Technology Center.

The combined VOC control efficiency of the existing gas-blanketing system and a new LDAR program is 98 percent.

Step 4 – Select RACT

For the By-Products Recovery Plant, ACHD has determined that VOC RACT is:

- The continued use of a clean COG gas-blanketing system as required by Clairton's Title V permit.
- The implementation of a LDAR program consistent with the corresponding standards of 40 CFR Part 61, Subpart V, codified in 40 CFR 61.242-1 through 61.247.

I. RACT for VOC – Desulfurization Plant

Process/Unit description – Desulfurization Plant

Large quantities of COG are produced in the ovens during the coking process. The evolved COG exits the battery ovens through standpipes, is spray-cooled to precipitate tar and condense various vapors and routed to the collection main. The collected COG is routed to the By-Products Recovery Plant (BPRP), where a variety of valuable organic compounds are extracted, and then further processed by the Desulfurization Plant (DP) where hydrogen sulfide (H2S) and other sulfur compounds are removed. Sulfur dioxide (SO2) emissions are generated from the oxidation of H2S present in COG when it is combusted.

Desulfurization processes vary considerably from coke plant to coke plant. At Clairton, the DP primarily consists of two Claus Plants (one primary and one backup) and the Shell Claus Offgas Treatment (SCOT) Plant. The Claus Plant converts a large portion of the H2S and other sulfur compounds in the treated COG to elemental sulfur, which is sold. The treated COG exiting the Claus Plant is then routed to the SCOT Plant where it is processed and separated into three gas streams: a treated/low sulfur COG stream, a concentrated H2S stream, and an acid offgas stream. The H2S stream is returned/recycled to the Claus Plant for further sulfur removal and recovery. The acid offgas stream is incinerated by the SCOT Plant Incinerator.

The concentration of H2S in the COG exiting the DP is typically reduced to approximately 10 grains per 100 dry standard cubic feet (dscf) of COG, or approximately 0.045 percent sulfur.

Step 1 – Identify Control Options

According to information available in the aforementioned resources and Clairton's RACT submittal, VOC emissions from the DP could, in theory, be controlled with:

(a) Thermal Oxidization
(b) Carbon Adsorption
(c) Catalytic Oxidization
(d) Refrigerated Condensation
(e) Flaring
(f) Absorption (Scrubbing)

A concise description of each of these technologies is as follows:

(a) Thermal Oxidation

Thermal oxidizers are refractory lined enclosures with one or more burners in which the waste gas stream is routed through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidizers typically operate at 1200 to 2100 degrees Fahrenheit with residence times typically ranging from 0.5 to 2 seconds. An efficient thermal oxidizer design must provide adequate residence time for complete combustion, sufficiently high temperatures for VOC destruction, and adequate velocities to ensure proper mixing without quenching combustion. The type of burners and their arrangement affect combustion rates and residence time; the more thorough the contact between the flame and VOC, the shorter the time required for complete combustion. Natural gas is required to ignite the flue gas mixtures and maintain combustion temperatures. Typically, a heat exchanger upstream of the oxidizer uses the heat content of the oxidizer flue gas to preheat the incoming VOC-laden stream to improve the efficiency of the oxidizer. Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve VOC vapor removal efficiencies in excess of 95 percent.[97]

Thermal Oxidation can be used over a fairly wide range of organic vapor concentrations. However, concentration of the organics in the waste gas must be substantially below the lower explosive limit of the compound being controlled. Accounting for economic factors, thermal oxidation performs best at inlet concentrations from approximately 1500 to 3000 ppmv, because the heat of combustion of the hydrocarbon gases is sufficient to sustain the requisite temperature. Otherwise, the emissions reductions benefit of the oxidizer is somewhat offset by the emissions created by the supplemental fuel required. While air stream pretreatment is generally not required, thermal oxidation is generally not recommended for controlling gas streams containing halogen (or sulfur) containing compounds, because of the resulting formation of corrosive gases (e.g. hydrogen chloride) and/or SO2.[98]

(b) Carbon Adsorption

Carbon adsorption is a process by which VOC is retained on a granular carbon surface (the adsorbent), which is highly porous and has a very large surface-to-volume ratio. Eventually, the adsorbent becomes saturated with the vapors and the system's efficiency drops. Regulatory considerations dictate that the adsorbent be regenerated or replaced soon after efficiency begins to decline. Compounds with high molecular weights greater than 50 and a boiling point greater than 50 degrees C are typically good candidates for adsorption. In regenerative systems, carbon adsorption systems operate in two phases: adsorption and desorption. Adsorption is rapid and removes most of the VOC in the stream. Desorption is the process by which the adsorbent is reactivated (typically with steam or hot air), and an absorbate (a solvent appropriate for the VOC) is used to collect the retained VOC. The absorbate is then recovered for reuse or disposal. VOC compounds that are difficult to desorb from the carbon media will significantly reduce VOC control-effectiveness. In non-regenerative systems, the adsorbent is simply removed and replaced with fresh or previously regenerated carbon. Removal efficiencies of 90 to 99 percent can be achieved using carbon adsorption.[99]

(c) Catalytic Oxidation

Catalytic oxidizers are similar to thermal oxidizers (the units are enclosed structures that use heat to oxidize the combustible materials). However, in a catalytic oxidizer, a catalyst is used to lower the operating temperature needed to oxidize the VOCs by lowering the activation energy for oxidation. When a preheated gas stream is passed through a catalytic oxidizer, the catalyst bed initiates and promotes the oxidation of the VOC without being permanently altered itself. Note that steps must be taken to ensure complete combustion. The types of catalysts used include platinum, platinum alloys, copper chromate, copper oxide, chromium, manganese, and nickel. These catalysts are deposited in thin layers on an inert substrate, usually a honeycomb shaped ceramic. VOC destruction efficiency is dependent upon a number of factors, including VOC composition and concentration, operating temperature, and the velocity of the gas passing through the bed. As the velocity increases, VOC destruction efficiency decreases. As temperature increases, VOC destruction efficiency increases. Catalytic oxidation is therefore most suited for air streams with low exhaust volumes, with little variation in the type and concentration of VOC, and where catalyst poisons or other fouling containments (e.g. silicone, sulfur, particulates etc.) are not present. Catalytic oxidation has been used effectively with very low VOC inlet loadings (around 1 ppmv). As with other types of incinerators, concentration of the

[97] Id.
[98] Id.
[99] Id.

organics in the waste gas must be substantially below the lower explosive limit of the compound being controlled. Catalytic oxidizers typically achieve greater than or equal to 98% VOC reduction.[100]

(d) Refrigerated Condensation

A refrigerated condenser is a control device that is used to cool an emission stream having organic vapors in it and to change the vapors to a liquid. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. A refrigerated condenser works best on emission streams containing high concentrations of VOC. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a condenser is directly related to the lowest temperature that can be achieved in the condenser. Condensation is feasible for air streams with a high VOC concentration of few organic compounds. The greater the number of VOC components, the lower the temperature that must be maintained to achieve effective condensation. Removal efficiencies typically range from 50-98%.[101]

(e) Flaring

Flaring is an open-air combustion process typically applied when the heating value of the air stream cannot be recovered economically because of intermittent or uncertain flow, or when process upsets occur. In general, flare performance depends on a number of factors, including gas velocity, emission stream heating value, residence time in the combustion zone, waste gas/oxygen mixing, and flame temperature. If conditions in the flame zone are optimal, a non-assisted flare may achieve a VOC destruction efficiency of 98 percent or greater. It may be necessary to add supplementary fuel to the emission stream to achieve this destruction efficiency if the net heating value of the emission stream is less than 300 Btu/scf. For assisted flares such as steam-assisted or air-assisted units, combustion efficiencies may be lower.

Flares are typically unsuitable for the treatment of dilute gas streams because the costs of supplemental fuel needed to attain the minimum combustion temperature are prohibitive. Unlike afterburners, flares have no heat recovery capability that could produce credits for heat generated from combustion. Flares are also generally less effective than other devices in controlling organic vapors.[102]

(f) Absorption (Scrubbing)

Absorption (aka scrubbing) is a type of control technology that uses one or more methods to remove air pollutants, including diffusional impaction, reaction with a sorbent or reagent slurry, and/or absorption into a liquid solvent. It is widely used as a raw material and/or product recovery technique in the separation and purification of gaseous streams containing high concentrations of VOC, especially water-soluble compounds (e.g. methanol, ethanol, acetone and formaldehyde). Hydrophobic VOC can be absorbed using an amphiphilic block copolymer dissolved in water. However, as an emission control technique, it is much more commonly employed for controlling inorganic gases than for VOC. The suitability of gas absorption as a pollution control method is generally dependent on the following factors: 1) availability of suitable solvent; 2) required removal efficiency; 3) pollutant concentration in the inlet vapor; 4) capacity required for handling waste gas; and 5) recovery value of the pollutant(s) or the disposal cost of the unrecoverable solvent.

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[100] Id.
[101] Id.
[102] Id.

Absorption for VOC emissions control is fundamentally limited by the temperature of the air stream and is therefore reserved for low temperature applications. High gas temperatures can lead to significant solvent or scrubbing liquid loss from evaporation. That loss translates to displaced VOC emissions and would inherently limit the VOC control-effectiveness. Absorbers typically achieve 70 to 99% VOC reduction.[103]

Step 2 – Eliminate Technically Infeasible Control Options

Each identified control option is technically feasible.

Step 3 - Evaluate Control Options

The uncontrolled VOC PTE of the DP is 398 ton/yr. [This is from the US Steel Clairton 2014 RACT submittal]. However, the existing DP/SCOT Plant incinerator has a VOC PTE of approximately 5.78 tons/yr[1]. (The existing DP/SCOT Plant incinerator is an example of thermal oxidation.)

The potential incremental VOC reduction (ton/yr.) of any of the technically feasible control options is therefore so low that none of those options are economically feasible. As a result, no additional analyses were completed.

Step 4 – Select RACT

ACHD has determined that VOC RACT for Desulfurization Plant (which includes the SCOT Plant) is the continued use of the SCOT Plant Incinerator. The incinerator will operate with a VOC limit of 1.32 lb/hr and 5.78 tons/yr. Operation of the incinerator shall be consistent with the other current requirements established for the unit in Clairton's Title V permit. In addition, the SCOT Plant Incinerator and the Desulfurization Plant shall be properly operated and maintained in accordance with good engineering and air pollution control practices.

[1]39 tpy based on X:\Public Health Programs\Air Quality\AQ Common\AQ Documents\u\us steel clairton\permits\operating permits\draft\clairton - tvcalcs – draft.xlsx

However, stack testing from November of 2015 shows highest test run of 1.32 lb/hr. 1.32 lb/hr * 8760 hrs/yr * ton/2000lbs = 5.78 tpy (stack testing report is "0052str2016-01-25scot")
Increase by 15% = (1.32 lbs/hr)*1.15 = 1.52 lbs/hr

[103] Air Pollution Control Technology Fact Sheet - Packed-Bed/Packed-Tower Wet Scrubber (EPA-452/F-03-018). Available at http://www.epa.gov/ttn/catc/dir1/fcataly.pdf. Accessed January, 2015.

Attachment 16

CLEAN AIR COUNCIL

ENVIRONMENTAL INTEGRITY PROJECT

PennFuture

Proposed Revision to Allegheny County's Portion of the
Pennsylvania State Implementation Plan

For the Attainment and Maintenance of the
National Ambient Air Quality Standards

Revision Tracking No. 87

Allegheny County Health Department
Rules and Regulations
Article XXI, Air Pollution Control
§2105.21 Coke Ovens and Coke Oven Gas
with Related §2101.20 Definitions and §2109.01 Inspections

Allegheny County Health Department

January 21, 2020

Written Comments by Clean Air Council

Via email: aqcomments@alleghenycounty.us

Clean Air Council ("the Council"), Environmental Integrity Project ("EIP"), and Citizens for Pennsylvania's Future ("PennFuture") (collectively, "Commenters") appreciate the opportunity to submit these comments regarding proposed coke oven and coke oven gas regulations of the Allegheny County Health Department ("the Department").

The Council is a non-profit environmental health organization headquartered at 135 South 19th Street, Suite 300, Philadelphia, Pennsylvania, 19103. The Council maintains an office in Pittsburgh. The Council has been working to protect everyone's right to a clean environment for over 50 years. The Council has members throughout the Commonwealth who support its mission, including members in Allegheny County.

The Environmental Integrity Project ("EIP") is a national nonprofit organization headquartered at 1000 Vermont Avenue NW, Suite 1100, Washington, D.C. 20005, and with staff in Pittsburgh and Philadelphia. EIP is dedicated to advocating for more effective environmental laws and better enforcement. EIP has three goals: (1) to provide objective analyses of how the failure to enforce or implement environmental laws increases pollution and affects public health; (2) to hold federal and state agencies, as well as individual corporations, accountable for failing to enforce or comply with environmental laws; and (3) to help local communities obtain the protection of environmental laws.

PennFuture is a Pennsylvania-statewide environmental organization dedicated to leading the transition to a clean energy economy in Pennsylvania and beyond. PennFuture strives to protect our air, water and land, and to empower citizens to build sustainable communities for future generations. A main focus of PennFuture's work is to improve and protect air quality across Pennsylvania through public outreach and education, advocacy, and litigation.

In November 2020 the Department published notice of proposed coke oven regulations, establishing a 60-day public comment period ending on Thursday, January 21, 2020. The proposed regulations and Technical Support Document are located here: https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/Coke-Oven-Regulations-2105-21-2101-20-w-Tech-Support-Doc.pdf.

Index to Comments

1. The Department Should Explain How the Proposed Regulations Would Reduce Emissions of Fine Particulates and Sulfur Dioxide Under the State Implementation Plan.

2. The Proposal to Include Requirements of Federal and State Law Involves Things the Department Should Already Have Been Doing.

3. Section VII of the Settlement Agreement Only Purports to Limit More Stringent Emission Standards, Not Procedural Requirements Like Inspections.

4. The Proposed Revision of the Emission Standard for Hydrogen Sulfide in Coke Oven Gas Would Not Make the Standard More Stringent Than It Should Be, If It Is Merely Correcting An Error.

5. The Department Should Reinstate Proposed Requirements in the First Draft Regulations (June 2018), Which Were Reversed in the Second Draft Regulations (July 2020) and the Proposed Regulations.

6. It is Unlawful for the Department to Use Section VII of the Settlement Agreement to Abdicate its Authority to Adopt More Stringent Emission Standards.

7. The Department's Failure to Propose Any More Stringent Emission Standards Is Not Compelled by Section VII of the Settlement Agreement, Even If It Could Lawfully Restrict the Department's Regulatory Authority.

8. The Department Should Revise the Proposed Regulations to Require a Meaningful Work Practice Plan to Facilitate Emissions Reductions at the Clairton Coke Works.

9. The Department Should Develop More Stringent Emission Standards, Including Technology-Forcing Standards.

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Attachment 7 -- Allegheny County Health Department, USS Clairton emission reductions (Email dated July 11, 2019)

Attachment 8 -- Allegheny County Health Department, 2019 Consent Agreement, Estimated Emission Reduction (Excel Spreadsheet dated July 11, 2019)

Attachment 9 -- Excerpts from Allegheny County Area Attainment Plan for the 2012 PM2.5 National Ambient Air Quality Standard, Appendix D, https://beta.regulations.gov/docket/EPA-R03-OAR-2020-0157/document?pageNumber=2&sortBy=postedDate&sortDirection=asc

Attachment 10 -- Excerpts from Installation Permit 0052-1011 for battery C (July 24, 2008)

Attachment 11 -- Allegheny County Health Department, Excel spreadsheets relating to leaking doors, lids, and offtakes

Attachment 12 -- Clean Air Council, Compliance Rates 2017 (Excel Spreadsheets prepared in 2021)

Attachment 13 -- U.S. Steel, NESHAPS Work Practices Plan, dated November 12, 1993 (for batteries 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, and 20), NESHAPS Work Practices Plan, dated November 12, 1993 (battery B)

Attachment 14 -- Chapter 5 from Joint Reference Report, Best Available Techniques (BAT) Reference Document for Iron and Steel Production, Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control), https://op.europa.eu/en/publication-detail/-/publication/eaa047e8-644c-4149-bdcb-9dde79c64a12/language-en

Attachment 15 -- Nippon Steel Technical Report No. 123, SCOPE21 Cokemaking Process (March 2020), https://www.nipponsteel.com/en/tech/report/pdf/123-25.pdf

Attachment 16 -- Paul Wurth, SOPRECO Retrofitting Coke Oven Pressure Control Without Stopping Production (2013)

Comments

1. **The Department Should Explain How the Proposed Regulations Would Reduce Emissions of Fine Particulates and Sulfur Dioxide Under the State Implementation Plan.**

The draft coke oven regulations are intended to be a revision to the Department's portion of the state implementation plan. *See* Proposed Regulations (title page), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/Coke-Oven-Regulations-2105-21-2101-20-w-Tech-Support-Doc.pdf. But the Department does not identify the state implementation plan to be revised. Under the Clean Air Act, state implementation plans are tied to particular criteria pollutants subject to national ambient air quality standards:

> ***Each State shall***, after reasonable notice and public hearings, ***adopt and submit to the Administrator***, within 3 years (or such shorter period as the Administrator may prescribe) after the promulgation of a national primary ambient air quality standard (or any revision thereof) under section 7409 of this title for any air pollutant, ***a plan which provides for implementation, maintenance, and enforcement of such primary standard in each air quality control region (or portion thereof) within such State***. In addition, ***such State shall adopt and submit to the Administrator*** (either as a part of a plan submitted under the preceding sentence or separately) within 3 years (or such shorter period as the Administrator may prescribe) after the promulgation of a national ambient air quality secondary standard (or revision thereof), ***a plan which provides for implementation, maintenance, and enforcement of such secondary standard in each air quality control region (or portion thereof) within such State***.

See Section 110(a)(1) of the Clean Air Act, 42 U.S.C. 7410(a)(1) (bold italics added for emphasis), https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7410&num=0&edition=prelim. Presumably, fine particulates and sulfur dioxide are the primary criteria pollutants of concern.

The one reference to fine particulates in the Technical Support Document involves the assertion only Battery B is required to meet a particulate mass emission rate set forth in a particular paragraph. *See* Technical Support Document, dated September 22, 2020, page 26. The references to sulfur dioxide (and its precursor, hydrogen sulfide) merely involve proposed amendments regarding the definition of measured sulfur compounds. *See id.*, pages 22, 25-26. There is nothing that attempts to quantify the emissions reductions or otherwise demonstrate how the proposed regulations will help reduce emissions of these criteria pollutants. *See id.*

Moreover, it is not clear if there would be any quantifiable emissions reductions from these proposed regulations, at all. The Department does not attempt to quantify emissions reductions. *See generally* Technical Support Document.

The Department should provide more detail regarding how the proposed regulations will improve air quality.

2. The Proposal to Include Requirements of Federal and State Law Involves Things the Department Should Already Have Been Doing.

The Department proposes to make six amendments to its regulations to conform to the form of state and federal regulations. Because federal and state regulations are binding on the county, the Department should explain why there is a need to make these revisions at all. For proposed requirements that only repeat the requirements of federal and state regulations, the Department should explain why this is not an academic exercise.

A. The Department should provide an explanation why it is necessary to make these six amendments.

The Department should provide an explanation why it is necessary to make these amendments. It should also explain whether it already had the authority to enforce the proposed requirements, in the absence of a change in the county regulations. If it believes it lacked this authority, it should explain why.

First, the Department proposes to amend the regulations because the county regulations defining "charging emissions" are less stringent than the federal regulations:

Section	Department's Explanation for Change
§2101.20 (Definition of "Charging emissions")	The Pennsylvania Air Pollution Control Act states that the ACHD may enact "ordinances with respect to air pollution which will not be less stringent than the provisions of this act, the Clean Air Act or the rules and regulations promulgated under either this act or the Clean Air Act." 35 P.S. § 4012(a). The U.S. Environmental Protection Agency's regulations on visible emissions from by-product coke oven batteries states in a note that "[visible emissions] from open standpipes of an oven being charged count as charging emissions." 40 C.F.R. Part 63, Appendix A, Method 303, Section 11.1.4. ***The ACHD determined that because its definition of "charging emissions" is "less stringent" because it does not include the language in the federal regulation. Therefore, the ACHD is proposing to amend the definition for "Charging emissions" to include the language "open standpipes of the oven being charge."***

See Technical Support Document, page 22 (bold italics added for emphasis).

Second, the Department proposes to amend the regulations because the county regulations defining the commencement of "pushing operations" are less stringent than the state regulations:

Section	Department's Explanation for Change
§2101.20	As discussed above, the ACHD regulations cannot be "less stringent" than the

(Definition of "Pushing operation")	regulations promulgated under the Pennsylvania Air Pollution Control Act. 35 P.S. § 4012(a). ***The Pennsylvania "Air Resources" regulations provide that "pushing operations" begin "when the coke side door is first removed from a coke oven."*** 25 Pa.Code § 121.1. ***Under the current Article XXI regulation***, for coke oven batteries 13, 14, 15, 20, and B at the U.S. Steel Corporation Mon Valley Works Clairton Plant, ***the push does not start until after the coke side door is first removed and the coke mass starts to move***. For these batteries, the emissions between the time the coke side door is first removed and when the coke mass starts to move is not included in determining compliance with the pushing emissions standard. ***Because the ACHD regulation is less stringent, the ACHD is proposing to amend the definition of "Pushing" so that it is identical to the definition of "Pushing operation" in the Pennsylvania "Air Resources" regulations. 25 Pa.Code § 121.1.***

See id. (bold italics added for emphasis).

Third, the Department proposes to amend the regulations because the county regulations for calculating the percent of leaking doors are less stringent than the federal regulations:

Section	**Department's Explanation for Change**
§2105.21.b. 2, B.3	***When determining compliance with the emissions standards for door areas, the regulations currently provide that the ACHD must exclude the "two door areas of the last oven charged and any door areas obstructed from view."*** As noted above, any regulations promulgated by the ACHD cannot be less stringent that the EPA regulations promulgated under the Clean Air Act. When calculating the percent of leaking doors, the federal regulations for determination of visible emissions from byproduct coke oven batteries does not include a two door exclusion. 40 C.F.R. Part 63, Appendix A, Method 303, Section 12.5.3.1. ***In order to avoid being less stringent than the federal regulation, the ACHD is proposing to remove the two door exclusion***.

See id., page 24 (bold italics added for emphasis).

Fourth, the Department proposes to amend the county regulations because they do not include a state requirement for enclosure of a pushing operation and containment of pushing emissions:

Section	**Department's Explanation for Change**
§2105.21.e	The Pennsylvania Air Pollution Control Act states that the ACHD may enact "ordinances with respect to air pollution which will not be less stringent than the provisions of this act, the Clean Air Act or the rules and regulations promulgated under either this act or the Clean Air Act." 35 P.S. § 4012(a).

	Section 129.15 ("Coke pushing operations") of the Pennsylvania "Air Resources" regulations states: "No person may permit the pushing of coke from a coke oven unless the pushing operation is enclosed during the removal of coke from a coke oven and pushing emissions are contained, except for the fugitive pushing emissions, that are allowed by subsections (c) and (e)." 25 Pa.Code 129.15(a). The ACHD's current regulations for pushing do not include this requirement. ***In order to avoid being less stringent than the Pennsylvania regulations, that ACHD is proposing to add this language to its regulations***.

See id., page 24 (bold italics added for emphasis).

Fifth, the Department proposes to amend the county regulations because they do not include a state requirement that compliance with the emission standards for coke oven gas is determined by measuring sulfur compounds "expressed as equivalent hydrogen sulfide":

Section	**Department's Explanation for Change**
§2105.21.h, h.3	As discussed above, the ACHD regulations cannot be "less stringent" than the regulations promulgated under the Pennsylvania Air Pollution Control Act. 35 P.S. §4012(a). ***Under Section 123.23 ("Byproduct coke oven gas") of the Pennsylvania "Air Resources" regulations, compliance with the emission standards for coke oven gas is determined by measuring sulfur compounds "expressed as equivalent hydrogen sulfide."*** 25 Pa.Code § 123.23(b). The current version of the ACHD regulations are less stringent because it does not include this language. ***The ACHD is proposing to revise its regulations to state "expressed as equivalent hydrogen sulfide" which is consistent with the Pennsylvania regulations***.

See id., page 25 (bold italics added for emphasis).

Sixth, the Department proposes to amend the county regulations to include state requirements for Miscellaneous Topside Emissions, that are not included in the current county regulations:

Section	**Department's Explanation for Change**
§2105.21.j	***The ACHD is proposing adding a new section titled "Miscellaneous Topside Emissions."*** The requirements under this section are from the Pennsylvania "Air Resources" regulations, 25 Pa.Code §123.44(a)(6),(7). ***The ACHD is required to include these requirements so that the Article XXI regulations are not less stringent than the Pennsylvania regulations.*** 35 P.S. § 4012(a).

See id., page 26 (bold italics added for emphasis). The proposed regulations would prohibit topside emissions from any point on the topside other than allowed emissions from charging port seals, offtake piping, and soaking. *See id.*, page 19 (proposed Section §2105.21.j.1). They would also prohibit visible emissions from the coke oven gas collector main. *See id.* (proposed Section §2105.21.j.2).

The Department should provide an explanation why it is necessary to make these amendments.

B. The Department is not exempt from federal requirements, even if they are not incorporated into the county's regulations.

The federal requirements applicable to coke ovens emanate from the federal Clean Air Act and regulations promulgated by EPA. Nothing in the federal law creates an exemption for coke ovens or an exemption for the Department, and nothing in federal law preempts the Department from regulating coke ovens.

If anything, the federal law reserves to the state and local governments the authority to adopt more stringent regulations:

> Except as otherwise provided in sections 119(c), (e), and (f) (as in effect before the date of the enactment of the Clean Air Act Amendments of 1977 [enacted Aug. 7, 1977]), 209, 211(c)(4), and 233 [42 USCS §§ 7543, 7545(c)(4), and 7573] (preempting certain State regulation of moving sources) ***nothing in this Act shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution***; except that if an emission standard or limitation is in effect under an applicable implementation plan or under section 111 or 112 [42 USCS § 7411 or 7412], such State or political subdivision may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such plan or section.

See Section 116 of the Clean Air Act, 42 U.S.C. 7416 ("Retention of State Authority") (bold italics added for emphasis), https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section7416&num=0&edition=prelim. (The exception to this rule merely states that the state and local governments may not adopt less stringent requirements than certain federal requirements).

Pursuant to the federal law, EPA has adopted three National Emission Standards for Hazardous Air Pollutants for coke facilities. *See* 40 CFR part 61, subpart L (Benzene NESHAP for coke by-product recovery plants) (July 1, 2019), https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol10/pdf/CFR-2019-title40-vol10-part61-subpartL.pdf; *see also* 40 CFR part 63, subpart L (Battery NESHAP for coke oven batteries) (July 1, 2019), https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol11/pdf/CFR-2019-title40-vol11-part63-subpartL.pdf; *see also* 40 CFR part 63, subpart CCCCC (Quenching NESHAP for pushing, quenching, and battery stacks at coke ovens) (July 1, 2019), https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol15/pdf/CFR-2019-title40-vol15-part63-subpartCCCCC.pdf.

Nothing in these regulations creates an exemption for the Department or for the Clairton Coke Works. *See generally id.*

C. The Department is not exempt from state requirements, even if they are not incorporated into the county's regulations.

The Air Pollution Control Act contains a non-preemption provision similar to the non-preemption provision in the federal Clean Air Act:

> (a) ***Nothing in this act shall prevent counties, cities, towns, townships or boroughs from enacting ordinances with respect to air pollution which will not be less stringent*** than the provisions of this act, the Clean Air Act or the rules and regulations promulgated under either this act or the Clean Air Act.

See Pennsylvania Air Pollution Control Act, Section 12 ("Powers Reserved to Political Subdivisions") (bold italics added for emphasis), https://www.dep.pa.gov/Business/Air/BAQ/Regulations/Documents/apca.pdf, 35 P.S. §4012, https://govt.westlaw.com/pac/Document/NC4C2A170343D11DA8A989F4EECDB8638?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1 (unofficial version).

The Department of Environmental Protection has approved the Allegheny County Air Quality program under the Air Pollution Control Act, with conditions. Air Quality Program Approval With Conditions (undated), http://164.156.71.80/Air/AirQuality/AQPortalFiles/Permits/docs/allegheny_plan_approval.pdf. One of those conditions is that the Department must implement the requirements of the state law and state regulations:

> b. ***Allegheny County shall implement regulatory requirements promulgated by the Department applicable to air contamination sources including mobile sources located in Allegheny County***. Allegheny County shall also promulgate regulations to implement regulations promulgated by the Department. Allegheny County will describe the process and timing for implementation of these regulations in the Annual Program Plan.

See id., Section I.b (bold italics added for emphasis). In another section, the Air Quality Program Approval states that the Department must implement a program at least as stringent as the requirements in the state air pollution regulations:

> ***Allegheny County shall continue to implement an air contamination source permitting program, as approved by DEP, that is at least as stringent as the requirements of 25 Pa. Code Chapter 127*. *Allegheny County's permitting program shall conform to or be more stringent than that of DEP***, and be implemented in accordance with DEP policies and procedures, ***unless modifications are approved by DEP in writing***. Allegheny County's permitting program may be more stringent than the Department's permitting program.

XVI.a ("Air Quality Permitting") (bold italics added for emphasis).

There is an exception to this requirement where there "modifications are approved by DEP in writing." *See id.* In response to these comments, the Department should provide information regarding any possible modifications of the program that have been approved by DEP in writing, that might have formed the basis for the Department not fully enforcing the state requirements in the past.

In summary, there does not appear to be any legal barrier to the Department fully enforcing the requirements of the state law and regulations, even without the proposed amendments. If the Department is relying on any authority to the contrary, it should explain.

3. Section VII of the Settlement Agreement Only Purports to Limit More Stringent Emission Standards, Not Procedural Requirements Like Inspections.

According to its terms, a settlement agreement with the regulated industry in 2019 that purports to limit the Department's regulatory authority to adopt more stringent regulations would not apply to proposed procedural requirements concerning inspections. This is because Section VII of the agreement ("Adoption of More Stringent Emission Standards") relates to emission standards, not procedures. *See* Attachment 1 -- Settlement Agreement dated June 27, 2019, paragraph 12, page 19 ("[t]he Department may pursue a rulemaking to impose more stringent limits on the coke batteries (except C Battery) only if the more stringent limits are determined to be, inter alia, technically feasible in accordance with this Paragraph.").

In addition, Section VII is unlawful for reasons set forth in Comment #6, below.

4. **<u>The Proposed Revision of the Emission Standard for Hydrogen Sulfide in Coke Oven Gas Would Not Make the Standard More Stringent Than It Should Be, If It Is Merely Correcting An Error</u>.**

The Department proposes to lower the emission standard for coke oven gas (measured in grains of hydrogen sulfide), apparently to correct a computational error. *See* Technical Support Document, pages 21, 26. While this would involve lowering the number, it would not make the emission standard more stringent if it is simply correcting an error in what was intended by the current regulations.

A. The Department should provide more information regarding the nature of the error being corrected in the proposed regulations.

In the Technical Support Document, the Department asserts the proposal is intended to correct an error in the calculation of the current emission standard in the regulations, but it does not say what precisely was this error and when it occurred:

> ***During the current regulatory review process, the ACHD determined that there was an error in how the 40 grains standard was calculated. The ACHD recalculated the grains standard by taking the weighted design capacity for the coke oven batteries in operation and using the emissions limits under Paragraphs h.1 (10 grains) and h.2 (50 grains).*** The ACHD also included Battery C in the recalculation. The ACHD calculated that the grains standard under Paragraph h.3 should ***be 23 grains per hundred dry cubic feet of coke oven gas. The ACHD believes that it is necessary to correct this error considering that the U.S. Steel facility is currently benefiting by not having to test each of its batteries***. It is not appropriate for U.S. Steel to further benefit by having a higher grains standard than it would have to meet if each battery was tested individually. In order to allow time for U.S. Steel to adjust to the corrected concentration standard, the ACHD is allowing U.S. Steel until January 1, 2025, to meet a concentration of 23 grains per hundred dry cubic feet of coke oven gas. Prior to January 1, 2025, U.S. Steel is required to meet a concentration of 35 grains, which is the standard set forth in the Battery C installation permit.

See Technical Support Document, page 26 (discussion of §2105.21.h.3) (bold italics added for emphasis). This does not explain what precisely was the error in the calculation of the current emission standard of 40 grains.

The Department should provide a more detailed explanation of the error being corrected, for the public in the response to comments.

B. A consent order executed in 1992 does not prevent the Department from lowering the emission standard for coke oven gas.

The current standard of 40 grains per dry square cubic meter apparently resulted from a consent decree executed in 1992. *See* Attachment 2 -- Email from U.S. Steel dated August 21, 2020, attaching Second Consent Decree, dated December 11, 1992. According to the consent decree, the standard of 40 grains was an alternate means of compliance for a company that otherwise would have had to comply with a more stringent emission standard of 10 grains for batteries 13, 14, 15, 20 and B:

> H. Coke Oven Gas Desulfurization:
>
> 1. On and after the date of entry of this Second Consent Decree, the concentration of sulfur compounds in the coke oven gas produced by coke oven batteries designated 13, 14, 15, 20 and B ***shall be no greater than ten grains per hundred dry standard cubic feet of coke oven gas produced, including organic sulfur and tail gas***. ***Provided, however, that the foregoing standard in this subparagraph V.H.l. shall be satisfied for such batteries if the coke oven gas treated by the existing Clairton Works coke oven gas desulfurization system has a sulfur compound concentration, measured as H2S, of no greater than 40 grains per 100 DSCF of coke oven gas produced by the Clairton Works***, when all sulfur emissions from its Claus Sulfur Recovery Plant and the tail gas cleaning equipment thereon, expressed as equivalent H2S, are added to the measured H2S.
>
> ….
>
> 3. Compliance with subparagraph V.H.l. above shall be determined in accordance with the procedures set forth in Appendix 2, Paragraph B.

See id., Paragraphs V.H.1, V.H.3, pages 15-16 (bold italics added for emphasis).

The termination of Section V.H.1 was governed by Section V.H.2 of the Consent Decree. *See id.*, Subsection XXV.B, page 55 (“the requirements of subparagraph V.H.l. shall terminate according to the terms of subparagraph V.H.2.”). Section V.H.2 merely states that the company shall comply with the standard until the Department amends the state implementation plan to include the standard or includes that standard in an enforceable air permit:

> Notwithstanding the provisions of Paragraph XXV.A., ***Defendant shall comply with the standard set forth in subparagraph V.H.l. until such time as the SIP for Allegheny County has been amended to include the standard set forth in subparagraph V.H.l.***

> ***or until such time as such standard is made part of a permit that is enforceable by EPA, DER, and the County***.

See id., Paragraph V.H.2, page 15. Since that time, the standard of 40 grains has been incorporated into the company's Title V permit, which is enforceable by the Department and EPA in federal court. *See* Attachment 3 -- Excerpts from Title V Permit dated March 27, 2012, pages 48, 78, 110, 142, 184, 241, 244, 247, 250, https://gasp-pgh.org/wp-content/uploads/2014/05/U.-S.-Steel-Clairton-Works.pdf; *see also* Attachment 4 -- Excerpts from Review Memorandum, Section 1.2, page 7 (June 14, 2010), https://gasp-pgh.org/wp-content/uploads/uss-clairton-tvrv-draft-public-1.pdf Consequently, those provisions of the Consent Order have terminated.

The Consent Order is not an iron-clad agreement that forever prohibits the Department from adopting an emission standard for coke oven gas that is more stringent than 40 grains.

C. The Department Should Explain How the Proposed Revision Will Have a Meaningful Impact on Emissions of Sulfur Dioxide from the Clairton Coke Works.

While the lowering of an emissions limitation would appear to lead to a reduction of air emissions and an improvement in air quality, this is not necessarily a foregone conclusion. Since the calculations here involve a weighted average formula, this depends on emissions levels for all the batteries.

In addition, lowering the numerical emissions limitation would only have an impact to the extent it actually causes the facility to do things to reduce emissions that would exceed the proposed emissions limitation.

But the Department has not provided any analysis in the Technical Support Document as to how this will result in actual emissions reduction from the Clairton Coke Works.

Conceivably, a lower emissions limitation could ultimately increase fines and penalties in future enforcement actions. But the present comment is concerned with how the company will reduce its emissions, and not with how much it will pay in fines and penalties.

The Department should provide an analysis of how this proposal will result in actual emissions reductions from the Clairton Coke Works.

5. **The Department Should Reinstate Proposed Requirements in the First Draft Regulations (June 2018), Which Were Reversed in the Second Draft Regulations (July 2020) and the Proposed Regulations.**

In the first draft regulations in 2018, the Department proposed a number of requirements that would have made the regulations more stringent. *See* Attachment 5 -- First Draft Regulations, dated June 29, 2018. Then it entered into a settlement agreement with the regulated industry in 2019. Now, it is reversing those proposals under the rationale that it has entered into a settlement agreement preventing it from making emission standards more stringent. *See* Attachment 6 -- Second Draft Regulations, dated July 14, 2020; *see also* Proposed Regulations, https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/Coke-Oven-Regulations-2105-21-2101-20-w-Tech-Support-Doc.pdf.

The Department is required to provide a justification for its action. But it has not provided a reasonable justification for reversing proposals that it presumably believed to be in the public interest in the first place.

To illustrate, the following is a short list of language in the first draft that was removed or watered down in later drafts:

1. door areas -- §2105.21(b) ("at any time, there are visible emissions from more than one (1) of the door areas of the coke ovens per observed battery side"),

2. charging ports -- §2105.21(c) ("at any time, there are visible emissions from any of the charging ports or charging port seals on the coke ovens of such battery"),

3. offtake piping -- §2105.21(d) ("at any time, there are visible emissions from more than one (1) of the offtake piping on the coke ovens per observed battery side"),

4. pushing -- §2105.21(e) ("At any time, the particulate mass emission rate from the pushing emission control device, exceeds a rate determined by an outlet concentration of 0.020 pounds per ton of coke produced"),

5. combustion stacks -- §2105.21(f) ("Exceed a particulate concentration of 0.010 grains per dry standard cubic foot") (in the proposed regulations, this would apply to only one battery), and

6. soaking -- §2105.21(g) ("No person shall operate, or allow to be operated, any battery of coke ovens in such manner that there are soaking emissions from a standpipe cap opening") (in the proposed regulations, this was replaced by percentage limitations for opacity).

The following tables provide a more detailed analysis of the more stringent emission standards that were proposed in the first draft, and subsequently reversed in later drafts:

Charging (§2105.21.a)

	Regulatory Requirements	**Section**
Current	Limitation on visible charging emissions exceeding a total of 55 seconds during any five (5) consecutive charges (post-1978 batteries), and the current limitation on visible charging emissions exceeding a total of 75 seconds during any four (4) consecutive charges (pre-1978 batteries).	§2105.21.a.1, §2105.21.a.2
First Draft	Proposed standard of visible charging emissions exceeding ten (10) seconds per charge for all batteries.	§2105.21.a.1 (charging)
Second Draft	Reversal of proposals in the First Draft Regulations Proposal to narrow the current limitation on visible charging emissions exceeding a total of 55 seconds during any five (5) consecutive charges (post-1978 batteries), to only "valid charges"	§2105.21.a §2105.21.a.1
Proposed	Follows the Second Draft Regulations, adds the word "valid"	§2105.21.a.1

Door Areas (§2105.21.b)

	Regulatory Requirements	Section
Current	limitation on visible emissions from more than (5%) of door areas of operating coke ovens	§2105.21.b.1 (post-1978 batteries)
	current limitation on visible emissions from more than ten percent (10%) of door areas of operating coke ovens	§2105.21.b.2 (any other batteries)
	current limitation on visible emissions from more than eight percent (8%) of door areas of operating coke ovens	§2105.21.b.3 (listed batteries 1, 2, 3, and 19)
	current limitation on emissions from door areas of any coke oven exceeding an opacity of 40% at any time	§2105.21.b.4
First Draft	proposal to replace the percentage limitations on visible emissions from door areas (post-1978 batteries, any other batteries, and listed batteries) with a limitation on visible emissions from more than one of the door areas per observed battery side (all batteries)	§2105.21.b.1-3
	proposal to reduce the 40% opacity limitation for emissions from door areas (all batteries) to 30%	§2105.21.b.4
	proposal to delete the requirements for big plug doors as replacement doors	§2105.21.b.5
	proposal to delete the 10% limitation on visible emissions from door areas (batteries other than 1-3, 7-19, 19)	§2105.21.b.2
	proposal to delete the 8% limitation on visible emissions from door areas (batteries 1-3, 7-19, 19)	§2105.21.b.3
Second Draft	reversal of proposals in the First Draft Regulations	§2105.21.b
	proposal to replace the proposed limitation on visible emissions from more than one of the door areas per observed battery side (all batteries), with a 3% limitation on visible emissions from door areas (post-1978 batteries only)	§2105.21.b.1

	proposed limitation on visible emissions from more than five percent (5.00%) of the door areas (post-1978, pre-2012 batteries) proposal to retain the limitation on visible emissions from more than eight percent (8.00%) of the door areas (batteries 1-3, 19) proposal to limit the lowered 30% opacity limitation to emissions from door areas from only one battery (battery C) proposal to retain the current 40% opacity limitation for emissions from door areas for batteries other than battery C (batteries 1-3, 13-15, 19-20, and B) proposed provisions subjecting future major modifications to the requirements of Sections 2102.06 and 2102.07, including records demonstrating what door area requirements would apply to such major modifications	§2105.21.b.2 §2105.21.b.3 §2105.21.b.4 §2105.21.b.4 §2105.21.b.5
Proposed	Follows the Second Draft Regulations, revises percentages in draft emissions limitations from hundredths to tenths	§2105.21.b.1 §2105.21.b.2 §2105.21.b.3

Charging Ports (§2105.21.c)

	Regulatory Requirements	**Section**
Current	current limitation on visible emissions from more than one percent (1%) of charging ports or charging port seals on operating coke ovens (post-1978 batteries) current limitation on visible emissions from more than two percent (2%) of charging ports or charging port seals on operating coke ovens (pre-1978 batteries)	§2105.21.c.1 §2105.21.c.2
First Draft	proposal to replace the 1% limitation on visible emissions from charging ports or charging port seals (post-1978 batteries) and the 2% limitation on visible emissions from charging ports or charging port seals (pre-1978 batteries) with a limitation on visible emissions from any of the charging ports or charging port seals (any battery)	§2105.21.c.1 , §2105.21.c.2
Second Draft	reversal of proposals in the First Draft Regulations proposal to replace the proposed limitation on visible emissions from any of the charging ports or charging port seals (any battery) with a limitation on visible emissions from more than 0.60% of the charging ports or charging port seals (battery C only) proposed 1% limitation on visible emissions from charging ports or charging port seals (post-1978, pre-2012 batteries) proposed provisions subjecting future major modifications to the requirements of Sections 2102.06 and 2102.07, including records demonstrating what charging port requirements would apply to such major modifications proposal to retain the 2% limitation on visible emissions from charging ports or charging port seals (any other batteries (pre-1978 batteries))	§2105.21.c §2105.21.c.1 §2105.21.c.2 §2105.21.c.3 §2105.21.c.4
Proposed	Follows the Second Draft Regulations	§2105.21.c.1 §2105.21.c.2 §2105.21.c.4

Offtake Piping (§2105.21.d)

	Regulatory Requirements	Section
Current	current limitation on visible emissions from more than (4%) of offtake piping on operating coke ovens (post-1978 batteries) current limitation on visible emissions from more than five percent (5%) of offtake piping on operating coke ovens (pre-1978 batteries)	§2105.21.d.1 §2105.21.d.2
First Draft	proposal to replace the 4% limitation on visible emissions from offtake piping (post-1978 batteries) and 5% limitation on visible emissions from offtake piping on the operating coke ovens (pre-1978 batteries), with a limitation on visible emissions from more than one (1) of the offtake piping on the operating coke ovens per observed battery side (any battery)	§2105.21.d.1, §2105.21.d.2
Second Draft	proposed 60% opacity limitation on emissions from an open offtake piping of any coke oven (any battery) reversal of proposals in the First Draft Regulations proposal to delete the 60% opacity limitation on emissions from an open offtake piping of any coke oven (any battery) proposed 3% limitation on visible emissions from the offtake piping on the operating coke ovens (battery C) proposal to retain the 4% limitation on visible emissions from the offtake piping on the operating coke ovens (post-1978, pre-2012 batteries) proposed provisions subjecting future major modifications to the requirements of Sections 2102.06 and 2102.07, including records demonstrating what offtake piping requirements would apply to such major modifications proposal to retain the limitation on visible emissions from more than five percent (5.00%) of the offtake piping on the operating coke ovens of such battery (any other battery (pre-1978 batteries))	§2105.21.d.2 §2105.21.d §2105.21.d §2105.21.d.1 §2105.21.d.2 §2105.21.d.3 §2105.21.d.4
Proposed	Follows the Second Draft Regulations	§2105.21.d.1 §2105.21.d.2 §2105.21.d.4

Pushing Emissions (§2105.21.e)

	Regulatory Requirements	Section
Current	current limitation on the particulate mass emission rate from the pushing emission control device exceeding a rate determined by an outlet concentration of 0.020 grains per dry standard cubic foot, or the rate determined by the regulatory formula, whichever is greater (any other battery)	§2105.21.e.1
	current limitation on the particulate mass emission rate from the pushing emission control device exceeding a rate determined by an outlet concentration of 0.010 grains per dry standard cubic foot (Batteries 1, 2, 3, and 19)	§2105.21.e.2
	current limitation on the particulate mass emission rate from the pushing emission control device exceeding a rate determined by an outlet concentration of 0.040 pounds per ton of coke produced (Batteries 13, 14, 15, 20, and B)	§2105.21.e.3
	current limitation on fugitive pushing emissions or emissions from the pushing emission control device outlet equaling or exceeding an opacity of 20% at any time	§2105.21.e.4
	current limitation on visible emissions from the transport of hot coke in the open atmosphere exceeding ten percent (10%) opacity at any time	§2105.21.e.5
First Draft	proposal to delete the formulaic limitation on the particulate mass emission rate from the pushing emission control device exceeding a rate determined by an outlet concentration of 0.020 grains per dry standard cubic foot, or the rate determined by a formula, whichever is greater (any other batteries)	§2105.21.e
	proposal to limit the particulate mass emission rate from the pushing emission control device to a rate determined by an outlet concentration of 0.010 grains per dry standard cubic foot	§2105.21.e.1
	proposal to decrease the particulate mass emission rate from the pushing emission control device to a rate determined by an outlet concentration of 0.020 pounds per ton of coke produced	§2105.21.e.2

	(currently 0.040 pounds per ton of coke for batteries 13-15, 20), and make it applicable without regard to battery	
	proposal to decrease the 20% opacity limitation for fugitive pushing emissions or emissions from the pushing emission control device outlet to 10%, and delete the exception for emissions of only minor significance	§2105.21.e.3
	proposal to delete the limitation on visible emissions from the transport of hot coke in the open atmosphere exceeding 10% opacity at any time	§2105.21.e.3, §2105.21.e.4
Second Draft	reversal of proposals in the First Draft Regulations	§2105.21.e
	proposal to prohibit the pushing of coke from a coke oven unless the pushing operation is enclosed during the removal of coke from a coke oven and pushing emissions are contained, except for the fugitive pushing emissions, that are allowed by Paragraphs 4 and 5 of this Subsection	§2105.21.e
	proposal to retain the formulaic limitation on the particulate mass emission rate from the pushing emission control device exceeding a rate determined by an outlet concentration of 0.020 grains per dry standard cubic foot, or the rate determined by a formula, whichever is greater (any other batteries)	§2105.21.e.1
	proposal to retain the limitation on the particulate mass emission rate from the pushing emission control device of 0.010 pounds per ton of coke (batteries 1-3, 19)	§2105.21.e.2
	proposal to retain the limitation on the particulate mass emission rate from the pushing emission control device of 0.040 pounds per ton of coke (battery B)	§2105.21.e.3
	proposal to retain the 20% opacity limitation for fugitive pushing emissions or emissions from the pushing emission control device outlet (not the previously proposed 10%), and retain the exception for emissions of only minor significance	§2105.21.e.4
	proposal to retain the limitation on visible emissions from the transport of hot coke in the open atmosphere exceeding 10% opacity at any time	§2105.21.e.3, §2105.21.e.5
	proposed inspection requirements for pushing emissions	§2105.21.e.7

Proposed	Follows the Second Draft Regulations	§2105.21.e.1 §2105.21.e.2 §2105.21.e.3 §2105.21.e.4 §2105.21.e.5 §2105.21.e.6

Combustion Stacks (§2105.21.f)

	Regulatory Requirements	Section
Current	current limitation on emissions from a combustion stack exceeding a particulate concentration of 0.015 grains per dry standard cubic foot (post-1978 batteries) current limitation on emissions from a combustion stack exceeding a particulate concentration of 0.030 grains per dry standard cubic foot (any other battery) opacity limitations for the combustion stacks	§2105.21.f.1 §2105.21.f.2 §2105.21.f.3, §2105.21.f.4
First Draft	proposal to decrease the limitation on air emissions from the combustion stacks from a particulate concentration of 0.015 grains per dry standard cubic foot to a particulate concentration of 0.010 grains per dry standard cubic foot (any battery)	§2105.21.f.1
Second Draft	reversal of proposals in the First Draft Regulations proposal to narrow the proposed limitation of 0.010 grains per dry standard cubic foot to be applicable to only one battery (battery C) proposal to retain the particulate concentration of 0.015 grains per dry standard cubic foot for other batteries (post-1978, pre-2012 batteries) proposed provisions subjecting future major modifications to the requirements of Sections 2102.06 and 2102.07, including records demonstrating what combustion stack requirements would apply to such major modifications proposal to retain the limitation on the particulate concentration of 0.030 grains per dry standard cubic foot (any other battery) proposed requirements for measurement of visible emissions	§2105.21.f §2105.21.f.1 §2105.21.f.2 §2105.21.f.3 §2105.21.f.4 §2105.21.f.7
Proposed	Follows the Second Draft Regulations	§2105.21.f.1 §2105.21.f.2 §2105.21.f.3 §2105.21.f.4 §2105.21.f.5

		§2105.21.f.6

Coke Oven Gas (§2105.21.h)

	Regulatory Requirements	Section
Current	Standards for hydrogen sulfide	
First Draft	proposal to decrease the standard of 70 grains per hundred dry standard cubic feet of coke oven gas to 35 grains per hundred dry standard cubic feet of coke oven gas, for purposes of the formulaic emissions limitation where the rated production capacity of the coke plant producing such gas is less than 70 million standard cubic feet of coke oven gas per day proposal to retain the concentration of 50 grains per hundred dry standard cubic feet of coke oven gas (all other coke batteries) proposal to retain the standard of ten grains per hundred dry standard cubic feet of coke oven gas (post-1978 batteries) proposal to decrease the standard for sulfur compounds, measured as H2S, of no greater than 40 grains per hundred dry standard cubic feet of coke oven gas (batteries 13, 14, 15, 20, and B) to 35 grains per hundred dry standard cubic feet of coke oven gas (all batteries) proposal to set the standard for sulfur compounds according to a formula that contemplates a weighted average, depending on certain conditions being met (e.g. shut down, idle, or major modification, etc.)	§2105.21.h.1 §2105.21.h.3 §2105.21.h.2 §2105.21.h.4 §2105.21.h.4
Second Draft	proposal to retain the concentration of 50 grains per hundred dry standard cubic feet of coke oven gas (all other coke batteries) proposal to retain the standard of ten grains per hundred dry standard cubic feet of coke oven gas (post-1978 batteries) reversal of proposals in the First Draft Regulations proposal to delete the formulaic emissions limitation where the rated production capacity of the coke plant producing such gas is less than 70 million standard cubic feet of coke oven gas per day	§2105.21.h.2 §2105.21.h.1 §2105.21.h §2105.21.h, §2105.21.h.1 §2105.21.h.4

	proposal to decrease the proposed standard for sulfur compounds, measured as H_2S, of no greater than 35 grains per hundred dry standard cubic feet of coke oven gas to 23 grains per hundred dry standard cubic feet of coke oven gas (all batteries)	
Proposed	Follows the Second Draft Regulations Revises and reorganizes Second Draft Regulations	§2105.21.h.1 §2105.21.h.2 §2105.21.h.3 §2105.21.h.4 §2105.21.h.5

Soaking (§2105.21.i)

	Regulatory Requirements	Section
Current	limitation on soaking emissions from a standpipe cap opening exceeding twenty percent (20%) opacity, including records demonstrating whether U.S. Steel has qualified for the exclusion	§2105.21.i
First Draft	proposal to delete the 20% limitation on soaking emissions from a standpipe cap opening, and replace it with a prohibition on soaking emissions from a standpipe cap opening, and proposing conditions for the exclusion and determining compliance	§2105.21.i.1
Second Draft	reversal of proposals in the First Draft Regulations proposed 10% limitation on soaking emissions from a standpipe cap opening (battery C) proposed provisions subjecting future major modifications to the requirements of Sections 2102.06 and 2102.07, including records demonstrating what soaking requirements would apply to such major modifications proposal to retain the 20% limitation on soaking emissions from a standpipe cap opening (any other batteries) proposed conditions for the exclusion from the opacity limit for soaking emissions proposed inspection requirements for soaking	§2105.21.i §2105.21.i.1 §2105.21.i.2 §2105.21.i.3 §2105.21.i.3 §2105.21.i.4
Proposed	Follows the Second Draft Regulations	§2105.21.i.1 §2105.21.i.2 §2105.21.i.3

Visible Emissions/Miscellaneous Topside Emissions (§2105.21.j)

	Regulatory Requirements	**Section**
Current		
First Draft	proposed requirements for visible emissions	§2105.21.j
Second Draft	reversal of proposals in the First Draft Regulations proposed requirements for miscellaneous topside emissions	§2105.21.j §2105.21.j
Proposed	Follows the Second Draft Regulations	§2105.21.j

6. <u>It is Unlawful for the Department to Use Section VII of the Settlement Agreement to Abdicate its Authority to Adopt More Stringent Emission Standards</u>.

Unlawfully, the Department has attempted to enter into an agreement with a regulated industry that purports to prevent the Department from adopting more stringent standards unless they meet the terms negotiated with the regulated industry. (*See* Comment #3, above). This is unlawful.

A. For a reduction of emissions of fine particulates of only 5.1 tons per year, the Department abdicated its authority to adopt more stringent emission standards for fine particulates for as many as five years.

In the agreement, the company essentially purchased the forbearance of more stringent coke oven regulations for a period for five years, in return for the payment of a civil penalty of $2,732,504 to neighboring communities and the Department, plus some emissions reductions.

The Department entered into an agreement with the regulated industry that would dictate the substance of coke oven regulations:

> VII. ADOPTION OF MORE STRINGENT ***EMISSION STANDARDS***
>
> 12. The Department may pursue a rulemaking to impose ***more stringent limits on the coke batteries*** (except C Battery) ***only if the more stringent limits are determined to be***, inter alia, ***technically feasible in accordance with this Paragraph***. C Battery is excluded because the existing limits are based upon current Best Available Control Technology. U.S. Steel hereby agrees that it will not challenge, and hereby waives any right to challenge, any such rulemaking on the basis of technical feasibility, ***provided that any more stringent emission standards are shown to be achievable and maintainable***, based on meeting all criteria below:
>
> A. ***The consideration of EPA's Upper Prediction Limit (UPL) methodology across all Batteries based on the actual inspections performed from December 24, 2013 to December 23, 2018*** (the five-year period just prior to a fire at the No. 2 Control Room that significantly affected plant operations) and shall consist of all required inspection data;
>
> B. ***Standards must be based on an appropriate compliance rate which shall not be less than 99% for all regulated emissions points on the battery over any consecutive 12-month period 20 during a five-year period on a battery-by-battery basis***. The database for establishing the rate of compliance shall be based on the actual inspections performed from December 24, 2013 to

> December 23, 2018 (the five-year period just prior to a fire at the No. 2 Control Room that significantly affected plant operations) and shall consist of all required inspection data; and
>
> C. ***Any more stringent limit must be supported by a demonstration that the such limit is shown to correlate with a measurable reduction in hydrogen sulfide and benzene levels at the Liberty monitor***.

See Attachment 1 -- Settlement Agreement, Section VII, pages 19-20 (bold italics added for emphasis). The consideration was $2,732,504. *See id.*, Section V, pages 15-16. This would limit the Department's regulatory authority for a period of up to five years:

> XIII. EFFECTIVE DATE AND TERMINATION
>
> 32. ***The effective date of this Settlement Agreement ("Effective Date") shall be the date on which it is signed by both the ACHD and U.S. Steel***. This Settlement Agreement shall remain in effect until terminated. ***The Settlement Agreement shall be terminated by the earliest of the following***: (i) mutual agreement of the Parties; (ii) after the completion of all projects required by Paragraph 8; or (iii) ***five (5) years after the Effective Date***. However, either party may request of the other party an extension of the terms of this Settlement Agreement beyond the termination date in which case, Section XIII of this Settlement Agreement may be modified only by written agreement of the Parties.

See id., Section XIII, page 28 (bold italics added for emphasis).

But the Department has been able to quantify emissions reductions of only 5.1 tons per year of fine particulates under the Settlement Agreement. *See* Attachment 7 -- Allegheny County Health Department, USS Clairton emission reductions (Email dated July 11, 2019), Attachment 8 -- Allegheny County Health Department, 2019 Consent Agreement, Estimated Emission Reduction (Excel Spreadsheet dated July 11, 2019). This is around 1% of the actual emissions of fine particulates forecast for the Clairton Coke Works in 2021. *See* Attachment 9 -- Allegheny County Area Attainment Plan for the 2012 PM2.5 National Ambient Air Quality Standard, Appendix D, page 14 (554.094 tons per year), https://beta.regulations.gov/docket/EPA-R03-OAR-2020-0157/document?pageNumber=2&sortBy=postedDate&sortDirection=asc.

While the Department estimates emissions reductions of sulfur dioxide of 65 tons per year under the Settlement Agreement, it also estimates emissions increases (not decreases) of nitrogen oxides of 192 tons per year. *See* Attachment 7 (Email), Attachment 8 (Excel Spreadsheet). The Department expressly projected that if all the increases and decreases in pollution are added together, the result will be an increase in pollution. *See* Attachment 7 (Email).

With respect to fine particulates, this is particularly a problem. For years, the county has failed to meet health-based standards for fine particulates. *See* U.S. EPA, Pennsylvania Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, https://www3.epa.gov/airquality/greenbook/anayo_pa.html (Data is current as of December 31, 2020).

By entering into the agreement with the company, the Department voluntarily tied its hands and forced itself to make only marginal changes in procedural requirements such as inspections, rather than on substantive changes in emissions standards. It has abdicated its regulatory authority.

B. In the proposed regulations, the Department actually reverses proposals to make emission standards for fine particulates more stringent, initially set forth in the first draft regulations in 2018.

Apart from a few exceptions, the Department has failed to propose emission standards for fine particulates that are more stringent. (Those exceptions apparently involve conforming the emission standards in the regulations to the requirements of air permits for battery C).

In fact, the Department has reversed a number of original draft proposals made in 2018, which would make the regulations more stringent for fine particulates. *See* Comment #6, below.

C. Section VII of the settlement agreement violates the Local Health Administration Law, 16 P.S. § 12011(c).

The Department has failed to exercise its rulemaking power for the benefit of public health, in violation of state health law:

> ***The board of health shall exercise the rule-making power conferred upon the county department of health by the formulation of rules and regulations for the prevention of disease, for the prevention and removal of conditions which constitute a menace to health, and for the promotion and preservation of the public health generally***. Rules and regulations formulated by the board of health shall be submitted to the county commissioners or, in the case of a joint-county department of health to the joint-county health commission, for approval or rejection.

See Local Health Administration Law, 16 P.S. § 12011(c), https://govt.westlaw.com/pac/Document/NC530DC50342C11DA8A989F4EECDB8638?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1. When the Department is proposing a regulation, it must be for the benefit of public health. It should not be for the benefit of the regulated industry.

Under the law, the Department may not negotiate away its regulatory authority for a period of years, in the manner that it has done.

D. Section VII of the settlement agreement involves a disguised regulation rather than an adjudication, under the Administrative Agency Law (Local Agency Law).

Under state law, the Department's agreement with US Steel represents an adjudication that is a disguised regulation, in violation of state administrative law. *See* Administrative Agency Law, Local Agency Law, 2 Pa.C.S. § 101 et seq., 101 (definition of "adjudication", 103(b) (reference to "[r]ule making"), https://www.legis.state.pa.us/cfdocs/legis/LI/consCheck.cfm?txtType=HTM&ttl=02; *see also Home Builders Association of Chester & Delaware Counties v. Commonwealth*, 828 A.2d 446, 455 (Pa. Commw. Ct. 2003), https://cite.case.law/a2d/828/446/ (" … it is clear that an agency cannot create new regulation through negotiations that are binding on the agencies without formally adopting the regulation through the procedures set forth in the Commonwealth Documents Law; nor can an agency enter into settlement agreements that are *de facto* regulations").

In the *Home Builders Association* decision, the Court found that "[t]he Settlement Agreement imposes specific conditions that DEP will impose as part of its review of all applications filed by anyone for NPDES permits for stormwater associated with construction activities in Valley Creek." *Id*. at 453. The Court dismissed the home builders' legal challenge to a settlement agreement that allegedly limited the rulemaking authority of the Department of Environmental Conservation, only because the action was not yet ripe. *See id.* at 455.

Similar to the facts of *Home Builders Association*, Section VII of the Settlement Agreement sets forth specific conditions for the adoption of "more stringent" coke oven regulations. Under the reasoning of the Court in *Home Builders Association*, that is unlawful.

E. Section VII of the settlement agreement involves a disguised regulation rather than an adjudication, under county law.

Under county law, the Department's agreement with US Steel represents an adjudication that is a disguised ordinance. Article IV of the Charter of Allegheny County sets forth the powers and duties of the County Council. *See* Article IV (Legislative Branch), https://ecode360.com/8453377. It gives the authority to adopt ordinances to the Council. *See id*., §1.4-402, Powers and duties of County Council, https://ecode360.com/8453379. These powers are not granted to the executive branch or an executive agency. *See id*. The Charter prescribes specific procedures for the adoption of ordinances. *See* § 1.4-405, Adoption of ordinances, resolutions and motions, https://ecode360.com/8453379. These were not followed in the case of the settlement agreement.

The Code for Allegheny County provides for the organization of the county government. *See* Article 201 (Organization of County Government), https://ecode360.com/8716570. Specifically, it provides that the "County Council shall have exclusive legislative power." Article 201 (Organization of County Government), § 5-201.01, Legislative Branch of County government), https://ecode360.com/8716572. The Code provides that "[t]he County Council shall have exclusive legislative power and shall exercise all its legislative powers and shall perform such functions and duties as are provided for in Article IV of the Charter." *Id.*, § 5-201.01, https://ecode360.com/8716570.

By entering into a Settlement Agreement purporting to preclude the Department from adopting "more stringent" emission standards, the Department has exercised an exclusive legislative power, in violation of the Charter and Code of Allegheny County.

F. The execution of the settlement agreement with a regulated industry that dictates future coke oven regulations is a violation of the Environmental Rights Amendment.

By negotiating away its regulatory authority to adopt more stringent coke oven regulations to a regulated industry in the manner that it has done, the Department has violated the Environmental Rights Amendment. *See* Environmental Rights Amendment, Article 1, §27, https://www.legis.state.pa.us/cfdocs/legis/LI/consCheck.cfm?txtType=HTM&ttl=00&div=0&chpt=1&sctn=27&subsctn=0.

The Environmental Rights Amendment recognizes the right of the people to clean air, makes the public natural resources the common property of all the people, and requires the Commonwealth (as trustee) to conserve and maintain them for the benefit of all people. *See id.* All Pennsylvania government bodies, including the County of Allegheny (acting through the Department) are responsible for implementing the Environmental Rights Amendment. *See Robinson Township v. Commonwealth*, 83 A.3d 901, 952 (Pa. 2013) (plurality) ("the constitutional obligation binds all government, state or local, concurrently"); *Accord*, *Pennsylvania Environmental Defense Foundation v. Commonwealth*, 161 A.3d 911, 931, fn. 23 (2017).

The County of Allegheny (acting through the Department) is a trustee with respect to clean air, which is part of the corpus of the trust. *Pennsylvania Environmental Defense Foundation*, 161 A.3d at 931-932 (2017) ("The third clause of Section 27 establishes a public trust, pursuant to which the natural resources are the corpus of the trust, the Commonwealth is the trustee, and the people are the named beneficiaries.").

The Department negotiated away its regulatory authority to the regulated industry for a period of as many as five years, in exchange for the distribution of some $2.7 million to neighboring communities and the Department, and an emissions reduction of 5.1 tons per year of fine particulates and 65 tons per year of sulfur dioxide (but with an emissions increases of nitrogen oxides of 192 tons per year). By doing this, the Department has violated the Environmental Rights Amendment.

G. Due to a severability clause, the legal invalidation of Section VII of the settlement agreement would not invalidate other provisions, including the provisions for payment of a civil penalty to neighboring communities.

Under a severability provision, the invalidation of one provision of the settlement agreement does not result in the invalidation of other provisions:

> The paragraphs of this Settlement Agreement are ***severable***, and ***should any part hereof be declared invalid or unenforceable, the remainder shall remain in full force and effect between the Parties***.

See Attachment 1 -- Settlement Agreement, Section X, paragraph 20, page 24 (bold italics added for emphasis). Section VII of the settlement agreement is unlawful and it should be invalidated. But this does not make all other provisions of the settlement invalid.

7. **<u>The Department's Failure to Propose Any More Stringent Emission Standards Is Not Compelled by Section VII of the Settlement Agreement, Even If It Could Lawfully Restrict the Department's Regulatory Authority</u>.**

Even if Section VII of the 2019 settlement agreement could legally restrict the Department from adopting more stringent emission standards, it would not be a basis for doing nothing to improve emission standards for fine particulates -- which is what the Department is doing. Even within the parameters of those provisions, there would still be options for proposing more stringent standards that would be more protective of public health.

Section VII of the settlement agreement contemplates a hypothetical level of performance over the course of a rolling one-year period during the five-year period preceding the fire on Christmas Eve, 2014:

> B. ***Standards must be based on an appropriate compliance rate which shall not be less than 99% for all regulated emissions points on the battery over any consecutive 12-month period during a five-year period on a battery-by-battery basis***. The database for establishing the rate of compliance ***shall be based on the actual inspections performed from December 24, 2013 to December 23, 2018*** (the five-year period just prior to a fire at the No. 2 Control Room that significantly affected plant operations) and shall consist of all required inspection data ...

See Settlement Agreement, dated June 26, 2019 (bold italics added for emphasis). Apparently, the parties to the settlement agreement would evaluate any future proposed emissions standard according to this test.

According to its terms, the Department could only justify a proposed emission standard if it could find not less than 99% compliance, assuming the future proposed standards were to apply retroactively. The Department would have to find this level of hypothetical compliance within a consecutive 12-month period during a five-year period on a battery-by-battery basis. *See id.* The compliance is "hypothetical" because what is being compared with a future emission standard for purposes of this test are not future emissions, but past emissions in past years.

Before illustrating how this would work, it is important to set forth the general requirements in the current regulations.

Arranged by battery, the following is a summary of the allowable seconds of visible emissions from charging of the batteries, under the current regulations:

Charging

battery	2% Section 2105.21.a.2 (pre-1978) "Any other battery of coke ovens in such manner that the aggregate of visible charging emissions exceeds a total of 75 seconds during any four (4) consecutive charges on such battery"	1% Section 2105.21.a.1 (post-1978) "Any battery of coke ovens installed, replaced, or reconstructed, or at which a major modification was made on or after January 1, 1978, in such manner that the aggregate of visible charging emissions exceeds a total of 55 seconds during any five (5) consecutive charges on such battery"	0.6% installation permit, July 24, 2008 (battery C)[1] Section 2105.21.a.1 (post-1978) "Any battery of coke ovens installed, replaced, or reconstructed, or at which a major modification was made on or after January 1, 1978, in such manner that the aggregate of visible charging emissions exceeds a total of 55 seconds during any five (5) consecutive charges on such battery"
1	75 seconds		

[1] *See* Attachment 10 -- Excerpts from Installation Permit 0052-1011 for battery C, page 21, Condition V.A.1.e ("The permittee shall not operate, or allow to be operated C Battery coke ovens in such manner that, at any time, there are visible emissions from more than (0.6%) of the charging ports or charging port seals on the operating coke ovens of such battery."), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/USSteel-Clairton-Plant-Installation-Permit-11.pdf.

2	75 seconds		
3	75 seconds		
13		55 seconds	
14		55 seconds	
15		55 seconds	
19	75 seconds		
20		55 seconds	
B		55 seconds	
C			55 seconds

See https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Article-21-Air-Pollution-Control-rev3319(1).pdf (effective July 26, 2020).

Arranged by battery, the following is a summary of the percentages of allowable leaking doors, lids, and offtakes:

Door Areas

battery	8% Section 2105.21.b.3 (pre-1978) "For any of the following batteries, at any time, there are visible emissions from more than eight percent (8%) of the door areas of the operating coke ovens in such battery, excluding the two door areas of the last oven charged and any door areas obstructed from view …."	5% Section 2105.21.b.1 (post-1978) "For any batteries installed, replaced, or reconstructed, or at which a major modification was made on or after January 1, 1978, at any time, there are visible emissions from more than five percent (5%) of the door areas of the operating coke ovens in such battery, excluding the two door areas of the last oven charged and any door areas obstructed from view"	3% installation permit, July 24, 2008 (battery C)[2]
1	8%		
2	8%		
3	8%		
13		5%	
14		5%	
15		5%	
19	8%		
20		5%	
B		5%	
C			3%

[2] *See* Attachment 10 -- Excerpts from Installation Permit 0052-1011 for battery C, page 21, Condition V.A.1.c ("The permittee shall not operate, or allow to be operated, C Battery coke ovens in such manner, at any time, there are visible emissions from more than three percent (3%) of the door areas of the operating coke ovens in such battery, excluding the two door areas of the last oven charged and any door areas obstructed from view.") (July 24, 2008), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/USSteel-Clairton-Plant-Installation-Permit-11.pdf.

Charging Ports
(Lids)

battery	**2%** **Section 2105.21.c.2** **(pre-1978)** "Any other battery of coke ovens in such manner that, at any time, there are visible emissions from more than two percent (2%) of the charging ports or charging port seals on the operating coke ovens of such battery"	**1%** **Section 2105.21.c.1** **(post-1978)** "Any battery of coke ovens installed, replaced, or reconstructed, or at which a major modification was made on or after January 1, 1978, in such manner that, at any time, there are visible emissions from more than one percent (1%) of the charging ports or charging port seals on the operating coke ovens of such battery"	**0.6%** **installation permit, July 24, 2008** **(battery C)[3]**
1	2%		
2	2%		
3	2%		
13		1%	
14		1%	
15		1%	
19	2%		
20		2%	
B		2%	
C			1%

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[3] *See* Attachment 10 -- Excerpts from Installation Permit 0052-1011 for battery C, page 21, Condition V.A.1.e ("The permittee shall not operate, or allow to be operated C Battery coke ovens in such manner that, at any time, there are visible emissions from more than (0.6%) of the charging ports or charging port seals on the operating coke ovens of such battery."), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/USSteel-Clairton-Plant-Installation-Permit-11.pdf.

<u>Offtake Piping</u>

battery	**5%** **Section 2105.21.d.2** **(pre-1978)** "Any other battery of coke ovens in such manner that, at any time, there are visible emissions from more than five percent (5%) of the offtake piping on the operating coke ovens of such battery"	**4%** **Section 2105.21.d.1** **(post-1978)** "Any battery of coke ovens installed, replaced, or reconstructed, or at which a major modification was made on or after January 1, 1978, in such manner that, at any time, there are visible emissions from more than four percent (4%) of the offtake piping on the operating coke ovens of such battery"	**3%** **installation permit, July 24, 2008** **(battery C)[4]**
1	5%		
2	5%		
3	5%		
13		4%	
14		4%	
15		4%	
19	5%		
20		4%	
B		4%	
C			3%

See id.

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[4] *See* Attachment 10 -- Excerpts from Installation Permit 0052-1011 for battery C, page 21, Condition V.A.1.f ("The permittee shall not operate, or allow to be operated, C Battery coke ovens in such manner that, at any time, there are visible emissions from more than three percent (3%) of the offtake piping on the operating coke ovens of such battery."), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/USSteel-Clairton-Plant-Installation-Permit-11.pdf.

In response to a records request from the Council several months ago, the Department has made available Excel spreadsheets providing daily records on percentages of leaking doors, lids, and offtakes. *See* Attachment 11 -- Allegheny County Health Department, Excel spreadsheets relating to leaking doors, lids, and offtakes. Those records track the performance of batteries with respect to the emissions standards set forth above.

To illustrate, the Department's 2017 calculations track compliance on a day-to-day basis, with a separate spreadsheet setting forth the number of leaking doors, lids, and offtakes on a daily basis. There is a column for designating compliance with a "Y" or "N," completed by the Department. *See id.*

To evaluate different compliance scenarios under more stringent emission standards, Commenters created their own spreadsheets similar to the Department's spreadsheets. *See* Attachment 12 -- Clean Air Council, Compliance Rates 2017 (Excel Spreadsheets prepared in 2021), "Compliance Rates" and "What If" tabs. Using these spreadsheets, one can adjust emissions standards to any percentage, and then evaluate the corresponding rate of compliance for each battery for the calendar year 2017. *See id.*

The conclusion is that the Department can propose more stringent emission standards that would still result in a level of compliance of no less than 99%, as set forth in Section VII of the settlement agreement.

This analysis is based on one example in a discrete one-year interval -- calendar year 2017. But this is not a limitation in the analysis. It is not a question of whether the data for 2017 are representative. Rather, it is a question of the Department finding a one-year period within the five-year period that would pass the test. The terms of the settlement contemplate a number of consecutive one-year periods within the five-year period. (In fact, there are precisely (4 x 365 days) +1 = 1,461 consecutive one-year periods during the five-year period, from which the Department could select the data).

What is important is that the Department has not performed an analysis evaluating alternate compliance scenarios. (The Department made this representation to the Council).

As a matter of law, this is unreasonable. Even though the Department believes it may abdicate its regulatory authority through a settlement agreement (this is wrong, *see* Comment #6), the Department should have evaluated whether it could make emission standards for doors, lids, and offtakes more stringent and still be consistent with the terms of the settlement agreement.

When looking at overall compliance over the calendar year 2017, the Department could lower the percentages of allowable leaks from doors, lids, and offtakes and still have 98.51% hypothetical compliance (which would round up to 99%)[5]:

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[5] Applying rounding conventions, a level of compliance of 98.51% would meet the 99% test. *See* Memorandum from William G. Laxton and John S. Seitz to New Source Performance Standards/National Emission Standards for Hazardous Pollutants Compliance Contacts,

	Current Standards									Theoretical Standards								
	Doors*			Lids			Offtakes			Doors*			Lids			Offtakes		
Battery	**SIP Limit: 8%**	**SIP Limit: 5%**	**SIP Limit: 3%**	**SIP Limit: 2%**	**SIP Limit: 1%**	**SIP Limit: 0.6%**	**SIP Limit: 5%**	**SIP Limit: 4%**	**SIP Limit: 3%**	**SIP Limit: 7%**	**SIP Limit: 6%**	**SIP Limit: 5%**	**SIP Limit: 1.5%**	**SIP Limit: 1%**	**SIP Limit: 0.5%**	**SIP Limit: 4.5%**	**SIP Limit: 4%**	**SIP Limit: 3.5%**
Battery 1	0.99178			1			0.99726			0.969863	0.961644	0.942466	1	0.99726	0.989041	0.994521	0.994521	0.991781
Battery 2	0.99726			0.994521			1			0.991781	0.989041	0.986301	0.994521	0.991781	0.986301	1	0.99726	0.99726
Battery 3	0.98630			0.994521			0.994521			0.975342	0.967123	0.958904		0.986301	0.983562	0.991781	0.978082	0.975342
Battery 13		0.994521			0.99726			0.991781				0.994521		0.99726	0.994521		0.991781	0.991781
Battery 14		0.99726			1			0.994521				0.99726		1	1		0.994521	0.989041
Battery 15		0.99726			0.99726			0.989041				0.994521		0.99726	0.99726		0.989041	0.986301
Battery 19	1			0.994521			0.983562			1	1	1	0.991781	0.991781	0.989041	0.975342	0.969863	0.956164
Battery 20		1			0.986301			0.983562				1		0.986301	0.986301		0.983562	0.978082
Battery B		0.967123			0.994521			0.99726				0.986301			0.989041		0.99726	0.99726
Battery C			0.956164			0.986301			1				0.991781	0.989041	0.986301			
Average	0.993836	0.991233	0.956164	0.99589	0.995068	0.986301	0.993836	0.991233	1	0.984247	0.979452	0.984475	0.994521	0.992998	0.990137	0.990411	0.988432	0.984779

See Attachment 12 -- Clean Air Council, Compliance Rates 2017. All percentages of compliance greater than 98.51% are highlighted in green.

The Council prepared this table based on the Keramida data provided by the Department for 2017. Attachment 11 -- Allegheny County Health Department, Excel spreadsheets relating to leaking doors, lids, and offtakes. The Council calculated the percentages of compliance by checking the limit and comparing it with the data provided by the Department. If the data were lower than the limit, a "Y" was tabulated, and if the data were greater than a limit a "N" was tabulated. The total "Y" was then divided by the sum of the total "Y" and "N" values (usually 365, because each day is an event for purposes of compliance) to get the compliance percentage for that year for that specific limit (*See* Attachment 12 for formulas).

As seen by the table, batteries could have achieved 99% compliance for calendar year 2017 even under an alternate scenario involving lower percentages of allowed leaking doors, lids, and offtakes. The Department can and should have done a similar analysis for a number of one year consecutive periods within the five-year year contemplated by the settlement agreement.

Looking at the batteries individually, the Department could make the emission standards more stringent and still achieve 99% compliance according to the test in the settlement agreement.

All batteries (with the close exception of battery 3) could lower their lid limits to 0.5% and still achieve greater than 99% compliance rates individually, at least with calendar year 2017 as the reference period. Again, the Department has 1,460 other one-year time periods to evaluate whether a 99% compliance rate could be met.

Battery 1 could lower its offtake limit from 5% to 3.5% or lower.

"Performance Test Calculation Guidelines," pages 3-4 (June 6, 1990) ("90.639 would be rounded to 91"), https://www3.epa.gov/ttn/emc/faqs/rounding.pdf; *See also* Clean Air Act National Stack Testing Guidance (April 27, 2009), page 19 (deferring to 1990 guidance for clarification on how stack test results should be calculated). https://www.epa.gov/sites/production/files/2013-09/documents/stacktesting_1.pdf.

Battery 2 could lower all its leak percentages across the board (doors, lids, and offtakes). Battery 2's door limit could be lowered from 8% to 5% or lower, and its offtake limit from 5% to 3.5% or lower, and as stated previously, like all batteries, it can lower its lid limit to 0.5% or lower while still maintaining 99% compliance rate.

Battery 19 can lower its door limit from 8% to 5% and its lid limit from 5% to 3.5%.

Batteries 13, 14, 15 and B can lower their offtake limits to 3.5%.

Even Battery C has room for improvement. It can lower its lid limit from 0.6% to 0.5% (again, along with all other battery lid limits).

This only changes slightly when looking at the collective average facility-wide compliance rates. <u>All</u> batteries could lower their leaking lid limits to 0.31% and still achieve an average compliance rate of 98.5%, highlighting even more room for possible lowering of lid rates (*See* the table below which illustrates minimum percentages for overall facility compliance >98.5%). All batteries with 8% leaking doors or greater could be lowered to 5.4%, and all offtakes (with the exception of Battery C with a limit of 3%) could be lowered to 3.4% and still maintain greater than 99% compliance.

	Doors	Lids	Offtakes	
What would the compliance rate be if the standard was	5.4	0.31	3.4	% ?

Battery	Doors*	Lids	Offtakes
Battery 1	0.95068	0.98904	0.99178
Battery 2	0.9863	0.97808	0.99726
Battery 3	0.9589	0.98082	0.97534
Battery 13	1	0.99178	0.99178
Battery 14	0.99726	1	0.98356
Battery 15	0.99726	0.99452	0.9863
Battery 19	1	0.97808	0.95616
Battery 20	1	0.9863	0.97808
Battery B	0.9726	0.97534	0.99726
Battery C	0.98904	0.98356	1
AVERAGE	0.98521	0.98575	0.98575

Despite the numerous mathematical possibilities for lowering the percent of allowable leaking doors, lids, and offtakes even within the terms of the settlement agreement, the Department has not done this analysis. Accordingly, it has acted unreasonably as a matter of law. It has also failed to do things to protect public health even under its flawed interpretation of the settlement agreement.

As a matter of law, it is unreasonable for the Department to rely on Section VII of the settlement agreement as a basis for not proposing any more stringent emission standards, where there are considerable possibilities for making emission standards more stringent even within the terms of the Settlement Agreement.

8. <u>The Department Should Revise the Proposed Regulations to Require a Meaningful Work Practice Plan to Facilitate Emissions Reductions at the Clairton Coke Works</u>.

The county should revise its proposed regulations to develop a framework for the development of work practice standards and a work practice plan to address fugitive emissions from all items of equipment. Because of the nature of fugitive emissions associated with coke oven batteries, there are a number of potential areas for emissions reduction.

While EPA required the preparation of a work practice plan for coke oven facilities in 1993, it is apparent that there has not been any meaningful discussion regarding measures such as an improved battery door replacement policy. Moreover, current county regulations contain no references to work practice standards or a work practice plan.

Building off the federal regulations, the Department should revise the proposed coke oven regulations to include a requirement to prepare a work practice plan, building off the model of the federal regulations, but not limited to those requirements, which contain weaknesses.

The Department should go further and identify criteria and standards for the repair and replacement of leaking equipment, in the regulations.

The work practice plan should not be treated solely as an internal company document, like an employee handbook.

There needs to be a dialogue between the company and the Department regarding ongoing review and revision to a work practice plan, for this method of regulation to have any meaningful benefit.

More frequent maintenance and repair that is backed by regulation will lead to lower emissions and fewer violations due to leaks.

A. While the federal regulations set forth requirements for the preparation of a work practice plan in 1993, there are limitations in those regulations that could be addressed by the Department in the present regulatory initiative.

Under the battery NESHAP in 1993, the company was required to prepare a written emission control work practice plan to address visible emission limitations for coke oven doors, topside port lids, offtake systems, and charging operations:

> § 63.306 Work practice standards.
>
> (a) Work practice plan. ***On or before November 15, 1993, each owner or operator shall prepare and submit a written emission control work practice plan for each coke oven battery***. ***The plan shall be designed to achieve compliance with visible emission limitations for coke oven doors, topside port lids, offtake systems,***

> ***and charging operations under this subpart***, or, for a coke oven battery not subject to visible emission limitations under this subpart, other federally enforceable visible emission limitations for these emission points.
>
> (1) ***The work practice plan must address each of the topics specified in paragraph (b) of this section*** in sufficient detail and with sufficient specificity to allow the reviewing authority to evaluate the plan for completeness and enforceability.

40 C.F.R. 63.306(a)(1) (bold italics added for emphasis), https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol11/pdf/CFR-2019-title40-vol11-part63-subpartL.pdf;

The following topics had to be addressed in this work practice plan:

> (2) Procedures for controlling emissions from coke oven doors on by-product coke oven batteries, ***including***:
>
> (i) ***A program for the inspection, adjustment, repair, and replacement of coke oven doors and jambs, and any other equipment for controlling emissions from coke oven doors***, including a defined frequency of inspections, the method to be used to evaluate conformance with operating specifications for each type of equipment, ***and the method to be used to audit the effectiveness of the inspection and repair program for preventing exceedances***;
>
> (ii) ***Procedures for identifying leaks that indicate a failure of the emissions control equipment to function properly***, including a clearly defined chain of command for communicating information on leaks and procedures for corrective action;
>
> (iii) ***Procedures for cleaning all sealing surfaces of each door and jamb***, including identification of the equipment that will be used and a specified schedule or frequency for the cleaning of sealing surfaces;
>
> (iv) ***For batteries equipped with self-sealing doors, procedures for use of supplemental gasketing and luting materials***, if the owner or operator elects to use such procedures as part of the program to prevent exceedances;
>
> (v) ***For batteries equipped with hand-luted doors, procedures for luting and reluting***, as necessary to prevent exceedances;

> (vi) Procedures for maintaining an ***adequate inventory of the number of spare coke oven doors and jambs located onsite***; and
>
> (vii) ***Procedures for monitoring and controlling collecting main back pressure***, including corrective action if pressure control problems occur.

Id., 40 C.F.R. 63.306(b)(2) (bold italics added for emphasis).

For charging operations, the work practice plan was supposed to address the following topics:

> (3) ***Procedures for controlling emissions from charging operations on by-product coke oven batteries***, including:
>
> (i) Procedures for equipment inspection, including the frequency of inspections, ***and replacement or repair of equipment for controlling emissions from charging***, the method to be used to evaluate conformance with operating specifications for each type of equipment, and the method to be used to audit the effectiveness of the inspection and repair program for preventing exceedances;
>
> (ii) Procedures for ensuring that ***the larry car hoppers are filled properly with coal***;
>
> (iii) Procedures for ***the alignment of the larry car over the oven to be charged***;
>
> (iv) Procedures for filling the oven (***e.g., procedures for staged or sequential charging***);
>
> (v) Procedures for ensuring that ***the coal is leveled properly in the oven***; and
>
> (vi) ***Procedures and schedules for inspection and cleaning of offtake systems*** (including standpipes, standpipe caps, goosenecks, dampers, and mains), oven roofs, charging holes, topside port lids, the steam supply system, and liquor sprays.

Id., 40 C.F.R. 63.306(b)(3) (bold italics added for emphasis).

For topside port lids, the work practice plan was supposed to address the following topics:

> (4) Procedures for controlling emissions from topside port lids on by-product coke oven batteries, ***including***:

> (i) ***Procedures for equipment inspection and replacement or repair of topside port lids and port lid mating and sealing surfaces***, including the frequency of inspections, the method to be used to evaluate conformance with operating specifications for each type of equipment, and the method to be used to audit the effectiveness of the inspection and repair program for preventing exceedances; and
>
> (ii) ***Procedures for sealing topside port lids after charging, for identifying topside port lids that leak, and procedures for resealing***.

Id., 40 C.F.R. 63.306(b)(4) (bold italics added for emphasis).

For offtake systems, the work practice plan was supposed to address the following topics:

> (5) Procedures for controlling emissions from offtake system(s) on by-product coke oven batteries, ***including***:
>
> (i) ***Procedures for equipment inspection and replacement or repair of offtake system components***, including the frequency of inspections, the method to be used to evaluate conformance with operating specifications for each type of equipment, and the method to be used to audit the effectiveness of the inspection and repair program for preventing exceedances;
>
> (ii) ***Procedures for identifying offtake system components that leak and procedures for sealing leaks that are detected***; and
>
> (iii) ***Procedures for dampering off ovens prior to a push***.

Id., 40 C.F.R. 63.306(b)(4) (bold italics added for emphasis).

For all these emissions points, the facility was supposed to maintain a daily record of the performance of plan requirements:

> (7) Procedures for maintaining, for each emission point subject to visible emission limitations under this subpart, ***a daily record of the performance of plan requirements pertaining to the daily operation of the coke oven battery and its emission control equipment***, including:
>
> (i) ***Procedures for recording the performance of such plan requirements***; and

> (ii) Procedures for certifying the accuracy of such records by the owner or operator.

Id., 40 C.F.R. 63.306(b)(7) (bold italics added for emphasis).

There are several limitations that inhibit the effectiveness of the regulations. First, while there are provisions for implementing the work practice plan under the federal regulations, the regulations might be construed to limit this to certain circumstances tied to exceedances of emissions limitations. *See id.,* 40 C.F.R. 63.306(c) ("Implement the provisions of the work practice plan pertaining to a particular emission point following the second independent exceedance of the visible emission limitation for the emission point in any consecutive 6-month period ….").

Second, while there are provisions for reviewing and revising the work practice plan under the federal regulations, the regulations might be construed to limit this to certain circumstances tied to exceedances of emissions limitations. *See id.,* 40 C.F.R. 63.306(d)(1) ("The reviewing authority may request the owner or operator to review and revise as needed the work practice emission control plan for a particular emission point if there are 2 exceedances of the applicable visible emission limitation in the 6-month period that starts 30 days after the owner or operator is required to implement work practices under paragraph (c) of this section").

The Department maintains the authority to expand upon these requirements in its own regulations. Nothing in the federal law or regulations preempts the Department from requiring a work practice plan and work practice standards as part of the performance-based standards in the county regulations.

B. The work practices plan prepared by US Steel in 1993 has not been sufficiently used as a means of pursuing emissions reductions at the Clairton Coke Works.

Obviously, the work practice plan requirement and work practice standards approach in 1993 has not been working to address the longstanding air pollution problems in the community near this facility. Based on data at the Liberty monitor, the county has long failed to meet the national ambient air quality standard. U.S. EPA, Pennsylvania Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, https://www3.epa.gov/airquality/greenbook/anayo_pa.html (Data is current as of December 31, 2020). But even using the flawed regulatory approaches, there are opportunities to do something to achieve emissions reductions.

In response to a recent records request from the Council relating to the battery NESHAP, the Department did not provide any records relating to such a work practice plan.

In a follow-up communication, the Department denied knowledge of a door replacement policy, although it assumed such a policy would exist. The Department stated that there had not been communications with the Clairton Coke Works regarding a door replacement policy.

In a response to a follow-up request specifically asking for records relating to the work practice plan described above, the Department provided one record -- the work practices plans actually prepared in 1993. *See* Attachment 13 -- U.S. Steel, NESHAPS Work Practices Plan, dated November 12, 1993 (for batteries 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, and 20), NESHAPS Work Practices Plan, dated November 12, 1993 (battery B) (There were actually two plans, one for all the batteries except for battery B, and one for battery B).

These plans provide a context for improving the regulations.

C. For door areas, the work practices plan does not specify standards or criteria for repair or replacement, or for corrective action.

Although the work practices plan provides for mechanical steps for repair and replacement, it does not specify standards or criteria for repair or replacement, or for corrective action. *See id.*, NESHAPS Work Practices Plan, dated November 12, 1993 (for batteries 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, and 20), pages 7-15.[6] Therefore, it is a weak plan that could be improved by the Department through regulation.

The plan provides for inspections of doors. *See id.,* Section I.A.1, page 7 ("Oven doors and jambs are to be inspected for defects which may cause problems with the door sealing system."). However, the inspection is limited to "visible defects." *See id.,* Section I.A.1.c, page 7 ("Visible defects are to be brought to the attention of the first line supervisor …."). Therefore, this does not address problems of excess fugitive emissions from defects that are not visible.

One would think this would be covered by language in the plan that cites "poor performance" as a second reason for identifying a problem door or jamb:

> ***A problem door or jamb*** which has been ***identified by either poor performance or a report of a visible defect is to be inspected more-thoroughly*** by the first line supervisor or Door Coordinator. This inspection may include taking physical measurements to determine the remedial action required.

See id., Section I.A.3.b, page 8 (bold italics added for emphasis). However, the plan does not define "poor performance," or provide an indication of what this phrase means.

The provisions for door replacement do not set forth criteria or standards for determining whether doors need to be repaired or replaced. *See id.,* Section I.B.1, page 8 ("The first line supervisor, with the help of the Door Coordinator, is to determine which doors are to be taken out of service."). The plan sets forth several mechanical steps for repair and replacement. *See id.,* pages 8-9 ("Door reconditioning at CDR ranges from patching of refractory to a total rebuild of the door."). But it does not specify the criteria or standards for when a particular step should be taken.

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[6] For purposes of illustration for the rest of this comment, Commenters will cite provisions of the plan relating to all the batteries but battery B, which technically is subject to a separate plan. But similar concerns apply to that plan, as well.

Similarly, the procedures for jamp inspection, replacement, and repair are mechanical in nature, and do not set forth any standards or criteria for taking particular steps. *See id.*, Section I.B.3, page 9 ("Jamb repair may involve welding, repositioning of the jamb or replacement of the jamb casting (door frame)."). While the plan states that problems might be identified through "routine inspections" or "trouble shooting," this says nothing about when repair or replacement is required. *See id.*, Section I.B.3.1, page 9. Rather, this is apparently left to operators. *See id.*, Section I.B.3.2, I.B.3.3, page 9.

This is also the case with inspection of automatic cleaning systems. Following the "reporting [of] any problems associated with the automatic cleaning equipment," the plan states that the Maintenance Manager or teamleader "will take appropriate corrective action." *See id.*, Section I.C.2, page 10. This begs the question what is "corrective action."

For recently charged ovens, operators are required to inspect and report "door leakage which is considered excessive. (not expected to stop within a normal time period for self sealing doors)." *See id.*, Section I.D.1, page 11. But it does not set forth what is a "normal time." See id. The plan requires the facility to "maintain a list of doors that have been reported as problem doors," but it does not identify what are "problem doors." *See id.*, Section I.D.1, pages 10-11 (recently charged ovens): *see also* Section I.D.2 (all other operating ovens), page 11.

The corrective action provision for doors says nothing about what requires corrective action and what does not require corrective action:

> If door leakage is observed by the Door Cleaner or Machine Operator, ***he may inspect the leak to determine the cause and take corrective action such as retightening the latches***. If the problem door continues to leak, it will then be reported to the first line supervisor or Door Coordinator. ***The Door Coordinator will inspect door leaks as observed or reported to determine corrective action***. A door that will require repair is to either repaired on the unit or replaced by a reconditioned door. The Shift Manager's "Shift Report" along with the Emission Observer's report is to be used by the Door Coordinator to determine which doors must be taken out of service for cleaning, inspection, re-adjustment, and/or replacement. The Door Coordinator will schedule the transfer of problem doors to CDR for repair.

See id., Section I.D.3, page 11 (bold italics added for emphasis).

Provisions for an audit of the door and jamb repair program are weak. On its face, the purpose of the audit is only to spot-check to confirm that one door or jamb that has been repaired meets the specifications for a repaired door or jamb:

> The Area Manager-Maintenance will initiate ***an audit annually*** or more frequently as necessary ***to confirm that at least one door or***

> ***jamb that has been repaired meets the specifications for a repaired door or jamb***.

See id., Section I.H.2.a, page 14 (bold italics added for emphasis). The remedy for "significant deviation from the prescribed specifications" is to provide "supplemental training," and not necessarily faster or more efficient repair and replacement. *See id.,* Section I.H.2.c, page 14.

D. For charging, the work practices plan does not specify standards or criteria for repair or replacement, or for corrective action.

Although the work practices plan provides for mechanical steps for repair and replacement for charging operations, it does not specify standards or criteria for repair or replacement, or for corrective action. *See id.*, pages 16-21. Therefore, it is a weak plan that could be improved by the Department through regulation.

The plan provides for inspections of the larry car, pusher machine, and offtake and charging system. *See id.,* Section III.A, pages 16-17. Although the plan states that a defect found during an inspection that will cause the release of emissions will be repaired to maintain emission control, it does not define "defect":

> ***Any defect found during on an inspection that will cause the release of emissions will be repaired to maintain emission control***.
>
> If the results of an inspection of equipment used to control charging emissions ***indicate problems which will cause the release of emissions, the equipment is to be repaired or replaced by a back-up machine***. The Maintenance Manager and/or teamleader is to determine a schedule for repairs based on priority.

See id., Section III.C, page 17. Presumably, the word "defect" is the determinative term, as the phrase "release of emissions" is unqualified as to extent, and "maintain emissions control" indicates a commitment to ensure that there will be no violations of the emissions limitations.

Provisions for an audit of the offtake repair/replacement program are weak. On its face, the purpose of the audit is only to spot-check to confirm that at least one item of equipment was repaired or replaced and meets operating specifications:

> The Area Manager-Maintenance will initiate ***an audit annually*** or more frequently as necessary ***to confirm that at least one item listed below was repaired or replaced and meets operating specifications***:
>
> pusher machine
> larry car
> standpipes and standpipe caps

> goosenecks and liquor spray nozzles
> charging hole castings and lids
> steam supply system
> liquor supply pressure.

See id., Section III.E.2, pages 18-19 (bold italics added for emphasis). The remedy for "significant deviation from the prescribed repair or replacement procedures" is to provide "supplemental training," and not necessarily faster or more efficient repair and replacement. *See id.*, Section V.E.2.c, page 27. Therefore, the criteria for the audit consist only of whether an item of repaired or replaced equipment meets operating specifications and whether the operator has followed prescribed repair or replacement procedures.

E. For topside lids, the work practices plan does not specify standards or criteria for repair or replacement, or for corrective action.

Although the work practices plan provides for mechanical steps for repair and replacement of charging hole lids, it does not specify standards or criteria for corrective action. *See id.*, pages 22-24. Therefore, it is a weak plan that could be improved by the Department through regulation.

The plan provides for inspections of charging hole lids. *See id.*, Section IV.A.1.a, page 22 ("Charging hole lids and castings are to be inspected by the lidman each time after the oven is pushed."). The plan contemplates the replacement of lids that are visually damaged. *See id.*, Section IV.A.2.a, page 22 ("Lidman and/or Battery Laborer is to replace any cracked or damaged lids that cannot be sealed with luting material."). The plan does not specify standards or criteria for repair or replacement. *See id.*, Section IV.A.2.c, page 22 (the facility is to "to compile a listing of defective charging hole castings. Repair or replacement is to be scheduled and performed.").

The plan contemplates "corrective action" for lid emissions that cannot be stopped by sealing, but it does not specify standards or criteria for corrective action

> Any lid emission that cannot be stopped by sealing, or other means, is to be reported to the first line supervisor and logged in the "Daily Report". This report is to be submitted to the Senior Shift Manager for corrective action.

See id., Section IV.B.2.b, page 23.

Provisions for an audit of the lid repair/replacement program are weak. On its face, the purpose of the audit is only to spot-check to identify one item that was repaired or replaced and meets operating specifications:

> The Area Manager-Maintenance is to initiate ***an audit annually*** or more frequently as necessary ***to confirm that at least one of the items below was repaired or***

> ***replaced and meets operating specifications***:
>
> 1) Lid
> 2) Charging Hole Casting.

See id., Section IV.C.2.a, page 24 (bold italics added for emphasis). The remedy for "significant deviation from the prescribed repair or replacement procedures" is to provide "supplemental training," and not necessarily faster or more efficient repair and replacement. *See id.*, Section IV.C.2.c, page 24. Therefore, the criteria for the audit consists only of whether an item of repaired equipment meets the operating specifications and whether the operator has followed prescribed repair or replacement procedures.

F. For offtakes, the work practices plan does not specify standards or criteria for repair or replacement, or for corrective action.

Although the work practices plan provides for mechanical steps for repair and replacement of offtakes, it does not specify standards or criteria for repair or replacement, or for corrective action. *See id.*, pages 25-27. Therefore, it is a weak plan that could be improved by the Department through regulation.

The plan provides for inspections of offtakes. *See id.*, Section V.A.1.a. ("The Larry Car Operator is to inspect the gooseneck, standpipe cap, and standpipe each time the oven is dampered off the main prior to the charging operation."). The plan only requires the reporting of defects that are likely to cause excessive emissions, and does not require the reporting of poor performing offtakes. *See id.*, Section V.A.2.a, page 25. ("Defects in any offtake system components which are likely to be cause excessive emissions are to be reported to the first line supervisor"). Moreover, the plan does not identify criteria or standards for determining whether offtakes are to be repaired or replaced. V.A.2.c ("Repair or replacement is to be scheduled and performed.").

Provisions for an audit of the offtake repair/replacement program are weak. On its face, the purpose of the audit is only to spot-check to confirm that one item of equipment has been repaired or replaced and meets operating specifications:

> The Area Manager-Maintenance is to initiate ***an audit annually*** or more frequently as necessary ***to confirm that least one of the items listed below has been repaired or replaced and meets operating specifications***:
>
> Standpipe
> Standpipe caps
> Goosenecks.

See id., Section V.E.2.a, page 27 (bold italics added for emphasis). The remedy for "significant deviation from the prescribed repair or replacement procedures" is to provide "supplemental training," and not necessarily faster or more efficient repair and replacement. *See id.*, Section

V.E.2.c, page 27. Therefore, the criteria for the audit consist only of whether an item of repaired or replaced equipment meets operating specifications and whether the operator has followed prescribed repair or replacement procedures.

In conclusion, the company's work practices plans do not set forth minimal requirements of performance that would trigger the need to repair or replacement equipment, if violated. They do not say that certain equipment must be repaired or replaced if there are violations of particular standards that are sufficiently frequent to merit repair and replacement.

G. The Department has the ability to gather information for establishing standards that would facilitate repair and replacement of equipment that tends to frequently violate applicable standards.

While the Department does review documents from the facility regarding daily performance in connection with emissions limitations for coke oven doors, topside port lids, offtake systems, and charging operations under subpart L, that is only part of the matter. In addition to complying with the minimal requirements of emissions limitations, the facility is required to maintain daily performance records regarding compliance with its work practice plan. It is not clear that this is happening.

The Department should adopt the approach set forth by the Commenters in their Excel spreadsheet in Comment 7 above, to identify "poor performance" or "high priority violators," among the items of leaking equipment. The ones with the lowest compliance percentages would be the highest priority violators. The Department could also gather data regarding multiple violations within a specified period of time. The data already exist and simply need improved interpretation and implementation.

9. **The Department Should Develop More Stringent Emission Standards, Including Technology-Forcing Standards.**

To explore areas for improvement of its coke oven and coke oven gas regulations, the Department should look to present and future innovations made by steel industries in other countries, particularly Japan and members of the European Union.

The European Union's BAT document provides numerous potential improvements to requirements for inspections and maintenance programs. As an example of good coke oven maintenance, the maintenance program of ArcelorMittal, Ghent, Belgium is cited as a "commonplace technique carried out by all coke operators." *See* Attachment 14 -- Chapter 5 of Joint Reference Report, Best Available Techniques (BAT) Reference Document for Iron and Steel Production, Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control), Section 5.3.5, pages 244-245, https://op.europa.eu/en/publication-detail/-/publication/eaa047e8-644c-4149-bdcb-9dde79c64a12/language-en.

Most of this maintenance is centered around repairing brickwork at coke ovens, which has been contemplated at the Clairton Coke Works in the past, including in the settlement agreement in 2019. Rather than simply requiring repairs in settlement agreements, the Department should include such work as a part of a regulatory work practice plan, as discussed above.

The maintenance program in the European Union involves a complete overhaul for each coke oven -- on average, once every five years. Such an overhaul begins with daily periodic inspection of ovens to determine condition and need of maintenance, and roughly one oven is inspected per day. If maintenance is needed, this maintenance regime includes degraphitizing of oven chambers, welding of damaged refractory bricks, cement repair of oven floors, injecting dust into fine cracks, and a complete overhaul of doors (disassembling, cleaning a reassembling of doors, adjusting sealing elements, replacing damaged bricks, and rebricking if necessary). *See id.*, page 244-245. More regular maintenance practices are also considered, including regularly checking and adjusting bracing systems of the ovens, and cleaning goosenecks and main collecting passages to prevent obstructions. *See id.*, page 244-245.

Japan's Scope21 program is a comprehensive overhaul of how coke is produced. It includes technologies such as hot-briquetting of coal, total enclosure, fluidized bed coal drying, and many others. In recent years it has been shown to be highly effective, both at reducing emissions and at reducing operating costs while still meeting production targets. Two facilities using this program have been in operation since 2008 and 2013. *See* Attachment 15 -- Nippon Steel Technical Report No. 123, SCOPE21 Cokemaking Process (March 2020), https://www.nipponsteel.com/en/tech/report/pdf/123-25.pdf.

While the technological improvements demonstrated at Japanese facilities would likely require large scale overhauls, there are other technologies that would likely be much more manageable.

In particular there is the single oven pressure control system which allows for the pressure of each individual oven to be controlled to best suit the stage of coking in that oven. This system is already in use on battery C at the Clairton facility, but not on any of the older batteries. These devices are attached directly to the collecting main at each oven along the battery.

At least two companies manufacture single oven pressure control systems that can be retrofitted onto old batteries with only a minimal delay in coke production during the installation process, DMT-Group's PROven, and Paul Wurth's SOPRECO. *See* Attachment 16 -- Paul Wurth, SOPRECO Retrofitting Coke Oven Pressure Control Without Stopping Production (2013). The potential for bringing the older, significantly more polluting batteries closer in line with the modern battery C should speak for themselves, and it should be highly appealing.

In short, it should be clear that improvements can still be made to increase the safety of the air quality for the steel workers, their families, and the surrounding communities as a whole. It would be responsible to recognize the potential application of new technologies outside the United States.

10. **<u>The Department Should Provide a Reasonable Justification for Not Strengthening Water Quality Standards for Water in Quenching Operations</u>**.

Nearly one-fifth of the emissions of fine particulates at the Clairton facility are from the quench towers (103 tpy out of 554 tpy). *See* Attachment 9 -- Allegheny County Area Attainment Plan for the 2012 PM2.5 National Ambient Air Quality Standard, Appendix D, page 3, Table D-1 (for Projected 2021 tons/year, setting forth 22.068 tpy for Tower 1, 13.647 tpy for Tower 5A, 26.535 tpy for Tower 7A, 17.295 tpy for Tower B, and 23.214 tpy for Tower C), page 14 (554.094 tons per year), https://beta.regulations.gov/docket/EPA-R03-OAR-2020-0157/document?pageNumber=2&sortBy=postedDate&sortDirection=asc. The Department should be considering regulatory measures to reduce fine particulates from quenching, through improved water quality standards or other means.

The current regulations prohibit quenching unless the water meets water quality standards for the nearest stream or river:

> Quenching. ***No person shall quench***, or allow the quenching of, ***coke unless*** the emissions from such quenching are vented through a baffled quench tower and ***the water used for such quenching is equivalent to, or better than, the water quality standards established for the nearest stream or river by regulations promulgated by the DEP under the Pennsylvania Clean Streams Law***, Act of June 22, 1937, PL. 1987, as amended, 35 P.S. 691.1 et seq., ***except that water from the nearest stream or river may be used for the quenching of coke. The nearest stream or river to the USX Corporation facility in Clairton, PA, shall be the Monongahela River***.

See Current Regulations, Section §2105.21(g), page E-31 (bold italics added for emphasis), https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Article-21-Air-Pollution-Control-rev3319(1).pdf. Similar language is found in the facility's Title V permit:

> ***The permittee shall not quench***, or allow the quenching of, coke ***unless*** the emissions from such quenching are vented through a baffled quench tower and ***the water used for such quenching is equivalent to, or better than, the water quality standards established for the nearest stream or river by regulations promulgated by the DEP under the Pennsylvania Clean Streams Law, Act of June 22, 1937,*** PL. 1987, as amended, 35 P.S. 691.1 et seq., ***except that water from the nearest stream or river may be used for the quenching of coke***. The nearest stream or river to the USX Corporation facility in Clairton, PA, shall be the Monongahela River. [§2105.21.g]

See Attachment 3 -- Excerpts from Title V Permit dated March 27, 2012, Section V.I.1.a, https://gasp-pgh.org/wp-content/uploads/2014/05/U.-S.-Steel-Clairton-Works.pdf (bold italics added for emphasis).

Despite what appears to be a prohibition, the word "except" in the regulations and the permit might lead one to suggest that if the facility takes water from the Monongahela River for quenching operations, then it is not subject to water quality standards. But the "except" language in the regulations and the permit is not repeated in the review memorandum for the Title V permit, indicating that the facility is indeed subject to water quality standards:

> All quench towers are equipped with baffles ***and the water used for quenching the incandescent coke will be equivalent to or better than the water quality standards established for the Monongahela River*** per Article XXI, §2105.21.g.

See Attachment 4 -- Review Memorandum, Section 1.2, page 17 (June 14, 2010), https://gasp-pgh.org/wp-content/uploads/uss-clairton-tvrv-draft-public-1.pdf (bold italics added for emphasis).

The Department should clarify whether it believes the facility is subject to water quality standards for the water used in quenching operations. It is not clear what is the Department's position because the supporting document says nothing on this subject. *See* Technical Support Document.

If the Department believes that the facility is excepted from water quality standards, it should use the opportunity of the present regulatory initiative to make water quality standards more stringent.

If the Department believes that the facility is not excepted from water quality standards, then it should identify applicable water quality standards and provide a background on the history of the facility's compliance with such standards. It should also provide an explanation as to why it is doing nothing in the proposed regulations to improve the quality of the water used in quenching operations.

11. **For the Sake of Clarity, the Department Should Preserve Material in the Source Testing Manual Even If It Is Also Incorporated Into the Regulations.**

In 2010, the Department issued its Source Testing Manual. https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Programs/Air_Quality/SourceTestingManual_revMay2010.pdf. This is a protocol for testing for air emissions at stationary sources. The Department proposes to make amendments to its Source Testing Manual to include the test methods and inspection procedures. *See* Technical Support Document, page 21, 23, 24.

For the sake of clarity, the Department should maintain the material in the Source Testing Manual, even if the material is ultimately codified in the regulations. This will enable people reviewing the Source Testing Manual to have the material in the regulations at their fingertips. The Council suggests designating a section of the Source Testing Manual that would set forth *verbatim* the ultimate requirements to be codified in the regulations.

Thank you for your consideration of these comments.

Sincerely,

____

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Attachment 13

U.S. Steel, NESHAPS Work Practices Plan,

dated November 12, 1993

(for batteries 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, and 20),

NESHAPS Work Practices Plan,

dated November 12, 1993

(battery B)

U. S. Steel
Clairton Works
400 State Street
Clairton, PA 15025-1855

November 11, 1993

Ms. Carol Browner
Administrator, United States
Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

SUBJECT: Coke Oven Battery NESHAP
Notification of Election to Meet Emission Limits

Dear Ms. Browner:

Pursuant to 40 CFR §63.311(c)(2)(i), U.S. Steel Group, a Unit of USX Corporation, elects to follow the "straddle" track for the below listed batteries at U.S. Steel's Clairton Works in Clairton, Pennsylvania. U.S Steel intends to meet the emissions limitations in §63.304(b)(1) [the 11/15/93 LAER extension track], in addition to the limitations in §63.302(a).

This notification is for the batteries at Clairton Works listed below:

Battery Number 1	Battery Number 2	Battery Number 3	Battery Number 7
Battery Number 8	Battery Number 9	Battery Number 13	Battery Number 14
Battery Number 15	Battery Number 19	Battery Number 20	Battery Number B

Please call me at (412) 233-1101 if you have any questions concerning this notification.

Very truly yours,

H R McCollum

H. R. McCollum
Manager, Environmental Control

HRM/kb-93455

cc: M. Ioff, EPA III
J. Pezze, PaDER
R. Chleboski, Allegheny County DEQ
R. Dworek

USS Clairton Works

COKE OVEN BATTERY

NESHAPS Work Practices Plan

Battery #1

Battery #2

Battery #3

Battery #7

Battery #8

Battery #9

Battery #13

Battery #14

Battery #15

Battery #19

Battery #20

November 12, 1993

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I. TRAINING

Job Training at Clairton Works encompasses several areas in addition to environmental compliance. Before working on any battery, employees receive initial training which includes lectures, discussions, and video-taped presentations on rules, safety, and procedures. The initial training is then extended to include on-the-job training in routine job duties and in following Safe Job Procedures (SJPs). Additional training that is deemed necessary to achieve environmental compliance may be administered.

Training has been developed to provide personnel with practical instruction about the coking process and the relationship between individual job responsibilities and the environment.

Supplemental training will be required if an auditor reports significant deviations from prescribed procedures.

A. Job Title/Emission Points

The following is a list of coke battery job titles for personnel who perform functions directly associated with the control of emissions that may originate from coke oven doors, charging operations, and leakage from oven lids and offtakes. Each job has its own functions which are directly related to specific emission points.

1. Pusher Machine Operator
    a. Pusher Side Doors
    b. Charging

2. Larry Car Operator
    a. Charging
    b. Offtakes

3. Door Machine Operator
    a. Coke Side Doors

4. Lidman
    a. Lids
    b. Offtakes
    c. Charging

5. Door Cleaner
    a. Pusher Side Doors

6. Sprayman
    a. Offtakes
    b. Charging

7. Battery Laborer
    a. Offtakes
    b. Lids

8. Door Coordinator
   a. Pusher Side Doors
   b. Coke Side Doors

B. Subject Areas for Initial/Refresher Training

The following outline lists the written procedures that are used for initial and refresher training:

Note: There are two types of written procedures:

1. Safe Job Procedures (SJP)- written procedures which include all job activities and emphasize the hazards

2. Standard Operating Procedure (SOP)- written procedures describing how to do the job correctly including procedures that limit emissions.

1. Pusher Machine Operator
   a. pusher side doors
      * SJP P-2 Remove and Replace Oven Doors
      * SJP P-5 Cleaning Jambs, Doors, Latches, Deflectors
      * SJP P-6 Positioning Ram for Door Cleaner to Cut Hearth Carbon
   b. charging
      * SJP P-3 Leveling Ovens
   c. offtakes
      * SJP P-4 Pushing Ovens

2. Larry Car Operator
   a. charging
      * SJP LC-1 Operation of Larry Car
      * SJP LC-2 Cleaning Goosenecks, Standpipe Caps, etc
      * SJP LC-4 Relieving Excessive Pressure on an Oven During or After a Charge
      * SOP-LC2 Larry Car Loading
   b. offtakes
      * SJP LC-2 Cleaning Goosenecks, Standpipe Cap, etc.
      * SJP LC-4 Relieving Excessive Pressure on an Oven During or After a Charge
      * SJP LC-9 Sealing Caps
      * SOP-LC3 Offtake Preparation

3. Door Machine Operator
   a. coke side doors
      * SJP DM-1 Cleaning Doors
      * SJP DM-2 Remove and Replace Doors from Ovens or Racks
      * SJP DM-9 Using Automatic Door Cleaner
      * SJP DM-10 Using Automatic Jamb Cleaner

* SOP-DM2 Manual Door Cleaning

4. Lidman
   a. Lids
      * SJP L-5 Replacing Lids During Charging
      * SJP L-6 Removing Lids
      * SJP L-12 Reseal Oven Lids
      * SJP SOP-L1 Inspection and Cleaning
   b. Offtakes
      * SJP L-3 Dampering Off Oven
      * SJP L-4 Dampering Ovens On
   c. Charging
      * SJP L-1 Stage Charging Sequence
      * SJP L-2 Signaling Larryman
      * SJP L-4 Dampering Ovens On

5. Door Cleaner
   a. Pusher Side Doors
      * SJP DC-1 Cleaning Jambs and Sills
      * SJP DC-2 Cleaning Pusher Side Doors
      * SJP DC-3 Cleaning Hearth Plates

6. Sprayman
   a. offtakes
      * SOP-1 Flushing and Collector Main
   b. charging
      * SJP BL-20 Reaming Out Steam Sprays

7. Battery Laborer
   a. offtakes
      * SJP BL-38 Sealing Standpipe Caps
   b. lids
      * SJP BL-40 Resealing Lids

8. Door Coordinator
   a. doors (PS and CS)
      * SJP P-9 Chuck Door Sealing
      * SJP DC-3 Cleaning Hearth Plates

C. Training Methods/Duration

The initial training includes safety information and on-the-job training. Refresher training includes a review of Safe Job Procedures or other training deemed to be necessary.

It is difficult to allocate the time spent in training to environmental compliance because training in control of emissions is an integral part of total job training.

1. Initial Training

Indoctrination Period

When first assigned to the Coking Department, personnel receive at least 24 hours of initial classroom type training. During this training, the employee will receive basic information such as:

a. the importance of OSHA required apparel
b. "General Safety & Plant Conduct Rule Book"
c. "Lockout/Tryout" Rules
d. description/explanation of safety program
e. gas rescue training
f. Safety videos
g. Material Safety Data Sheets (MSDS)
h. Safe Job Procedures (SJP)
i. Standard Operating Procedures (SOP)

Break-in Period

The initial training is then extended to include on-the-job training in the routine job duties and in following Safe Job Procedures and Standard Operating Procedures (SOP). The employee is assigned an initial work area and job (usually Door Cleaner and/or Lidman). To become qualified at a particular job, the person works along side an experienced worker and then by himself to demonstrate his ability to properly perform the job. During the qualification period, the first line supervisor observes the worker to assure that he is following procedures that promote safety and environmental compliance. Other positions require similar break-in training and qualification periods.

When the employee has completed the qualification period, he is then assigned to a crew on one of the battery units.

Duration:

(the **estimated** time spent on training in environmental compliance is enclosed in parenthesis)

a) initial indoctrination:

The duration of the initial indoctrination period is between 24 and 40 hours. (4 to 10 hrs)

b) Break in Period "on-the-job training":

The duration of the Break-in period is different for the different positions.

Position	Minimum Training Hrs.	**Estimate** of Environmental Compliance Training Hrs.
Door Cleaner	16	(3-6)
Lidman	40	(12-15)
Larry Car Operator	24	(10-18)
Door Machine Operator	24	(10-15)
Pusher Machine Operator	24	(10-15)
Battery Laborer	8	(3-4)
Sprayman	16	(5-6)
Door Coordinator	24	(15-20)

Typically, employees have several years of experience in other positions before moving to a machine operator position.

2. Refresher Training-

To maintain awareness of job requirements, each employee is re-instructed in aspects of his job. Each week the first line supervisor meets individually with his crew members to review selected Safe Job Procedures. This instruction is then re-enforced by observing the employee as he performs his job.
Additional training may be required if the employee is not performing satisfactorily.

Safe Job Procedures (SJPs) are reviewed with all battery personnel. The first line supervisor reviews at least one procedure a week with each of his employees. These procedures, while highlighting job hazards, also assure that employees understand the best procedures for environmental compliance.

Duration:

	Estimate of Training	**Estimate** of Environmental Compliance Training Hrs.
Refresher Training	6-8 hrs/year	(2-4 hrs/year)

D. Demonstration of Successful Completion of Training

A record of both initial and refresher training that has been given to each employee is maintained by the first line supervisor. These records are dated and initialed by the first line supervisor.

E. Procedure to Document Performance of Plan Requirements

To document performance of plan requirements pertaining to the daily operation of the battery and its emission control equipment, the first line supervisor will record reported exceptions to plan requirements on the "Shift Report" (exhibit W-1). The first line supervisor will sign this report.

I. DOOR EMISSION CONTROL WORK PRACTICES PLAN

Doors on batteries at USS Clairton Works are considered self-sealing. On the coke side, the Door Machine Operator uses automatic door and jamb cleaners. On the pusher side, the Door Cleaner is responsible for manually cleaning doors and jambs.

A. Inspection and Cleaning of Doors and Jambs

1. Inspection of Oven Doors and Jambs

Oven doors and jambs are to be inspected for defects which may cause problems with the door sealing system.

a. The oven door and door jamb is to be visually inspected by the Door Cleaner on the pusher side and the Door Machine Operator on the coke side after the oven is pushed.
b. The oven wall and lintel is to be inspected by the Door Cleaner and Pusher Machine Operator after each push.
c. Visible defects are to be brought to the attention of the first line supervisor by the Door Cleaner, Door Machine Operator or the Pusher Machine Operator.
d. The Pusher Machine Operator is to inspect chuck doors and jambs for defects before the oven is charged. Defects are to be reported to the first line supervisor.
e. The first line supervisor is to either direct immediate remedial action or record the problem for later action on the "Daily Report" ("Six O'Clock Report") exhibit W-2, which is then distributed to appropriate operating and maintenance management.

2. Cleaning of Oven Doors and Jambs

The door and jamb will be cleaned after each coking cycle.
The coke side of Clairton batteries are equipped with mechanical cleaners. If the cleaners are inoperable for any reason, the doors and jambs will be cleaned manually.

a. Pusher Side Door Cleaning Procedure

1. Pusher Machine Operator removes the door and moves to align for leveling.
2. The Door Cleaner cleans the door gas channel, jamb surface, retainer, door plug, and sill plate by manually scraping and removing carbon and tar deposits.
3. Cleaning not finished before the leveling operation can be completed after the ram is spotted for the push.
4. Laborers will be utilized as necessary to cut hearth

and inside jamb carbon.
5. The P.M.O. is to clean the top of the jamb and the retainer down to the first lug and the gas channel of the top of the door down to the bottom of the chuck door casting.
6. Every chuck door jamb and sealing edge must be cleaned.
7. The Door Cleaner cleans the hearth plate of coke debris to allow the door to be properly seated.

b. Coke Side Door Cleaning Procedure

1. The Door Machine Operator is responsible for removing the door, positioning it in front of the cleaner, and operating the automatic cleaner.
2. The operator moves the door machine to spot up and initiates the automatic jamb cleaner.

3. Conformance with specifications

a. The routine inspection of the door sealing system will be conducted by the Pusher Machine Operator, Door Cleaner, and/or the Door Machine Operator. This inspection may include the visual inspection of cleanliness, excessive wear, and physical damage.
b. A problem door or jamb which has been identified by either poor performance or a report of a visible defect is to be inspected more thoroughly by the first line supervisor or Door Coordinator. This inspection may include taking physical measurements to determine the remedial action required.

4. Recording and Certification (Cleaning and Inspection)

Certification of inspection and cleaning practices for doors and jambs will be accomplished by listing the exception to standard procedures on the "Shift Report" (exhibit W-1) This report will be signed by the first line supervisor at the end of the shift certifying its accuracy.

B. Door and Jamb Repair and Replacement

1. Door Repair and Replacement

The first line supervisor, with the help of the Door Coordinator, is to determine which doors are to be taken out of service.

Each door taken out of service is either repaired on the unit or replaced with a reconditioned door. The Door Coordinator will be responsible for scheduling and recording of transferred doors. After the door is cleaned, the Mechanical Repairman Teamleader or his designee will determine the extent of the damage. Door reconditioning at CDR ranges from patching of refractory to a total rebuild of the door.

The Mechanical Teamleader will maintain records of doors reconditioned at CDR which may include the following information:

1) Type and extent of damage
2) Type and extent of repair
2) Date reconditioning was completed
4) Name of personnel who have worked on the door

2. Adjustment of new or repaired doors

1) All doors are to be checked for adjustment after being delivered to the door rack on the unit.
2) After a door is placed on the oven, the plungers are to be adjusted.
3) After the door has been placed on the oven and has been charged, readjustments may be required.

3. Jamb Inspection, Repair and Replacement

Jamb repair may involve welding, repositioning of the jamb or replacement of the jamb casting (door frame).

1) Jambs to be repaired may be identified by:
   a) routine inspection by operating personnel
   b) trouble shooting of doors identified by Emission Observers or Door Coordinators

2) A jamb suspected of being in need of repair, must first be cleaned and inspected. The results will be communicated to the Area Manager-Operations. The Area Manager-Operations or his designee and Operating Maintenance personnel will determine the next step of action.

3) The Area Manager-Operations or his designee will direct the Heating Manager to prepare a schedule of ovens to be removed from service for repair or replacement of the jamb. The Maintenance Manager or team leader will direct the maintenance personnel in the proper repair/replacement of the jamb.

4) If the jamb is to replaced or repaired, operations and /or maintenance will keep records of:

   a) when the repair order was received
   b) what repairs were conducted
   c) when the work was completed

4. Recording and Certification (door/jamb replacement inspection, adjustment, and repair)

   a) The first line supervisor will record on the "Daily Log Report" all doors that have been replaced with reconditioned door.
   b) A "Door Maintenance Card" (exhibit W-3) is completed for each door that has been repaired at CDR. These records will be maintained at CDR.

C. Inspection/ Adjustment/ Repair of Automatic Door and Jamb Cleaners

Automatic door cleaners are located on the coke side of all batteries. Automatic jamb cleaner are located on the door machines.

1. Inspection

The Door Machine Operators will be responsible for inspecting the automatic door and jamb cleaner at least once a shift. The operator will visually inspect the first door and jamb cleaned at the beginning of the shift to assure that the cleaner is functioning properly.

2. Adjustments and repair of automatic door and jamb cleaners

Door Machine Operators will be responsible for reporting any problems associated with the automatic cleaning equipment to the first line supervisor. The first line supervisor will then report the problem to the Maintenance Manager or teamleader who will take appropriate corrective action. Either spare machines or manual cleaning of doors and jambs is to be utilized during periods when the automatic cleaning equipment is unavailable because of maintenance or malfunctions.

3. Recording and Certification (Automatic Door and Jamb Cleaner Repair)

The first line supervisor will record problems and maintenance associated with automatic door and jamb cleaning equipment on the "Delay Report" form (exhibit W-4). This form will be signed by the first line supervisor and maintained in the Senior Shift Manager's office.

D. Identifying Leaks and Reporting Chain of Command

1. Recently Charged Ovens

Pusher Machine Operators, Pusher Side Door Cleaners and

Door Machine Operators will inspect and report to the first line supervisor or Door Coordinator door leakage which is considered excessive. (not expected to stop within a normal time period for self sealing doors)

The first line supervisor or Door Coordinator is to maintain a list of doors that have been reported as problem doors in the first line supervisor's office.

2. All Operating Ovens Other than Recently Charged Ovens

The following battery personnel are responsible for identifying door and jamb leaks and reporting them to the first line supervisor or the Door Coordinator:

Door Cleaner
Door Machine Operator
Pusher Machine Operator

The first line supervisor and/or Door Coordinator is to maintain a list of problem doors in the first line supervisor's office.

3. Corrective Action

If door leakage is observed by the Door Cleaner or Machine Operator, he may inspect the leak to determine the cause and take corrective action such as retightening the latches. If the problem door continues to leak, it will then be reported to the first line supervisor or Door Coordinator.

The Door Coordinator will inspect door leaks as observed or reported to determine corrective action.

A ~~door that~~ will require repair is to either repaired on the unit or replaced by a reconditioned door. The Shift Manager's "Shift Report" along with the Emission Observer's report is to be used by the Door Coordinator to determine which doors must be taken out of service for cleaning, inspection, re-adjustment, and/or replacement.

The Door Coordinator will schedule the transfer of problem doors to CDR for repair.

5. Recording and Certification (identifying and corrective action for leaks)

The following reports will be used to document that the work practices for identifying and corrective action for leaks have been performed.

1) first line supervisor's "Shift Report" (completed after each shift) will list cleaning and inspection exceptions and replaced doors.
2) The "Door Observation" report prepared and signed by

the Emission Observer will list leaking doors.
3) The CDR "Door Maintenance Card" will be used to record the type of maintenance performed on each reconditioned door.

E. Self Sealing Doors and Supplemental Luting

1. Supplemental luting is only to be used as a temporary response on a problem door. Luting material is to be applied with a brush or spray after the door is replaced and the chuck door is closed and it has been determined that the door will leak beyond its normal sealing time.

   Luting material is to be applied sparingly and only to the area of the leak.

2. Recording & Certification

   If problem doors are luted, the first line supervisor will record those doors as having been luted on the "Shift Report".

F. Procedures for maintaining an inventory of Spare Doors & Jambs

1. Inventory of Doors

   The Door Coordinator or first line supervisor is to record the number of doors received from CDR each week. The number of spare doors will be recorded on the "Daily Report" (Six O'clock Report).

2. Inventory of Jambs

   An inventory of the spare jambs will be maintained by the Operating Maintenance Manager or his designee. The "Spare Jamb Inventory Report" will be submitted to the Area Manager-Maintenance on a monthly basis.

   The weekly Maintenance and Operating Meeting report will list the number of jambs changed and the number to be changed in future outages.

G. Monitoring and Controlling Collector Main Back Pressure

1. Monitoring of Back Pressure

   The pressure of the coke oven gas in the collecting main at the battery (back pressure) is to be continuously recorded. Additionally, the operation of the back pressure regulator will be observed once per shift.

2. Inspection and Calibration

   a) The back pressure measurement and control regulator is to be visually inspected daily for defects including malfunctioning charts and oil leaks.
   b) Back pressure instrumentation is to be checked for calibration twice a year.
   c) Collecting mains are to be inspected twice a year or as needed for tar buildup.
   d) Impulse lines are to be inspected and steamed out twice a year.

3. Corrective Action

   a) If the back pressure control regulator (Askania) does not maintain the desired pressure, determine whether the problem is because of inadequate suction from the by-product plant, inappropriate position of the gate valve, or a malfunction of the control regulator.
   b) Position of the gate valve on the suction main is to be adjusted if that is identified as the problem.
   c) If the regulator itself is malfunctioning, it is to be repaired. Pressure should be manually controlled, if appropriate, until the automatic controller is functioning properly.

4. Recording and Certification

   a. A record is to be kept by the Heating department of the individuals assigned to the job positions and assignments responsible for back pressure control. The record is to include date and job position.
   b. A report is to be kept of problems with the back pressure monitoring and control system and any corrective action taken if necessary.
   c. A report is to be maintained which verifies visual inspection of back pressure regulation.

H. Audits of Effectiveness of Inspection and Repair Program

1. Audit of Door/Jamb and Equipment Inspection

   a. The Area Manager-Operations will initiate an audit annually, or more frequently as necessary, of the procedures used by one or more of the personnel listed below responsible for the inspection of doors and door cleaning equipment:

      Pusher Machine Operator
      Door Machine Operator
      Door Cleaner

   b. The audit will be conducted by observing the actions of selected operator(s) during the turn.

c. The auditor will use a check list and/or a written procedure to perform the audit.
d. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental training to the personnel selected. The supplemental training, if required, may include:

    1) review of written job procedures for inspecting doors, jambs, and equipment
    2) on-the-job training which includes demonstrations of proper procedures
    3) other training deemed necessary by the Senior Shift Manager

d. The Senior Shift Manager is to submit a report when the supplemental training, if required, has been completed.
e. The following reports are to be kept as part of the audit records:

    1) Auditor's Report
    2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed.

2. Audit of Door and Jamb Repair Program

    a. The Area Manager-Maintenance will initiate an audit annually or more frequently as necessary to confirm that at least one door or jamb that has been repaired meets the specifications for a repaired door or jamb.
    b. The auditor is to use a check list and/or a written procedure to conduct the audit.
    c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports a significant deviation from the prescribed specifications, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to the appropriate personnel. The supplemental training, if required, may include:

        1) review of written job procedures for door and jamb repair
        2) on-the-job training which includes demonstrations of proper procedures
        3) other training deemed necessary by the Maintenance Manager

    e. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.

f. The following reports are to be kept as part of the audit records:

   1) Auditor's Report
   2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed

III. CHARGING EMISSION CONTROL WORK PRACTICES PLAN

A. Machinery Inspection

1. Larry Car

   a. The following equipment on the larry car will be inspected during the shift:

      1) dropsleeve
      2) slide gate system

   b. Defects will be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection. The Maintenance Manager and/or teamleader is to determine the priority of repairs and to assure that the repairs are made.

2. Pusher Machine

   a. The following equipment on the pusher machine will be inspected during the shift:

      1) smoke box
      2) level bar indicator light
      3) decarbonization air
      4) automatic chuck door opener (if applicable)

   b. Defects will be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection. The Maintenance Manager and/or teamleader is to determine the schedule for repairs and to assure that the repairs are made.

3. Offtake and Charging System

   a. The following equipment is to be visually inspected during the shift:

      1) standpipe and standpipe caps of ovens being charged
      2) goosenecks and liquor spray nozzles of ovens being charged
      3) steam supply pressure
      4) liquor supply pressure
      5) charging hole casting and lids of ovens being charged

   b. Defects will be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection. The Maintenance Manager and/or teamleader is to determine the schedule for repairs and to assure that the repairs are made.

B. Frequency of Inspection

1. The operating personnel will inspect larry car, pusher machine, offtake system equipment once per shift as detailed in section III. A.
2. Maintenance personnel will inspect the larry car, pusher, and offtake system equipment once per month.

C. Repair or replacement of equipment

Any defect found during on an inspection that will cause the release of emissions will be repaired to maintain emission control.

If the results of an inspection of equipment used to control charging emissions indicate problems which will cause the release of emissions, the equipment is to be repaired or replaced by a back-up machine. The Maintenance Manager and/or teamleader is to determine a schedule for repairs based on priority.

D. Method Used to Evaluate Conformance with Equipment Operating Specifications

The maintenance inspections as included under section A.1, A.2, and A.3 will be used to maintain equipment in accordance with operating specifications.

E. Audits of Effectiveness of the Inspection and Repair Program

1. Audit of Charging Equipment Inspection Program

a. The Area Manager-Operations will initiate an audit annually, or more frequently as necessary, of the procedures used by the personnel responsible for the inspection of the following items used to control charging emissions:

pusher machine
larry car
standpipes and standpipe caps
goosenecks and liquor sprays
charging hole casting and lids
steam supply pressure
liquor supply pressure

b. The auditor is to use a check list and/or written procedures to gather information about the inspection process during one charging operation.

c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviations from the prescribed procedures, the Area Manager-Operations will direct the Senior Shift Manager to provide supplemental training to selected personnel. The supplemental training, if required, may include:

1) a review of the written job procedures for inspection
2) on-the-job training
3) other training deemed necessary by the Senior Shift Manager

d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training, if required, has been completed.

e. The following reports are to be kept as part of the auditor's report:

1) Auditor's report
2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed.

1. Audit of Charging Equipment Repair Program

a. The Area Manager-Maintenance will initiate an audit annually or more frequently as necessary to confirm that at least one item listed below was repaired or replaced and meets operating specifications:

pusher machine
larry car
standpipes and standpipe caps
goosenecks and liquor spray nozzles
charging hole castings and lids
steam supply system
liquor supply pressure

b. The auditor is to target an item that has been repaired to confirm that the repair meets the required operating specifications. The auditor will use a check list and/or written procedures.

c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports that the repair does not meet prescribed specifications, the Area Manager-Maintenance will direct Maintenance Manager to provide supplemental training to personnel involved in that type of repair. The supplemental training, if required, may include:

1) a review of the written job procedures for the

repair of that item
2) on-the-job training
3) other training deemed necessary by the Maintenance Manager

d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.

e. The following reports are to be kept as part of the auditor's report:

1) Auditor's report
2) The Maintenance Manager Report certifying that the supplemental training, if required, has been completed.

F. Procedures for Controlling Emissions from Charging Operations

1. Procedure for filling larry car hoppers

1. Move larry car to loading station.
2. Activate the equipment to deposit coal into the larry car.
3. Visually inspect the hoppers or use hopper full lights and camera monitors to make sure the hoppers are fully loaded.

2. Procedure for the alignment of car over ovens

1. Move larry car over oven to be charged.
2. Align car by visual inspection of the car or by using camera monitors.
3. The Lidman is to verify correct alignment. If the larry car is not properly aligned, the lidman is to notify the larry car operator before charging begins so that proper alignment can be made.

3. Procedure for Filling the Oven with Coal (charging)

1. Pour the coal into the oven by opening the hopper slide gates in the following order; #4 and #1 first, then #3 and #2 last.
2. Contact the pusher machine operator to begin leveling.

4. Leveling operation

1. Upon receiving the appropriate signal from the Larry Car Operator, the Pusher Operator is to open the chuck door and begin the leveling process.

2. When the Larry Car Operator gives the signal that #2 hopper is empty, the Pusher Machine Operator will make one more pass with the leveling bar (clean-out pass).
3. The P.M.O. is to then close the chuck door after removing the leveling bar.
4. The Pusher Machine Operator is to observe the coal being pulled back. If an excessive or insufficient amount of coal is being pulled back, the Pusher Machine Operator is to notify the Shift Manager so that proper adjustments can be made to the larry car's volumetric controls.

G. Procedures and schedules for inspection and cleaning of the offtake system

1. Standpipes: The Larry Car Operator is to inspect the standpipe prior to a charge. If the inside opening is restricted, the operator is to clean the inside opening enough to assure emission control performance.
2. Standpipe Caps: The Larry Car Operator is to inspect the standpipe cap each time the oven is pushed. The operator will clean the standpipe cap manually as necessary to assure emissions control performance.
3. Goosenecks: The Larry Car Operator is to inspect the goosenecks prior to charging. If restricted, the operator will clean the goosenecks manually as necessary to assure emissions control performance.
4. Dampers and mains: The Lidman will check the damper for proper operation prior to each charging operation. The Sprayman will check the tar level in the collector mains monthly or more frequently as necessary assure emissions control performance.
5. Oven Roof: The Pusher Operator is to inspect the oven roofs for damage and excessive roof carbon buildup each time the oven is pushed. The Pusher Machine Operator will monitor roof carbon levels. Ovens with excessive carbon are to be reported to the first line supervisor.
6. Charging Holes: The Lidman is to inspect the charging holes each time a lid is removed prior to the charging operation. The Lidman or Battery Laborer will clean the charging hole castings manually as necessary to assure emissions control performance.
7. Charging Hole Lids: The Lidman is to inspect the charging hole lids each time the lid is removed prior to the charging operation. The Lidman or Battery Laborer will clean the charging hole lids manually as necessary to assure emissions control performance. The Lidman will replace any cracked or damaged lids that cannot be sealed with sealing material.
8. Steam Supply System: The Sprayman is to inspect the

aspiration steam header pressure each day. Due to the location and type of spray nozzle they do not need to be inspected daily.

9. Liquor Sprays. The Sprayman is to inspect the flushing liquor system header pressure each day. The Larry Car Operator is to assure an adequate spray pattern when he cleans the gooseneck prior to charging. The liquor spray nozzles will be cleaned as necessary to assure emissions control performance.

H. Recording and Certification

The inspection and cleaning duties performed by operating personnel are to be performed as part of routine job procedures. Any defect that will influence control of charging emissions is to be reported to the first line supervisor.

The "Shift Report" will list reported exceptions to cleaning and inspection requirements. The "Delays and Machine Repairs" report will list repairs to charging emission control equipment. Maintenance inspection reports will be maintained by the Maintenance Manager and/or teamleader.

IV. TOPSIDE LID EMISSION CONTROL WORK PRACTICES PLAN

A. Inspection, Cleaning, Repair, and Replacement of Charging Hole Lids

The charging hole lids are automatically or manually removed and replaced by the Larry Car Operator or the Lidman. A wet sealing material is applied to seal the lid and charging hole casting interface each time the lids are replaced and periodically as needed.

1. Inspection and Cleaning of Charging Hole Lids

a) Charging hole lids and castings are to be inspected by the lidman each time after the oven is pushed.
b) The Battery Laborer or Lidman will be assigned to clean charging hole lids and charging hole castings, as necessary, to assure proper sealing.
c) Defects are to be brought to the attention of the first line supervisor

2. Repair and Replacement of Charging Hole Lids

a) The Lidman and/or Battery Laborer is to replace any cracked or damaged lids that cannot be sealed with luting material.
b) If action is required other than replacing a lid, the first line supervisor is to either direct remedial action, or record the defect on the first line supervisor's "Daily Report" (Six O'clock Report), exhibit W-2, and submit the report to the Senior Shift Manager.
c) The Senior Shift Manager or his designee is to review the "Daily Report" (Six O'Clock Report) daily and to compile a listing of defective charging hole castings. Repair or replacement is to be scheduled and performed.

3. Recording and Certification

a) The "Shift Report" (exhibit W-1) will be used to record exceptions to the cleaning and inspection practices.

b) The "Daily Report" will be used to record defects in lids or charging hole castings.

c) The Senior Shift Manager will maintain a listing of all charging hole casting repairs or replacements.

B. Sealing and Resealing of Charging Hole Lids

1. Sealing Lids After the Charge

a) The Lidman is to seal all charging lids on each oven after the oven is charged.
b) The Lidman is to remove the aspiration steam after wet sealing the charging hole lids and reseal the lids if leaking.

2. Resealing of Charging Hole Lids.

a) The Lidman is to visually inspect newly sealed lids and reseal if leaking.

b) Any lid emission that cannot be stopped by sealing, or other means, is to be reported to the first line supervisor and logged in the "Daily Report". This report is to be submitted to the Senior Shift Manager for corrective action.

3. Recording and Certification

The "Shift Report" will be used to record defects that prevent the use of sealing material between the lid and charging hole casting.

C. Audits of Effectiveness of Inspection and Repair Program

After the Work Practice Plan for Lid Emissions is implemented, the Area Manager-Operations is to initiate the following audit program:

1. Audit of Inspection Procedures

a. The Area Manager-Operations is to initiate an audit annually, or more frequently as necessary, of the procedures used by the Lidman for inspecting lids and charging hole castings.
b. The auditor is to use a check list and audit the Lidman for at least one charging sequence.
c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental refresher training to selected personnel. The supplemental training, if required, may include a review of the written job procedures for inspection, on-the-job training, or other training deemed to be required by the Senior Shift Manager.
d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training, if required, has been completed.
e. The following reports are to be kept as part of the

audit records:

1) Auditor's Report
2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed

2. Audit of Lid Repair/Replacement Program

a. The Area Manager-Maintenance is to initiate an audit annually or more frequently as necessary to confirm that at least one of the items below was repaired or replaced and meets operating specifications:

   1) Lid
   2) Charging Hole Casting

b. The auditor is to use a checklist and/or written procedure.
c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports significant deviation from the prescribed repair or replacement procedures, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to the selected personnel The supplemental training, if required, may include a review of the written job procedures for repair, on-the-job training, or other training deemed necessary by the Maintenance Manager.
d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.
e. Recording and Certification of Lid Repair Audits. The following reports are to be kept as part of the audit records:

   1) Auditor's Report
   2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed.

V. OFFTAKE SYSTEM EMISSION CONTROL WORK PRACTICES PLAN

The offtake system for Clairton Batteries consists of double collecting mains and two offtake assemblies for each oven. The offtake assembly consists of a gooseneck, standpipe cap, and standpipe.

A. Inspection, Repair, and Replacement of Offtake System Components

1. Inspection of Offtake System Components

   a. The Larry Car Operator is to inspect the gooseneck, standpipe cap, and standpipe each time the oven is dampered off the main prior to the charging operation.

2. Repair/Replacement of Offtake System Components

   a. Defects in any offtake system components which are likely to be cause excessive emissions are to be reported to the first line supervisor.
   b. The first line supervisor is to either direct repair, or record the defect on the "Daily Report" (Six O'Clock Report), exhibit W-2, and submit the report to the Senior Shift Manager.
   c. Repair or replacement is to be scheduled and performed.

B. Identifying and Sealing of Leaking Offtake System Components

1. Identifying of leaking offtake system components

   The Larry Car Operator and/or the Lidman is to visually inspect the offtake system of each oven charged after the removal of aspirating steam.

2. Sealing of Leaking Offtake System Components

   a. The Larry Car Operator is to seal visible leakage.

   b. Any offtake system emission that cannot be stopped by sealing is to be reported to the first line supervisor and logged on the "Daily Report" (Six O'Clock Report). The report is to submitted to the Senior Shift Manager for corrective action.

C. Dampering off Ovens Prior to a Push

1. Dampering procedure

1. The Lidman is to raise the standpipe cap and damper off ovens in a sequence that proceeds the oven pushing schedule.

D. Recording and Certification

a. "Shift Report" (exhibit W-1) listing exceptions to the inspection and cleaning procedures outlined above.
b. "Daily Report" (Six O'Clock Report) listing possible problems with offtake system components
c. Maintenance Planing Schedule which lists the scheduled offtake repairs.

E. Audits of Effectiveness of Inspection and Repair Program

After the Work Practice Plan for Offtake Emissions is implemented, the following audit program will be used:

1. Audit of Inspection Procedures

a. The Area Manager-Operations is to initiate an audit annually, or more frequently as necessary, of the procedures used by the Lidman and Larry Car Operator for inspecting the offtake system.
b. The auditor is to use a check list and audit the Lidman and Larryman for at least one inspection sequence.
c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental refresher training to the personnel selected. The supplemental training, if required, may include a review of the written job procedures for inspection, on-the-job training, or other training deemed to be required by Senior Shift Manager.
d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training if required, has been completed.
e. Recording and Certification of Lid Inspection Audits. The following reports are to be kept as part of the audit records:

    1) Auditor's Report
    2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed

2. Audit of Offtake Repair/Replacement Program

a. The Area Manager-Maintenance is to initiate an audit annually or more frequently as necessary to confirm that least one of the items listed below has been repaired or replaced and meets operating specifications:

   Standpipe
   Standpipe caps
   Goosenecks

b. The auditor is to use a checklist and/or written procedures.
c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports significant deviation from the prescribed repair or replacement procedures, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to selected personnel. The supplemental training, if required, may include a review of the written job procedures for repair, on-the-job training, or other training deemed necessary by the Maintenance Manager.
d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.
e. Recording and Certification of Offtake Repair Audits. The following reports are to be kept as part of the audit records:

   1) Auditor's Report
   2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed.

VI. GENERAL

A. Deadline Computation

Deadlines are all to be computed from the first Monday after the effective date for plan implementation under 40 C.F.R. 63.306(c). Thus, for example, a requirement to conduct an audit "each month" means that an audit must be conducted within 30 days of the Monday following the effective date for plan implementation of the plan provision containing the audit requirement.

7-9 BATTERY SHIFT REPORT.

SHIFT MANGER ________________ TURN ________ DATE ________

DAMPERS ________

PASS UPS ________________

KICKOUTS 7____ 8____ 9____

PICK UPS ________________

PULLBACKS 7____ 8____ 9____

QUENCH TIMER ____ AUTO

STICKERS ________________

QUENCH TOWER SETTING H: exhibit W-1

INVESTIGATE CHARGE ________

DECAR. AIR 5 ____

COKE LINES ________________

CARBON CUTTERS 5 ____

DUMP COAL ______ ______

REG. FLUSH. TIME ______ ______

WHARF ENDS 1. ______ ______

2. ______ ______

AVG. FLUSH. PSI. 7 ____ 8 ____ 9____

STEAM PSI. 7 ____ 8 ____ 9 ____

DOORS CHANGED ________________

____

FLUE TEMP. PS. 7 ____ 8 ____ 9 ____

CS. 7 ____ 8 ____ 9 ____

MACHINE	IN	OUT	COMMENTS
#5 P.M.			
#6 P.M.			
#7 P.M.			
#6 D.M.			
#7 D.M.			
#8 D.M.			
#4 L.C.			
#5 L.C.			
#6 L.C.			
#16 Q.C.			
#11 Q.C.			
OTHER			

QUENCH CAR ______ OVENS SCHED. ______ OVENS PUSHED ______

OVENS THROUGH PEC ______ OVENS LOSS ______ FIRST PUSH ______

DATE________; TURN________; SHIFT MANAGER____________________________

12X8		8x4		4X12	
SCH______	PUSH______	SCH______	PUSH______	SCH______	PUSH______

TOTAL SCHEDULE__________ TOTAL PUSHED__________

OVENS SPRAYED 12X8______ 8X4______ 4X12______ TOTAL______

exhibit W-2

MACHINE	TIME IN	REMARKS	AIR COND.____
11 QC			
16 QC			
5 PM			
6 PM			
7 PM			
6 DM			
7 DM			
8 DM			
4 LC			
5 LC			
6 LC			

PREVIOUS DAY

KICKOUTS

	12x8	8x4	4x12
#7			
#8			
#9			
TOT			

PULLBACKS

	12x8	8x4	4x12
#7			
#8			
#9			
TOT			

QUENCH
MANUAL ________
DRAIN ________

PUSH@6:00 ________
CHAR.@6:00 ________
K.O.@6:00 ________
P.B.@6:00 ________
ON TIME
YES OR NO ________
OVENS DOWN ________

TOT PEOPLE
WORKING 12x8 ________

TOT OT.
HRS. 12x8 ________

OTHER____________________________________

ACCIDENTS________________________________

PLANNED WORK_____________________________

DOORS CHANGED PREVIOUS DAY

#7 BAT ______ ______ ______ | #8 BAT ______ ______ ______ | #9 BAT ______ ______ ______

BUNKER STATUS

STATION	1 HOP	2 HOP	3 HOP	4 HOP	REMARKS
# 1					
# 2					
# 3					
# 4					
# 5					
# 6					
# 7					

DOOR NO.
(Keypunch Cols. 1-4)

CLAIRTON WORKS

DOOR MAINTENANCE CARD

TYPE MATERIAL USED

CIRCLE ONE: (Keypunch Col. 5) BRICK	CIRCLE ONE: (Keypunch Col. 6) SEALING RINGS	CIRCLE ONE: (Keypunch Col. 7) RETAINERS	CIRCLE ONE: (Keypunch Col. 8) DIAPHRAGMS
1. Harbison Walker	1. Stainless Steel	1. Fab. 5°L	1. Stainless Steel
2. Gen. Refr.	2. Carbon Steel	2. Fab. Bulb L	2.
3.	3.	3. Fab. 5°L Not bent	3.
4.	4.	4.	4.
5.	5.	5.	5.
6.	6.	6.	6.
7.	7.	7.	7.
	8.	8.	8.
	9.	9.	9.

TYPE MAINTENANCE PERFORMED

		YR.	MO.
1. Service Sealing Rings	(Punch 9–12)		
2. Replace Sealing Rings	(Punch 13–16)		
3. Service Diaphragm	(Punch 17–20)		
4. Replace Diaphragm	(Punch 21–24)		
5. Replace Retainers	(Punch 25–28)		
6. Reline – (Brick)	(Punch 29–32)		
7. Service Springs & Plgs.	(Punch 33–36)		
8. Replace Springs & Plgs.	(Punch 37–40)		
9. Srvc. Chuck Door Casting	(Punch 41–44)		
10. Repl. Chuck Door Casting	(Punch 45–48)		
11. Srvc. Chuck Door Face	(Punch 49–52)		
12. Repl. Chuck Door Face	(Punch 53–56)		
13. Srvc. Chuck Dr. "A" Cast	(Punch 57–60)		
14. Repl. Chuck Dr. "A" Cast	(Punch 61–64)		
15. Service Latches	(Punch 65–68)		
16. Replace Latches	(Punch 69–72)		
17. Replace Top Hook	(Punch 73–76)		
18. Replace Casting	(Punch 77–80)		
19. Other (Specify)			

exhibit W-3

.0085 2/85

DELAY REPORT - PRODUCTION

exhibit 4
(D-4)

T: ______________________

DATE: ______________________

12 X 8	8 X 4	4 X 12
EDULE	SCHEDULE	SCHEDULE
S	LOSS	LOSS
UBBED	SCRUBBED	SCRUBB
NO.	CAR NO.	CAR NC
EMAN	FOREMAN	FOREM/

exhibit W-4

12 X 8	8 X 4	4 X 12
OFF.______	OFF.______	
VAC.______	VAC.______	
LABOR ______	LABOR ______	LABOR ______
6TH ______	6TH ______	6TH ______
16 HR.______	16 HR.______	16 HR.______
S.A.______	S.A.______	S.A.______

DELAYS AND MACHINE REPAIRS

TIME OUT	LOSS	DESCRIPTION

USS Clairton Works

"B" Battery

NESHAPS Work Practices Plan

November 12, 1993

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I. Training

Job Training at Clairton Works encompasses several areas in addition to environmental compliance. Before working on any battery, employees receive initial training which includes lectures, discussions, and video-taped presentations on rules, safety, and procedures. The initial training is then extended to include on-the-job training in routine job duties and in following Safe Job Procedures (SJPs). Additional training that is deemed necessary to achieve environmental compliance may be administered.

Training at Clairton has been developed to provide personnel with practical instruction about the coking process and the relationship between individual job responsibilities and the environment.

Supplemental training will be required if an auditor reports significant deviations from prescribed procedures.

A. Job Title/Emission Points

The following is a list of coke battery job titles for personnel who perform functions directly associated with the control of emissions that may originate from coke oven doors, charging operations, and leakage from oven lids and offtakes. Each job has its own functions which are directly related to specific emission points.

1. Machine Operator
    a. Pusher Machine
        i. Pusher Side Doors
        ii. Charging
    b. Larry Car
        i. Charging
        ii. Offtakes
    c. Door Machine
        i. Coke Side Doors

2. Utility Top
    i. Offtakes
    ii. Charging

3. Tar Chaser/ Sprayman
    i. Doors
    ii. Offtakes
    iii. Charging

4. Laborer
    i. Offtakes
    ii. Charging
    iii. Lids

5. Door Coordinator
   i. Pusher Side Doors
   ii. Coke Side Doors

B. Subject Areas for Initial/Refresher Training

The following outline lists the written procedures that are used for initial and refresher training:

Note: There are two types of written procedures:

1. Safe Job Procedures (SJP)- written procedures which include all job activities and emphasize the hazards.
2. Standard Operating Procedures (SOP)- written procedures describing how to do the job correctly including procedures that limit emissions.

1. Machine Operator
   a. Pusher Machine
      i. Pusher Side Doors
         * SJP PB-5 Removing/Replacing Oven Doors
         * SJP PB-11 Cleaning Chuck Doors
         * SOP-PM12 Automatic Door Cleaning
         * SOP-PM15 Automatic Jamb Cleaning
      ii. Charging
         * SJP PB-6 Leveling Ovens
   b. Larry Car
      i. Charging
         * SOP-LC5 Stage Charging
         * SOP-LC6 Automatic Lid Removal/Replacement
      ii. Offtakes
         * SJP CCOB-2 Charging Oven
   c. Door Machine
      i. Coke Side Doors
         * SJP DMB-4 Use of Laser Spot
         * SJP DMB-5 Removing and Replacing Doors
         * SJP DMB-6 Cleaning Doors
         * SJP DMB-10 Jamb Cleaner Utilization

2. Utilityman Top
   i. Offtakes
      * SJP UMB-2 Cleaning Offtake Piping
   ii. Charging
      * SJP UMB-2 Cleaning Offtake Piping
      * SJP UMB-6 Dampering Ovens Off
      * SJP UMB-7 Dampering Ovens On

3. Tar Chaser/ Sprayman
   i. Doors
      * SJP SMB-1 Cleaning Flushing Sprays
      * SJP SMB-3 Chasing Tar
   ii. Offtakes
      * SJP SMB-1 Cleaning Flushing Sprays
      * SJP SMB-2 Cleaning Pitch Traps

* SJP SMB-3 Chasing Tar

iii. Charging
* SJP SMB-1 Cleaning Flushing Sprays
* SJP SMB-2 Cleaning Pitch Traps
* SJP SMB-3 Chasing Tar

4. Laborer
   i. Offtakes
   * SJP BLB-13 Cleaning Flushing Sprays
   * SJP BLB-14 Cleaning Pitch Traps

   ii. Charging
   * SJP LB-4 Dampering Ovens On
   * SJP LB-5 Damper Ovens Off

   iii. Lids
   * SJP BLB-54 Removing Lids, Cleaning Lids and Replacing Lids

5. Door Coordinator
   i. Doors
   * SOP-DC3 Door Trouble Shooting

C. Training Methods/Duration

The initial training includes safety information and on-the-job training. Refresher training includes a review of Safe Job Procedures or other training deemed to be necessary.

It is difficult to allocate the time spent in training to environmental compliance because training in control of emissions is an integral part of total job training.

1. Initial Training

Indoctrination Period

When first assigned to the Coking Department, personnel receive at least 24 hours of initial classroom type training. During this training, the employee will receive basic information such as:

a. the importance of OSHA required apparel
b. "General Safety & Plant Conduct Rule Book"
c. "Lockout/Tryout" Rules
d. description/explanation of safety program
e. gas rescue training
f. Safety videos
g. Material Safety Data Sheets (MSDS)
h. Safe Job Procedures (SJP)
i. Standard Operating Procedures (SOP)

Break-in Period

The initial training is then extended to include on-the-job training in the routine job duties and in following Safe Job Procedures and Standard Operating Procedures (SOP). The employee is assigned an initial work area and job (usually Door Cleaner and/or Lidman). To become qualified at a particular job, the person works along side an experienced worker and then by himself to demonstrate his ability to properly perform the job. During the qualification period, the first line supervisor observes the worker to assure that he is following procedures that promote safety and environmental compliance.

When the employee has completed the qualification period, he is then assigned to a crew on one of the battery units.

Typically, an employee with several years of experience is assigned to work on B Battery. Since a B Battery Laborer is required to operate every machine on B Battery, he will work along side an experienced operator to be trained in operating the machines.

Duration:

(the **estimated** time spent on training in environmental compliance is enclosed in parenthesis)

a) initial indoctrination:

The duration of the initial indoctrination period is between 24 and 40 hours. (4 to 10 hrs)

b) Break in Period "on-the-job training":

The duration of the Break-in period is different for the different positions. Listed below are recommended minimum training periods for the various job assignments on B Battery.

Position	Minimum Training Hrs.	**Estimate** of Environmental Compliance Training Hrs.
Machine Operator	24	(10-15)
Utilityman/Top	8	(3-4)
Battery Laborer	8	(3-4)
Sprayman	16	(5-6)
Door Coordinator	24	(15-20)

2. Refresher Training-

To maintain awareness of job requirements, each employee is re-instructed in aspects of his job. Each week the first line supervisor meets individually with his crew members to review selected Safe Job Procedures. This instruction is then re-enforced by observing the employee as he performs his job.

Additional training may be required if the employee is not performing satisfactorily.

Safe Job Procedures (SJPs) are reviewed with all battery personnel. The first line supervisor reviews at least one procedure a week with each of his employees. These procedures, while highlighting job hazards, also assure that employees understand the best procedures for environmental compliance.

Duration:	**Estimate of** Training	**Estimate of** Environmental Compliance Training Hrs.
Refresher Training	6-8 hrs/year	(2-4 hrs/year)

D. Demonstration of Successful Completion of Training

A record of both initial and refresher training that has been given to each employee is maintained by the first line supervisor. These records are dated and initialed by the first line supervisor.

E. Procedure to Document Performance of Plan Requirements

To document performance of plan requirements pertaining to the daily operation of the battery and its emission control equipment, the first line supervisor will record reported exceptions to plan requirements on the "Shift Report" (exhibit W-1). The first line supervisor will sign this report.

I. DOOR EMISSION CONTROL WORK PRACTICES PLAN

Doors on B battery at USS Clairton are considered self-sealing. Both the Pusher Machine Operator on the Pusher Side and the Door Machine Operator on the coke side use automatic door and jamb cleaners.

A. Inspection and Cleaning of Doors and Jambs

1. Inspection of Oven Doors and Jambs

Oven doors and jambs are to be inspected for defects which may cause problems with the door sealing system.

a. The oven door and door jamb is to be visually inspected by the Pusher Machine Operator on the pusher side and the Door Machine Operator on the coke side after the oven is pushed.
b. The oven wall and lintel is to be inspected by the Door Machine Operator and Pusher Machine Operator after each push.
c. Visible defects are to be brought to the attention of the first line supervisor by the Door Machine Operator or the Pusher Machine Operator.
d. The Pusher Machine Operator is to inspect chuck doors and jambs for defects before the oven is charged. Defects are to be reported to the first line supervisor.
e. The first line supervisor is to either direct immediate remedial action or record the problem for later action on the "Daily Report" ("Six O'Clock Report") exhibit W-2, which is then distributed to appropriate operating and maintenance management.

2. Cleaning of Oven Doors and Jambs

The door and jamb will be cleaned after each coking cycle.

If the cleaners on either the pusher machine or the door machine become inoperable for any reason, a spare machine can be put in service.

a. Pusher Side Door Cleaning Procedure

The Pusher Machine Operator spots the pusher at the correct oven with the aid of the laser spotting device and removes the oven door. Once the extractor has been returned to its home position, the Operator initiates the door cleaning sequence from the operators console. The door is moved into position and cleaned by hydraulically operated metal scrappers.

The jamb cleaning sequence is initiated upon completion of the pushing operation. The automatic cleaner consists of metal scrappers which remove tar and carbon from the inside jamb and jamb face. The sequence for door replacement is not performed until all required cleaning is executed from the pusher operator's console.

b. Coke Side Door Cleaning Procedure

In conjunction with the pushing operation, the door cleaning sequence is initiated from the door machine operator's console. The door cleaning components are essentially the same as on the pusher machine, ie. hydraulically controlled mechanisms which use scrappers to remove carbon deposits.

After the oven is pushed and the coke guide is removed, the automatic jamb cleaner sequence is initiated. After all required cleaning is performed, the door is then replaced.

3. Conformance with specifications

a. The routine inspection of the door sealing system will be conducted by the Pusher Machine Operator and/or the Door Machine Operator. This inspection may include the visual inspection of cleanliness, excessive wear, and physical damage.
b. A problem door or jamb which has been identified by either poor performance or a report of a visible defect is to be inspected more thoroughly by the first line supervisor or Door Coordinator. This inspection may include taking physical measurements to determine the remedial action required.

4. Recording and Certification (Cleaning and Inspection)

Certification of inspection and cleaning practices for doors and jambs will be accomplished by listing the exception to standard procedures on the "Shift Report" (exhibit W-1) This report will be signed by the first line supervisor at the end of the shift certifying its accuracy.

B. Door and Jamb Repair and Replacement

1. Door Repair and Replacement

The first line supervisor, with the help of the Door Coordinator, is to determine which doors are to be taken out of service.

Each door taken out of service is either repaired on the unit or replaced with a reconditioned door. The Door Coordinator will be responsible for scheduling and recording of transferred doors. After the door is cleaned, the Mechanical Repairman Teamleader or his designee will determine the extent of the damage. Door reconditioning at CDR ranges from patching of refractory to a total rebuild of the door.

The Mechanical Teamleader will maintain records of doors reconditioned at CDR which may include the following information:

1) Type and extent of damage
2) Type and extent of repair
2) Date reconditioning was completed
4) Name of personnel who have worked on the door

2. Adjustment of new or repaired doors

   1) All doors are to be checked for adjustment after being delivered to the door rack on the unit.
   2) After a door is placed on the oven, the plungers are to be adjusted.
   3) After the door has been placed on the oven and has been charged, final adjustments are to be made.

3. Jamb Inspection, Repair and Replacement

   1) Jambs to be repaired may be identified by:
      a) routine inspection
      b) trouble shooting of doors identified by Emission Observers or Door Coordinators

   2) A jamb suspected of being in need of repair, must first be cleaned and inspected. The results will be communicated to the Area Manager-Operations. The Area Manager-Operations or his designee and Operating Maintenance personnel will determine the next step of action.

   3) The Area Manager-Operations or his designee will direct the Heating Manager to prepare a schedule of ovens to be removed from service for repair or replacement of the jamb. The Maintenance Manager or team leader will direct the maintenance personnel in the proper repair/replacement of the jamb.

   4) If the jamb is to replaced or repaired, operations and /or maintenance will keep records of:

      a) when the repair order was received
      b) what repairs were conducted
      c) when the work was completed

4. Recording and Certification (door/jamb replacement inspection, adjustment, and repair)

   a) The first line supervisor will record on the "Shift Report" all doors that have been replaced with a reconditioned door.
   b) A "Door Maintenance Card" (exhibit W-3) is completed for each door that has been repaired at CDR. These records will be maintained at CDR.

C. Inspection/ Adjustment/ Repair of Automatic Door and Jamb Cleaners

Automatic door cleaners and jamb cleaners are on both the pusher machines and on the door machines.

1. The Machine Operators will be responsible for inspecting the automatic door and jamb cleaner at least once a shift. The operator will visually inspect the first door and jamb cleaned at the beginning of the shift to assure that the cleaner is functioning properly.

2. Adjustments and repair of automatic door and jamb cleaners.
   Machine Operators will be responsible for reporting any problems associated with the automatic cleaning equipment to the first line supervisor. The first line manager will then report the problem to the Maintenance Manager or teamleader who will take appropriate corrective action. Either spare machines or manual cleaning of doors and jambs is to be utilized during periods when the automatic cleaning equipment is unavailable because of maintenance or malfunctions.

3. Recording and Certification (Automatic Door and Jamb Cleaner Repair)

   The first line supervisor will record problems and maintenance associated with automatic door and jamb cleaning equipment on the "Delay Report" form (exhibit W-4). This form will be signed by the first line supervisor and maintained in the Senior Shift Manager's office.

D. Identifying Leaks and Reporting Chain of Command

1. Recently Charged Ovens

   Pusher Machine Operators and Door Machine Operators will inspect and report to the first line supervisor or Door Coordinator door leakage which is considered excessive. (not expected to stop within a normal time period for self sealing doors)

The first line supervisor or Door Coordinator is to maintain a list of doors that have been reported as problem doors in the first line supervisor's office.

2. All Operating Ovens Other than Recently Charged Ovens

The following battery personnel are responsible for identifying door and jamb leaks and reporting them to the first line supervisor or the Door Coordinator:

Door Machine Operator
Pusher Machine Operator

The first line supervisor and/or Door Coordinator is to maintain a list of problem doors in the first line supervisor's office.

3. Corrective Action

If door leakage is observed by the Machine Operator, he may inspect the leak to determine the cause and take corrective action such as retightening the latches.If the problem door continues to leak, it will then be reported to the first line supervisor or Door Coordinator.
The Door Coordinator will inspect door leaks as observed or reported to determine corrective action.
A door that will require repair is to either repaired on the unit or replaced by a reconditioned door. The Shift Manager's "Shift Report" along with the Emission Observer's report is to be used by the Door Coordinator to determine which doors must be taken out of service for cleaning, inspection, re-adjustment, and/or replacement.
The Door Coordinator will schedule the transfer of problem doors to CDR for repair.

5. Recording and Certification (identifying and corrective action for leaks)

The following reports will be used to document that the work practices for identifying and corrective action for leaks have been performed.

1) first line supervisor's "Shift Report" (completed after each shift) will list cleaning and inspection exceptions and replaced doors.
2) The "Door Observation" report prepared and signed by the Emission Observer will list leaking doors.
3) The CDR "Door Maintenance Card" will be used to record the type of maintenance performed on each reconditioned door.

E. Self Sealing Doors and Supplemental Luting

1. Supplemental luting is only to be used as a temporary response on a problem door. Luting material is to be applied with a brush or spray after the door is replaced and the chuck door is closed and it has been determined that the door will leak beyond its normal sealing time.
   Luting material is to be applied sparingly and only to the area of the leak.

2. Recording & Certification

   If problem doors are luted, the first line supervisor will record those doors as having been luted on the "Shift Report".

F. Procedures for maintaining an inventory of Spare Doors & Jambs

1. Inventory of Doors

   The Door Coordinator or first line supervisor is to record the number of doors received from CDR each week. The number of spare doors will be recorded on the "Daily Log" (Six O'clock Report).

2. Inventory of Jambs

   If the replacement of jambs becomes necessary, an inventory of the spare jambs will be maintained by the Operating Maintenance Manager or his designee. The "Spare Jamb Inventory Report" will be submitted to the Area Manager-Maintenance on a monthly basis.

G. Monitoring and Controlling Collector Main Back Pressure

1. Monitoring of Back Pressure

   The pressure of the coke oven gas in the collecting main at the battery (back pressure) is to be continuously recorded. Additionally, the operation of the back pressure regulator will be observed once per shift.

2. Inspection and Calibration

   a) The back pressure measurement and control regulator is to be visually inspected daily for defects including malfunctioning charts and oil leaks.
   b) Back pressure instrumentation is to be checked for calibration twice a year.
   c) Collecting mains are to be inspected twice a year or as needed for tar buildup.
   d) Impulse lines are to be inspected and steamed out twice

a year.

3. Corrective Action

   a) If the back pressure control regulator (Askania) does not maintain the desired pressure, determine whether the problem is because of inadequate suction from the by-product plant, inappropriate position of the gate valve, or a malfunction of the control regulator.
   b) Position of the gate valve on the suction main is to be adjusted if that is identified as the problem.
   c) If the regulator itself is malfunctioning, it is to be repaired. Pressure should be manually controlled, if appropriate, until the automatic controller is functioning properly.

4. Recording and Certification

   a. A record is to be kept by the Heating department of the individuals assigned to the job positions and assignments responsible for back pressure control. The record is to include date and job position.
   b. A report is to be kept of problems with the back pressure monitoring and control system and any corrective action taken if necessary.
   c. A report is to be maintained which verifies visual inspection of back pressure regulation.

H. Audits of Effectiveness of Inspection and Repair Program

1. Audit of Door/Jamb and Equipment Inspection

   a. The Area Manager-Operations will initiate an audit annually, or more frequently as necessary, of the procedures used by one or more of the personnel listed below responsible for the inspection of doors and door cleaning equipment:

      Pusher Machine Operator
      Door Machine Operator

   b. The audit will be conducted by observing the actions of selected operator(s) during the turn.
   c. The auditor will use a check list and/or a written procedure to perform the audit.
   d. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental training to the personnel selected. The supplemental training, if required, may include:

1) review of written job procedures for inspecting doors, jambs, and equipment
2) on-the-job training which includes demonstrations of proper procedures
3) other training deemed necessary by the Senior Shift Manager

d. The Senior Shift Manager is to submit a report when the supplemental training, if required, has been completed.
e. The following reports are to be kept as part of the audit records:

1) Auditor's Report
2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed.

2. Audit of Door and Jamb Repair Program

a. The Area Manager-Maintenance will initiate an audit annually, or more frequently as necessary, to confirm that at least one door or jamb that has been repaired meets the specifications for a repaired door or jamb.
b. The auditor is to use a check list and/or a written procedure to conduct the audit.
c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports significant deviation from the prescribed specifications, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to the appropriate personnel. The supplemental training, if required, may include:

1) review of written job procedures for door and jamb repair
2) on-the-job training which includes demonstrations of proper procedures
3) other training deemed necessary by the Maintenance Manager

e. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.
f. The following reports are to be kept as part of the audit records:

1) Auditor's Report
2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed

III. CHARGING EMISSION CONTROL WORK PRACTICES PLAN

A. Machinery Inspection

1. Larry Car

   a. The following equipment on the larry car will be inspected during the shift:

      1) dropsleeve
      2) slide gate system

   b. Defects are to be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection. The Maintenance Manager and/or teamleader is to determine the priority of repairs and to assure that the repairs are made.

2. Pusher Machine

   a. The following equipment on the pusher machine will be inspected during the shift:

      1) smoke box
      2) decarbonization air
      3) automatic chuck door opener

   b. Defects are to be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection. The Maintenance Manager and/or teamleader is to determine the schedule for repairs and to assure that the repairs are made.

3. Offtake and Charging System

   a. The following equipment is to be visually inspected during the shift:

      1) standpipes of ovens being charged
      2) steam supply pressure
      3) liquor pressure
      4) charging holes and lids of ovens being charged

   b. Defects are to be reported to the first line supervisor.

   c. Maintenance is to perform a monthly inspection.

The Maintenance Manager and/or teamleader is to determine the schedule for repairs and to assure that the repairs are made.

B. Frequency of Inspection

1. The operating personnel will inspect larry car, pusher machine, offtake system equipment once per shift as detailed in section III. A.
2. Maintenance personnel will inspect the larry car, pusher, and offtake system equipment once per month.

C. Repair or replacement of equipment

Any defect found during on an inspection that will cause the release of emissions will be repaired to maintain emission control.

If the results of an inspection of equipment used to control charging emissions indicate problems which will cause the release of emissions, the equipment is to be repaired or replaced by a back-up machine. The Maintenance Manager and/or teamleader is to determine a schedule for repairs based on priority.

D. Method Used to Evaluate Conformance with Equipment Operating Specifications

The maintenance inspections as included under section A.1, A.2, and A.3 will be used to maintain equipment in accordance with operating specifications.

E. Audits of Effectiveness of the Inspection and Repair Program

1. Audit of Charging Equipment Inspection Program

a. The Area Manager-Operations will initiate an audit annually or more frequently as necessary the procedures used by the personnel responsible for the inspection of the following items used to control charging emissions:

pusher machine
larry car
standpipes
charging holes and lids
steam system
liquor sprays

b. The auditor is to use a check list and/or written procedures to gather information about the inspection process during one charging operation.

c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviations from the prescribed procedures, the Area Manager-Operations will direct the Senior Shift Manager to provide supplemental training to selected personnel. The supplemental training, if required, may include:

   1) a review of the written job procedures for inspection
   2) on-the-job training
   3) other training deemed necessary by the Senior Shift Manager

d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training has been completed.

e. The following reports are to be kept as part of the auditor's report:

   1) Auditor's report
   2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed.

1. Audit of Charging Equipment Repair Program

a. The Area Manager-Maintenance will initiate an audit annually or more frequently as necessary to confirm that at least one item listed below was repaired or replaced and meets operating specifications:

   pusher machine
   larry car
   standpipes and standpipe caps
   goosenecks
   charging hole castings and lids
   steam supply system
   liquor sprays

b. The auditor is to target an item that has been repaired to confirm that the repair meets the required operating specifications. The auditor will use a check list and/or written procedures.

c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports that the repair does not meet prescribed specifications, the Area Manager-Maintenance will direct Maintenance Manager to provide supplemental training to personnel involved in that type of repair. The supplemental training, if required, may include:

   1) a review of the written job procedures for the

repair of that item
2) on-the-job training
3) other training deemed necessary by the Maintenance Manager

d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.

e. The following reports are to be kept as part of the auditor's report:

1) Auditor's report
2) The Maintenance Manager Report certifying that the supplemental training, if required, has been completed.

F. Procedures for Controlling Emissions from Charging Operations

1. Procedure for filling larry car hoppers

1. Move larry car to loading station.
2. Activate the equipment to deposit coal into the larry car.
3. Use hopper full lights and/or camera monitors to make sure the hoppers are fully loaded.

2. Procedure for the alignment of car over ovens

1. Move larry car over oven to be charged.
2. Align car over the oven by using camera monitors.

3. Procedure for Filling the Oven with Coal (charging)

1. Pour the coal into the oven by opening the hopper slide gates in the following order; #4 and #1 first, then #3 and #2 last.
2. Contact the pusher machine operator to begin leveling.
3. After #2 hopper is empty, the L.C.O. will tell the P.M.O. to make one more pass and then replace number #2 lid.

4. Leveling operation

1. Upon receiving the appropriate signal from the Larry Car Operator, the Pusher Operator is to open the chuck door and begin the leveling process.
2. When the Larry Car Operator gives the signal that #2 hopper is empty, the Pusher Machine Operator will make one more pass with the leveling bar (clean-out pass).
3. The P.M.O. is to then close the chuck door

after removing the leveling bar.

G. Procedures and schedules for inspection and cleaning of the offtake system

1. Standpipes: With the improved placement of the flushing liquor nozzle inside the gooseneck, the need to clean standpipes after every coking cycle has been eliminated. By observing the decarbonization air inside the oven, the Pusher Machine Operator will determine if the standpipe is opened enough for charging.
2. Standpipe Caps: The standpipe caps on B-Battery are of the water seal design. The Utilityman or Laborer inspects the cap to insure that there is sufficient water in the trough and is free from dirt. The caps are inspected daily.
3. Goosenecks: With the improved placement of the flushing liquor nozzle inside the gooseneck, the need to clean goosenecks after every coking cycle has been eliminated. Typically, however, goosenecks are cleaned at a minimum of 10 days, manually by the Battery Laborer and/or Utilityman/Top.
4. Dampers and Mains: The Sprayman will check the tar level inside the collector main every month or more frequently as necessary to assure emissions control performance. The Utilityman/Top will report to the first line manager any dampers that do not operate properly.
5. Oven Roof: Natural draft decarbonization through open charging holes, compressed air decarbonizing jets, and manual removal of carbon deposits, are methods of carbon removal. The Pusher Machine Operator is to inspect the oven roofs for damage and excessive roof carbon buildup each time the oven is pushed. The Pusher Machine Operator will monitor roof carbon levels as necessary to assure emissions control performance. If excessive roof carbon buildup or oven damage is found, the Pusher Machine Operator will contact the first line supervisor.
6. Charging Holes: The Larry Car Operator is to inspect the charging holes before the charge. The Utilityman or Battery Laborer will clean the charging hole castings manually as necessary to assure emissions control performance.
7. Charging Hole Lids: The Utilityman Top is to inspect the charging hole lids after the oven has been pushed and the doors have been replaced. The Utilityman Top or Laborer will clean the charging hole lids manually as necessary to assure emissions control performance.
8. Steam Supply System: The Sprayman is to inspect the steam system each day.
9. Liquor Sprays. The Sprayman is to inspect

the flushing liquor system (including the liquor spray pattern and the header pressure) each day. The Tar Chaser/Sprayman will clean the liquor spray nozzles as necessary to assure emissions control performance.

H. Recording and Certification

The inspection and cleaning duties performed by operating personnel are to be performed as part of routine job procedures. Any defect that will influence control of charging emissions is to be reported to the first line supervisor.

The "Shift Report" will list reported exceptions to cleaning and inspection requirements. The "Delays and Machine Repairs" report will list repairs to charging emission control equipment. Maintenance inspection reports will be maintained by the Maintenance Manager and/or teamleader.

IV. TOPSIDE LID EMISSION CONTROL WORK PRACTICES PLAN

A. Inspection, Cleaning, Repair, and Replacement of Charging Hole Lids

The charging hole lids are automatically removed and replaced by a magnetic lid lifting system which is operated by the Larry Car Operator. A wet sealing material is applied to seal the lid and charging hole casting interface each time the lids are replaced and periodically as needed.

1. Inspection and Cleaning of Charging Hole Lids

a) Charging hole lids and castings are to be inspected by the Utilityman/Top or the Larry Car Operator before the oven is charged.
b) The Battery Laborer or Utilityman/Top will be assigned to clean charging hole lids and charging hole castings, as necessary, to assure proper sealing.
c) Defects are to be brought to the attention of the first line supervisor

2. Repair and Replacement of Charging Hole Lids

a) The Larry Car Operator and/or Battery Laborer is to replace any cracked or damaged lids that cannot be sealed with luting material.
b) If action is required other than replacing a lid, the first line supervisor is to either direct remedial action, or record the defect on the first line supervisor's "Daily Report" (Six O'Clock Report), exhibit W-2, and submit the report to the Senior Shift Manager.
c) The Senior Shift Manager or his designee is to review the "Daily Report" (Six O'Clock Report) daily and to compile a listing of defective charging hole castings. Repair or replacement is to be scheduled and performed.

3. Recording and Certification

a) The "Shift Report" (exhibit W-1) will be used to record exceptions to the cleaning and inspection practices.

b) The "Daily Report" (Six O'Clock Report) will be used to record defects in lids or charging hole castings.

c) The Senior Shift Manager will maintain a listing of all charging hole casting repairs or replacements.

B. Sealing and Resealing of Charging Hole Lids

1. Sealing Lids After the Charge

a) The Utilityman/Top is to seal all charging lids on each oven after the oven is charged.
b) The Utilityman/Top is to remove the aspiration steam after wet sealing the charging hole lids and reseal the lids if leaking.

2. Resealing of Charging Hole Lids.

a) The Utilityman/Top is to visually inspect newly sealed lids and reseal if leaking.

b) Any lid emission that cannot be stopped by sealing, or other means, is to be reported to the first line supervisor and logged in the "Daily Report". This report is to be submitted to the Senior Shift Manager for corrective action.

3. Recording and Certification

The "Shift Report" will be used to record defects that prevent the use of sealing material between the lid and charging hole casting.

C. Audits of Effectiveness of Inspection and Repair Program

After the Work Practice Plan for Lid Emissions is implemented, the Area Manager-Operations is to initiate the following audit program:

1. Audit of Inspection Procedures

a. The Area Manager-Operations is to initiate an audit annually, or more frequently as necessary, of the procedures used by the Utilityman/Top or Larry Car Operator for inspecting lids and charging hole castings.
b. The auditor is to use a check list and/or written procedures and audit the Utilityman/Top or Larry Car Operator for at least one charging sequence.
c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental refresher training to selected personnel. The supplemental training, if required, may include a review of the written job procedures for inspection, on-the-job training, or other training deemed to be required by the Senior Shift Manager.

d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training has been completed.
e. The following reports are to be kept as part of the audit records:

   1) Auditor's Report
   2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed

2. Audit of Lid Repair/Replacement Program

   a. The Area Manager-Maintenance is to initiate an audit annually or more frequently as necessary to confirm that at least one of the items below was repaired or replaced and meets operating specifications:

      1) Lid
      2) Charging Hole Casting

   b. The auditor is to use a checklist and/or written procedure.
   c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports significant deviation from the prescribed repair or replacement procedures, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to the selected personnel The supplemental training, if required, may include a review of the written job procedures for repair, on-the-job training, or other training deemed necessary by the Maintenance Manager.
   d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.
   e. Recording and Certification of Lid Repair Audits. The following reports are to be kept as part of the audit records:

      1) Auditor's Report
      2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed.

V. OFFTAKE SYSTEM EMISSION CONTROL WORK PRACTICES PLAN

The offtake system for B Battery consists of double collecting mains and two offtake assemblies for each oven. The offtake assembly consists of a gooseneck, standpipe cap, and standpipe.

A. Inspection, Repair, and Replacement of Offtake System Components

1. Inspection of Offtake System Components

   a. The Larry Car Operator and/or Utilityman/Top is to inspect the gooseneck, standpipe cap, and standpipe prior to the charging operation.

2. Repair/Replacement of Offtake System Components

   a. Defects in any offtake system components which are likely to be cause excessive emissions are to be reported to the first line supervisor.
   b. The first line supervisor is to either direct repair, or record the defect on the "Daily Report" (Six O'Clock Report), exhibit W-2, and submit the report to the Senior Shift Manager.
   c. Repair or replacement is to be scheduled and performed.

B. Identifying and Sealing of Leaking Offtake System Components

1. Identifying of leaking offtake system components

   The Larry Car Operator and/or the Utilityman/Top is to visually inspect the offtake system of each oven charged after the removal of aspirating steam.

2. Sealing of Leaking Offtake System Components

   a. The Larry Car Operator and/or Utilityman/Top is to seal visible leakage.

   b. Any offtake system emission that cannot be stopped by sealing is to be reported to the first line supervisor and logged on the "Daily Report" (Six O'Clock Report). The report is to submitted to the Senior Shift Manager for corrective action.

C. Dampering off Ovens Prior to a Push

1. Dampering procedure

   The dampering procedure can be performed by either of two methods:

a. Remote mechanical operation from inside the operators cab.
b. Manually operated by the Utilityman/Top or Laborer from the battery top.

Using either method a or b, from above, ovens are dampered off in a sequence that proceeds the oven pushing schedule.

D. Recording and Certification

a. "Shift Report" listing exceptions to the inspection and cleaning procedures outlined above.
b. First line supervisor's "Daily Report" (Six O'Clock Report)
c. Maintenance Planing Schedule which lists the scheduled offtake repairs.

E. Audits of Effectiveness of Inspection and Repair Program

After the Work Practice Plan for Offtake Emissions is implemented, the following audit program will be used:

1. Audit of Inspection Procedures

a. The Area Manager-Operations is to initiate an audit annually, or more frequently as necessary, of the procedures used by the Larry Car Operator and/or Utilityman/Top for inspecting the offtake system.
b. The auditor is to use a check list and audit the Larry Car Operator and/or Utilityman/Top for at least one inspection sequence.
c. The auditor is to report his findings to the Area Manager-Operations. If the auditor reports significant deviation from the prescribed inspection procedures, the Area Manager-Operations is to direct the Senior Shift Manager to provide supplemental refresher training to the personnel selected. The supplemental training, if required, may include a review of the written job procedures for inspection, on-the-job training, or other training deemed to be required by Senior Shift Manager.
d. The Senior Shift Manager is to submit a report to the Area Manager-Operations when the supplemental training if required, has been completed.
e. Recording and Certification of Lid Inspection Audits. The following reports are to be kept as part of the audit records:

1) Auditor's Report
2) The Senior Shift Manager's Report certifying that the supplemental training, if required, has been completed

2. Audit of Offtake Repair/Replacement Program

a. The Area Manager-Maintenance is to initiate an audit annually or more frequently as necessary to confirm that least one of the items listed below has been repaired or replaced and meets operating specifications:

   Standpipe
   Standpipe caps
   Goosenecks

b. The auditor is to use a checklist and/or written procedures.
c. The auditor is to report his findings to the Area Manager-Maintenance. If the auditor reports significant deviation from the prescribed repair or replacement procedures, the Area Manager-Maintenance is to direct the Maintenance Manager to provide supplemental training to selected personnel. The supplemental training, if required, may include a review of the written job procedures for repair, on-the-job training, or other training deemed necessary by the Maintenance Manager.
d. The Maintenance Manager is to submit a report to the Area Manager-Maintenance when the supplemental training, if required, has been completed.
e. Recording and Certification of Offtake Repair Audits. The following reports are to be kept as part of the audit records:

   1) Auditor's Report
   2) The Maintenance Manager's Report certifying that the supplemental training, if required, has been completed.

VI. GENERAL

A. Deadline Computation

Deadlines are all to be computed from the first Monday after the effective date for plan implementation under 40 C.F.R. 63.306(c). Thus, for example, a requirement to conduct an audit "each month" means that an audit must be conducted within 30 days of the Monday following the effective date for plan implementation of the plan provision containing the audit requirement.

BATTERY FOREMAN'S REPORT

TURN ______ DATE ______

·MPER ______

QUENCH SETTING
TIMER ______ AUTO ______ DRAIN ______

·CKOUTS ______

PULLBACKS ______

·VESTIGATE CHARGES ______

OVEN INTERIOR INSP. ______

·MP COAL ______

COAL LINES ______

exhibit W-1

·CARB. AIR 1 ______ 2 ______

FLUE TEMPS. PS ______

·GHOUSE TIME 1 ______ 2 ______

CS ______

·USHING TIME 1 ______ 2 ______

DOORS CHANGED ______

·USHING PRESS. 1 ______ 2 ______

·EAM PRESSURE 1 ______ 2 ______

·SS UPS	NUMBER	SERIES	TIME
·CK UPS			

·CHINE STATUS	IN	OUT	COMMENTS
·SHER B-1			
B-2			
·OR M B-1			
B-2			
·RRY B-1			
B-2			

·ENCH CAR ______ AUTO ______ SEMI AUTO ______ MANUAL ______

·C ______ LOSS ______ FIRST PUSH ______ FIRST DUMP ______

000 0085 2/85

DELAY REPORT - PRODUCTION

exhibit 4
(D-9)

IT: ____________________ DATE: ____________________

12 X 8	8 X 4	4 X 12
HEDULE	SCHEDULE	SCHEDULE
SS	LOSS	LOSS
RUBBED	SCRUBBED	SCRUBBE
R NO.	CAR NO.	CAR NC
REMAN	FOREMAN	FOREM/

exhibit W-4

OFF. ________	OFF. ________	
VAC. ________	VAC. ________	
LABOR ________	LABOR ________	LABOR ________
6TH ________	6TH ________	6TH ________
16 HR. ________	16 HR. ________	16 HR. ________
S.A. ________	S.A. ________	S.A. ________

·DELAYS AND MACHINE REPAIRS

TIME OUT	LOSS	DESCRIPTION