$PM_{2.5}$ SIP

Appendix J

RACM/RACT Analysis

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Appendix J.1

RACM Analysis

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RACM Analysis

This document provides details of the Reasonably Available Control Measures (RACM) evaluation for the Allegheny County, PA $PM_{2.5}$ nonattainment area (NAA). The purpose of RACM analysis is to determine if candidate measures could advance the attainment date by at least one year or could contribute to Reasonable Further Progress (RFP) for the area. RACM should consider which emission sources to control, to what level, and when the controls can and should be implemented.

RACM is by definition "reasonable" and does not include impractical measures, and the measures should be technologically and economically feasible to implement within the NAA. ACHD is not obligated to adopt measures; if adopted, measures should be implemented within four years of the effective designation date.

RACM options for the control of primary $PM_{2.5}$ and precursors SO_2 and NO_x in the NAA were examined by category groups for: (1) area sources, (2) nonroad mobile sources, and (3) onroad mobile sources. Based on the insignificance findings for VOC and NH_3 (see Section 5 of the SIP), control options for VOC and NH_3 were not considered.

The methodology for the RACM analysis was originally developed for ACHD by TranSystems|E.H. Pechan (now TranSystems). The analysis follows recommendations given in the EPA $PM_{2.5}$ Implementation Rule and, when applicable, considers measures implemented by other agencies.

Identifying and evaluating potential RACM entails the following steps:

A. Examine source category group emissions in the NAA, with priority given to source categories with the largest emissions of primary $PM_{2.5}$ and precursors SO_2 and NO_x.

B. Determine technologically feasible control technologies or measures for each source category group.

C. For each technologically feasible emission control technology/measure, examine:
    1) The control efficiency by pollutant.
    2) The possible emission reductions by pollutant.
    3) The estimated cost per ton of pollutant reduced.
    4) The date by which the technology or measure could be reasonably implemented.

Relevant factors for technological or economic feasibility can include infrastructure, population, workforce type, cost effectiveness, seasonal factors, etc. Because concentrations can reflect a combination of regional and local impacts, different scales of effectiveness can also be examined. RACM options examined are county-wide (with Allegheny County occupying 745 m^2 of area) but must be substantial enough to affect specific monitors such as Liberty, the only current nonattainment monitor in the NAA. Source assessment of the Liberty area revealed wood burning and diesel mobile sources as potential activities that could be addressed (TranSystems et al, 2012).

Source categories for the area and mobile sources for the RACM analysis were grouped as shown in the table below. (Note: Area sources include smaller, non-inventoried point source emissions. Some controls already in place for small point source categories have been included in Section 6 of the SIP.)

Source Category Groups for RACM Evaluation

Area Sources	Nonroad Mobile Sources	Onroad Mobile Sources
Agriculture	Marine	Gasoline Refueling
Commercial Cooking	Railroad	Gasoline Vehicles (Light-Duty)
Cremation	Off-Highway Equipment (Gasoline)	Gasoline Vehicles (Heavy-Duty)
Fuel Combustion (Industrial/Commercial)	Off-Highway Equipment (Diesel)	Diesel Refueling
Fuel Combustion (Residential)	Off-Highway Equipment (Other)	Diesel Vehicles (Light-Duty)
Fuel Combustion (Residential Wood)		Diesel Vehicles (Heavy-Duty)
Fugitive Dust		CNG Vehicles (Heavy Duty)
Oil and Gas Exploration and Production		
Petroleum Storage		
Solvent Utilization		
Surface Coatings		

The RACM options for these source category groups are described in the pages that follow. Section 6 of the SIP summarizes the findings by source category group.

“Control efficiency” refers to the amount of emissions that can be reduced by a measure. “Rule effectiveness” is a rating of how well a regulatory program achieves possible emissions reductions. “Rule penetration” is the percentage of a source category covered by the applicable regulation.

Note: Some marine/railroad sources are listed as area sources in the Emissions Inventories in Section 4 and Appendix D.

Source Category: Agriculture

Associated Source Classification Codes: 2801000003, 2801500000, 2801700001, 2801700002, 2801700003, 2801700004, 2801700005, 2801700006, 2801700007, 2801700010, 2801700011, 2801700012, 2801700013, 2801700014, 2801700015, 2801700099, 2805001100, 2805001200, 2805001300, 2805002000, 2805003100, 2805007100, 2805007300, 2805009100, 2805009200, 2805009300, 2805010100, 2805010200, 2805010300, 2805018000, 2805019100, 2805019200, 2805019300, 2805021100, 2805021200, 2805021300, 2805022100, 2805022200, 2805022300, 2805023100, 2805023200, 2805023300, 2805030000, 2805030007, 2805030008, 2805035000, 2805039100, 2805039200, 2805039300, 2805040000, 2805045000, 2805047100, 2805047300, 2805053100

This source category group includes agricultural sources such as tilling, fertilizers, and livestock.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	99.867	102.857
NO_x	0.019	0.020
$PM_{2.5}$	13.034	13.181
SO_2	0.004	0.004
VOC	0.048	0.049
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No options were identified. Agriculture is a small source category in Allegheny County, and NH_3 is an insignificant contributor to nonattainment in the NAA.		

<u>Source Category</u>: Commercial Cooking

Associated Source Classification Codes: 2302002100

This source category group includes conveyorized charbroilers, underfired charbroilers, and frying at commercial cooking establishments.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	413.995	396.992
SO_2	0.000	0.000
VOC	60.491	58.006
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
Option 1 Operators of conveyorized (chain-driven) charbroilers must install and operate an approved catalytic oxidizer on their charbroiler exhaust stack.		
1. Control Efficiency by Pollutant Application of flameless catalytic oxidizers to chain-driven charbroilers was found to effectively reduce $PM_{2.5}$ emissions by 83%.		
2. Potential Emission Reductions by Pollutant 28.996 tons/year of $PM_{2.5}$ based on 80% rule penetration, with chain-driven charbroilers representing 11% of the commercial cooking $PM_{2.5}$ inventory in 2021.		

Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	28.996
SO_2	
VOC	
3. Cost per Ton of Pollutant Reduced $8,610 per $PM_{2.5}$ ton reduced based on a 10-year equipment lifetime. This is based on an initial cost of a catalytic oxidizer of $4,000, a $1,000 installation cost, a replacement cost of $4,000 after 5 years, and an annual maintenance cost of $750.	
4. Date by which the Technology or Measure Could be Reasonably Implemented Emission reductions could be observed one year after rule enactment. Relatively small area-wide emissions in NAA.	
Option 2 Include control of emissions from underfired charbroilers.	
1. Control Efficiency by Pollutant 90% $PM_{2.5}$ reduction can be achieved by affected units.	
2. Potential Emission Reductions by Pollutant 102.900 tons/year of $PM_{2.5}$ based on 40% rule penetration, with underfired charbroilers representing 72% of the commercial cooking $PM_{2.5}$ inventory in 2021.	
Pollutant	Reductions from 2021
NH_3	
NO_x	

$PM_{2.5}$	102.900
SO_2	
VOC	
3. Cost per Ton of Pollutant Reduced $16,384 per $PM_{2.5}$ ton reduced based on a 10-year equipment lifetime (and HEPA filter control technology). HEPA filters have a capital cost of $35,000 for a 3,000 cubic feet per minute unit and an estimated installation cost of $2,000. The annual operation and maintenance costs are anticipated not to exceed $3,000.	
4. Date by which the Technology or Measure Could be Reasonably Implemented Full implementation may take five years from promulgation.	
Option 3 Frying – no options were identified for frying. Relatively small area-wide emissions in the NAA, representing 16% of the commercial cooking $PM_{2.5}$ inventory in 2021.	

<u>Source Category</u>: Cremation

Associated Source Classification Codes: 2810060100

This source category includes emissions from crematoriums.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	4.899	4.698
$PM_{2.5}$	0.323	0.310
SO_2	0.754	0.723
VOC	0.017	0.016
CURRENT CONTROL REQUIREMENT Very few sources and small emissions in Allegheny County. ACHD permit limitations are generally the same as the BACT-based emission limits for crematoriums, not to exceed 0.08 grains per dry standard cubic feet (gr/dscf) at 7 percent oxygen (O_2).		

<u>Source Category</u>: Fuel Combustion (Industrial/Commercial)

Associated Source Classification Codes: 2102002000, 2102004000, 2102005000, 2102006000, 2102007000, 2102008000, 2102011000, 2103002000, 2103004000, 2103005000, 2103006000, 2103007000, 2103008000, 2103011000

This source category group includes industrial or commercial fuel combustion from all fuels and boiler types.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	20.112	22.627
NO_x	1577.314	1678.811
$PM_{2.5}$	580.771	722.591
SO_2	1357.765	935.168
VOC	72.158	76.917

CURRENT CONTROL REQUIREMENT
Federal standards for boilers and engines.
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES
Low-NO_x burners.
1. Control Efficiency by Pollutant 30% NO_x reduction can be achieved by affected units.
2. Potential Emission Reductions by Pollutant 402.915 tons/year of NO_x based on 80% rule penetration.

Pollutant	Reductions from 2021
NH_3	
NO_x	402.915
$PM_{2.5}$	
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced $1,894 - $2,167 per ton of NO_x based on EPA's RACT/BACT/LEAR Clearinghouse.
4. Date by which the Technology or Measure Could be Reasonably Implemented Full implementation may take five years from promulgation.

<u>Source Category</u>: Fuel Combustion (Residential)

Associated Source Classification Codes: 2104001000, 2104002000, 2104004000, 2104006000, 2104007000, 2104011000

This source category group includes residential fuel combustion from all fuels except wood, with combustion of natural gas as the largest individual source category.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	442.512	429.591
NO_x	2155.443	2080.871
$PM_{2.5}$	14.029	12.920
SO_2	99.967	69.023
VOC	124.583	120.548
CURRENT CONTROL REQUIREMENT On February 9, 2013, the PA DEP updated its regulations (25 Pa. Code §123.22) by lowering the allowable sulfur content of commercial fuel oil used in residential and commercial/industrial boilers, furnaces, and other heaters in the five separate geographical “air basins” delineated in the state. Effective July 1, 2016, the new limit for sulfur in No. 2 home heating oil for the Allegheny County Air basin is 500 ppm (0.05%). A newer limit of 15 ppm will be implemented in the future.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No options were identified.		

<u>Source Category</u>: Fuel Combustion (Residential Wood)

Associated Source Classification Codes: 2104008100, 2104008210, 2104008220, 2104008230, 2104008310, 2104008320, 2104008330, 2104008400, 2104008510, 2104009000, 2104008610, 2104008700

This source category group includes fireplaces and inserts, wood stoves (EPA-certified and non-EPA certified), outdoor wood-fired boilers (OWBs) and hydronic heaters, and other residential wood burning.

EMISSIONS INVENTORY (annual tons)

Pollutant	2011 tons	2021 tons
NH_3	56.726	59.064
NO_x	133.782	161.172
$PM_{2.5}$	1033.613	1052.875
SO_2	16.579	19.110
VOC	1409.494	1372.392

CURRENT CONTROL REQUIREMENT

There have been and are programs in place for residential wood stove and fireplace use in Allegheny County. Wood stove change-out and "bounty" programs have replacing existing wood stoves with new EPA-certified wood stoves. A fireplace conversion program offers discounts for fireplace inserts. The sale, installation, or purchase of non-Phase 2 outdoor wood-fired boilers (OWBs) is prohibited after May 31, 2011. Last, there is also an outdoor "no burn" policy when Air Quality Action Days are predicted. Residential wood can have both warm and cool weather factors, with burning in summer for recreation and burning in winter for heating purposes.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Option 1

Wood Stove Change-Out Program: This option generates incremental emissions reductions from wood stoves not certified by U.S. EPA. A wood stove change-out program is one where incentives are offered to home owners with existing wood stoves to replace them with new cleaner burning wood stoves that are EPA-certified. The entire Pittsburgh metropolitan area has previous experience with a wood stove change-out program. This was a program designed to provide low income residents of the Pittsburgh MSA with a free wood stove to replace an existing wood stove or fireplace insert. This program screened for low income households and also verified that an existing stove/insert was being replaced. This program was in place from 2005-2007. There were 81 exchanges performed, with 18 retailers being involved in the program. There was also a discount program which ended up replacing 95 stoves in three months. The trade association involved with the change-out process was the Hearth Patio and Barbeque Association (HPBA). They developed a form that retailers completed with estimates of yearly usage and an estimate of how many years the home owner had been burning wood. It is estimated that 20 exchanges yields between 0.25 to 1 tons/year of PM emissions reduced.

1. Control Efficiency by Pollutant

There are many different stove types, and control efficiencies can vary by stove type, but a 65 percent PM emission reduction has been estimated for catalytic stoves compared with conventional stoves. EPA is currently considering various options for revision of the residential wood heaters New Source Performance Standards (NSPS).

2. Potential Emission Reductions by Pollutant

From previous change-outs in Allegheny County, a possible number of exchanges could be derived as 380 exchanges over the course of one year (based on 95 exchanges during the three-month period). Using the high-end estimate of 1 ton of PM reduced per 20 exchanges, a possible 19.0 tons/year of $PM_{2.5}$ could be reduced from non-certified stoves.

Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	19.000
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced

Based on the Pittsburgh change-out campaign that targeted low income residents (HPBA), the average cost of the campaign per wood stove unit was $2,222. Using an estimate of 1 ton of $PM_{2.5}$ reduced per 20 exchanges, the cost effectiveness of the change-out program is $44,440 per ton of $PM_{2.5}$ reduced.

4. Date by which the Technology or Measure Could be Reasonably Implemented

A wood stove change-out program has been implemented before in the Pittsburgh MSA, so that it, or a similar structure, could begin implementation within 1 or 2 years. However, the process of selecting households and tracking implementation slows the change-out process. The number of exchanges would also be too small over this period for any substantial reduction of $PM_{2.5}$, even if focused on the Liberty area.

Option 2

Outreach Program: EPA has partnered with the HPBA to conduct an education and outreach campaign, called "Burn Wise." The campaign encourages air pollution professionals to work with the local hearth retailers, local firefighters, chimney sweeps, insurance agents, doctors, teachers and others to deliver the Burn Wise message to the public. The Burn Wise campaign encourages the public to: 1) burn dry seasoned wood containing less than 20% moisture or wood pellets; 2) maintain a bright, hot fire and not let it smolder; and 3) upgrade pre-1990 appliances with energy saving EPA approved appliances. Suggested campaign materials include a campaign website, live-read promotional ads, fact sheets, and educational DVDs. Similar campaigns have been implemented throughout Washington State and California.

1. Control Efficiency by Pollutant

Sacramento Metropolitan Air Quality Management District (SMAQMD)'s survey on Rule 421 (SMAQMD, 2009) found that 90% of respondents were aware of the regulation, which includes the provisions of the Burn Wise campaign model. The survey also indicated that there was a general level of compliance ranging between 57-70%. However, there is insufficient information to estimate the amount of emission reductions resulting from behavior change like fuel switching from green to seasoned wood.

2. Potential Emission Reductions by Pollutant

Not quantified.

3. Cost per Ton of Pollutant Reduced

The annual cost of the outreach campaign to SMAQMD was $200,000, itemized as follows: 1) contractor outreach $105,000; 2) paid advertising $45,000; 3) staff cost $50,000 assuming that the hourly rate for support staff was $30/hour.

4. Date by which the Technology or Measure Could be Reasonably Implemented

The outreach campaign can be implemented within 6 months. If the outreach campaign is coordinated with other complementary options, the timeframe would extend to within 12 months.

Option 3

Woodstove Replacement When Homes Are Sold: Old wood stoves are usually made of metal, weigh 250 to 500 lbs, last for decades, and can continue to pollute for just as long. As a result, homeowners are less likely to replace old stoves with a new, EPA-certified, cleaner-burning technology or to remove the old stove especially if they are not using it. To help get these old stoves "off-line," some local communities have required the removal and destruction of old wood stoves upon the resale of a home. This requirement has proven to be effective in locations like Mammoth Lakes, CA; Washoe County, NV; and Jacksonville, OR.

1. Control Efficiency by Pollutant
EPA certified catalytic woodstoves are 67% cleaner than conventional woodstoves with regard to $PM_{2.5}$ emissions. Similarly, EPA certified non-catalytic woodstoves are 64% cleaner.

2. Potential Emission Reductions by Pollutant
Emissions reductions are proportional to the number of homes sold. Based on 2010 estimates, SPC estimates a 9.0% turnover rate in the course of a year, with owners moving from one household to another within Allegheny County. However, this includes households of all types, using all methods of heating, with the majority of county households utilizing natural gas for heating. Reductions are difficult to quantify for this option – reductions could be similar to Option 1.

3. Cost per Ton of Pollutant Reduced
Costs were not quantified for this option.

4. Date by which the Technology or Measure Could be Reasonably Implemented
It is unlikely that this option could generate significant $PM_{2.5}$ emission reductions in a short or medium timeframe.

Option 4
Additional Replacement of OWBs: 25 Pa. Code Chapter 123.14 prohibits the sale, installation or purchase of non-Phase 2 OWBs. After May 31, 2011, a person may not sell, offer for sale, distribute or install an OWB unless it is a Phase 2 OWB. Additionally, Phase 2 OWBs must be installed at a minimum of 50 feet from the nearest property line, have a stack height greater than 10 feet, and burn clean wood, wood pellets from clean wood, or starting fuel like heating oil, natural gas or propane. These requirements do not apply to a permanently installed OWB that was installed prior to October 2, 2010 and is transferred to a new owner as a result of a real estate transaction.

1. Control Efficiency by Pollutant
EPA estimates that Phase 2 OWBs are 90% cleaner.

2. Potential Emission Reductions by Pollutant
The estimated number of OWB units in Allegheny County is unknown. OWBs and hydronic heaters represent 1% of the residential wood $PM_{2.5}$ inventory in 2021. Assuming that all units non-Phase 2 units could be replaced, a possible reduction could be 9.698 tons from 2021 emissions.

Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	9.698
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced
$2,308 per $PM_{2.5}$ ton reduced.

4. Date by which the Technology or Measure Could be Reasonably Implemented
Existing OWBs are exempt from the requirements of 25 Pa. Code Chapter 123.14. The exemption extends to new OWB owners that acquire the equipment as the result of a real estate transaction. It is unlikely that any significant emission reduction would be achieved.

<u>Source Category</u>: Fugitive Dust

Associated Source Classification Codes: 2294000000, 2296000000, 2311010000, 2311030000

This source category group includes fugitive dust from paved and unpaved roads and road and residential construction.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	332.919	415.403
SO_2	0.000	0.000
VOC	0.000	0.000

CURRENT CONTROL REQUIREMENT
Dust suppressant applications at various locations within Allegheny County.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Pave unpaved roads and unpaved parking lots. Under this measure, no new unpaved roads would be constructed. Also, existing public unpaved roads and parking areas would be required to be paved.

1. Control Efficiency by Pollutant
Reduce $PM_{2.5}$ emissions by 89%.

2. Potential Emission Reductions by Pollutant
70.984 tons/year of $PM_{2.5}$ based on 80% rule penetration, with unpaved roads representing 24% of the fugitive dust inventory.

Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	70.984
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced
$2,450-$6,725 per $PM_{2.5}$ ton reduced. Cost effectiveness calculation based on San Joaquin Valley Rule 8061.

4. Date by which the Technology or Measure Could be Reasonably Implemented
Emission reductions could be observed one year after rule enactment, but for a relatively small reduction in $PM_{2.5}$ county-wide.

<u>Source Category</u>: Oil and Gas Exploration/Production

Associated Source Classification Codes: 2310000220, 2310000330, 2310000550, 2310000660, 2310010100, 2310010200, 2310010300, 2310011000, 2310011201, 2310011501, 2310011502, 2310011503, 2310011505, 2310021010, 2310021030, 2310021100, 2310021202, 2310021251, 2310021300, 2310021302, 2310021351, 2310021400, 2310021501, 2310021502, 2310021503, 2310021505, 2310021506, 2310021509, 2310021603, 2310111100, 2310111401, 2310111700, 2310121100, 2310121401, 2310121700

This source category group includes all processes from oil and gas exploration, including drill rigs, lateral compressors, fugitive emissions, and other sources.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	288.602	692.336
$PM_{2.5}$	11.799	39.112
SO_2	21.584	52.952
VOC	181.648	308.075
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No feasible, cost effective options were identified.		

<u>Source Category</u>: Petroleum Storage

Associated Source Classification Codes: 2501011011, 2501011012, 2501011013, 2501011014, 2501011015, 2501012011, 2501012012, 2501012013, 2501012014, 2501012015, 2501060052, 2501060053, 2501060201, 2501080050, 2501080100, 2505040120

This source category group includes residential, commercial, and airport petroleum storage processes.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	0.000	0.000
SO_2	0.000	0.000
VOC	1178.244	380.496
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
VOCs were determined to have a negligible effect on $PM_{2.5}$ formation, so no RACM analysis was performed on this area source.		

<u>Source Category</u>: Solvent Utilization

Associated Source Classification Codes: 2415000000, 2425000000, 2460100000, 2460200000, 2460400000, 2460500000, 2460600000, 2460800000, 2460900000, 2461021000, 2461022000, 2461850000

This source category group includes solvents from various processes, including household products, adhesives and sealants, and other miscellaneous solvent sources.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	0.000	0.000
SO_2	0.000	0.000
VOC	6064.187	5860.315
CURRENT CONTROL REQUIREMENT ACHD Regulation §2105.82 Control of VOC Emissions from Industrial Solvent Cleaning Operations; limits VOC emissions from various applications. PA DEP additionally limits adhesives and sealants for VOC emissions.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
VOCs were determined to have a negligible effect on $PM_{2.5}$ formation, so no RACM analysis was performed on this area source.		

<u>Source Category</u>: Surface Coatings

Associated Source Classification Codes: 2401001000, 2401005000, 2401008000, 2401015000, 2401020000, 2401025000, 2401030000, 2401040000, 2401055000, 2401065000, 2401070000, 2401085000, 2401090000, 2401100000, 2401200000

This source category group includes surface coating activities from a variety of sources, including architectural coatings, auto refinishing, and other coating sources.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	0.000	0.000
SO_2	0.000	0.000
VOC	1988.675	1973.539
CURRENT CONTROL REQUIREMENT ACHD Regulations: §2105.10 Surface Coating Processes; §2105.77 Control of VOC Emissions from Large Appliance and Metal Furniture Surface Coating Processes; §2105.78 Control of VOC Emissions from Flat Wood Paneling Coating Processes; §2105.79 Control of VOC Emissions from Paper, Film, and Foil Surface Coating Processes; §2105.83 Control of VOC Emissions from Miscellaneous Metal and/or Plastic Parts Surface Coating Processes; §2105.84 Control of VOC Emissions from Automobile and Light-Duty Truck Assembly Coatings, limits VOC emissions from various applications and processes.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
VOCs were determined to have a negligible effect on $PM_{2.5}$ formation, so no RACM alternatives was examined performed for these area sources.		

<u>Source Category</u>: Marine

Associated Source Classification Codes: 2280002100, 2280002200, 2282005010, 2282005015, 2282010005, 2282020005, 2282020010

This source category group includes commercial port and underway (inter-port) emissions from diesel-fueled towboats (tugs), typically equipped with Category 1 engines less than 2,000 horsepower. Recreational pleasure craft emissions have also been included in this source category group (both gasoline- and diesel-fueled).

EMISSIONS INVENTORY (annual tons)

Pollutant	2011 tons	2021 tons
NH_3	0.599	0.601
NO_x	999.371	697.800
$PM_{2.5}$	35.335	20.034
SO_2	11.485	1.372
VOC	400.085	180.541

CURRENT CONTROL REQUIREMENT

There are no restrictions on towboat operations in Allegheny County. However, using funds from a $1.5 million grant, ACHD has repowered four towboats that operate within the Port of Pittsburgh. Commercial and recreational vessels must also meet federal standards.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Option 1

Vessel Repowering: This strategy involves early repowering (or replacement) of older Tier 0 engines with newer (Tier 2 or later) engines. Vessels with Tier 0 engines have higher emissions per hp-hr than newer engines. Because of the long average lifetime of towboat engines (~13 years), the majority of the population remains at Tier 0.

1. Control Efficiency by Pollutant

The Port of Los Angeles estimates that repowering harbor craft engines can reduce $PM_{2.5}$ and NO_x emissions by an average of 25 percent and 60 percent, respectively (POLA, 2005).

2. Potential Emission Reductions by Pollutant

4.407 tons/year of $PM_{2.5}$ and 368.438 tons/year of NO_x, based on port and underway emissions representing 88% of the marine $PM_{2.5}$ and NO_x inventory for 2021.

Pollutant	Reductions from 2021
NH_3	
NO_x	368.438
$PM_{2.5}$	4.407
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced

Costs are high per vessel, based on the previous repowering project ($375,000).

4. Date by which the Technology or Measure Could be Reasonably Implemented

Emission reductions could be observed one year after rule enactment.

Option 2

Diesel Particulate Filters: Retrofit towboats with DPFs, an after-treatment device that can be retrofitted to existing marine engines with only minor modifications to the exhaust system.

1. Control Efficiency by Pollutant

DPFs are primarily for reducing $PM_{2.5}$ emissions, with typical reductions of 80% to 90%. Port and underway emissions represent 88% of the marine $PM_{2.5}$ inventory for 2021.

2. Potential Emission Reductions by Pollutant 14.104 to 15.867 tons/year of $PM_{2.5}$.	
Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	14.104 to 15.867
SO_2	
VOC	
3. Cost per Ton of Pollutant Reduced \$18,100 - \$33,900 per ton of $PM_{2.5}$ based on EPA's RACT/BACT/LEAR Clearinghouse.	
4. Date by which the Technology or Measure Could be Reasonably Implemented Emission reductions could be observed one year after rule enactment, but with relatively small reductions for the NAA.	
Option 3 Diesel Idling Program: Controls for vessel idling typically take the form of on-shore power sources (e.g., cold ironing). Hotelling time is negligible for towboats operating on inland rivers. Towboats are deployed nearly constantly, are rarely at dock, and are most often refueled midstream (EPA, 1999). Therefore, no idling or on-shore control options were considered.	
Option 4 Recreational Pleasure Craft Controls: No options were identified. Recreational marine accounts for a small amount of marine emissions in the NAA, with most activity occurring in summer months during events. Boat traffic is predominantly commercial towboats and barges along the rivers, specifically near industrial areas with the highest PM emissions. Recreational boat traffic can also originate from many areas outside of the NAA, as well as within the county, so targeting controls for such movable equipment is difficult. It is also expected that the reductions achieved would not be cost-effective.	

Source Category: Railroad

Associated Source Classification Codes: 2285002006, 2285002007, 2285002015, 2285004015, 2285006015

This source category group includes diesel line haul locomotives (Class I/II/III) and railroad maintenance.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.886	0.887
NO_x	1905.547	1431.470
$PM_{2.5}$	61.496	37.295
SO_2	19.912	0.671
VOC	100.152	57.209

CURRENT CONTROL REQUIREMENT
Federal controls regulating new and re-manufactured line haul locomotive engines; no local programs are in place for controlling line haul locomotive emissions.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Replacement of Class II Medium Horsepower Engines – Replace older pre-Tier 0 and Tier 0 engines to meet newer (Tier 2 or later) level standards.

1. Control Efficiency by Pollutant
This option will yield reductions for NO_x and $PM_{2.5}$, calculated based on the difference between the EPA Tier 0 emission factors (15.5 g NO_x /horsepower-hour and 0.3 g $PM_{2.5}$/horsepower-hour) and EPA Tier 2 emission factors (4.0 g NO_x /horsepower-hour and 0.1 g $PM_{2.5}$/horsepower-hour). This results in a control efficiency of 73 percent for NO_x, and 68 percent for $PM_{2.5}$.

2. Potential Emission Reductions by Pollutant
The control option is expected to yield the following emission reductions from 2021 projections based on 5% rule penetration:

Pollutant	Reductions from 2021
NH_3	
NO_x	52.249
$PM_{2.5}$	1.268
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced
The average capital cost of a low-emitting Tier 2 locomotive is estimated to be $1 million (ARB, 2009). High costs per ton preclude this option from being considered as an economically feasible control strategy.

4. Date by which the Technology or Measure Could be Reasonably Implemented
Benefits of replacement with a cleaner locomotive engine could be realized sufficiently prior to attainment date of 2021, but high costs relative to benefit will preclude this technology.

<u>Source Category</u>: Off-Highway Equipment (Gasoline)

Associated Source Classification Codes: 2260001010, 2260001030, 2260001060, 2260002006, 2260002009, 2260002021, 2260002027, 2260002039, 2260002054, 2260003030, 2260003040, 2260004015, 2260004016, 2260004020, 2260004021, 2260004025, 2260004026, 2260004030, 2260004031, 2260004035, 2260004036, 2260004071, 2260005035, 2260006005, 2260006010, 2260006015, 2260006035, 2260007005, 2265001010, 2265001030, 2265001050, 2265001060, 2265002003, 2265002006, 2265002009, 2265002015, 2265002021, 2265002024, 2265002027, 2265002030, 2265002033, 2265002039, 2265002042, 2265002045, 2265002054, 2265002057, 2265002060, 2265002066, 2265002072, 2265002078, 2265002081, 2265003010, 2265003020, 2265003030, 2265003040, 2265003050, 2265003060, 2265003070, 2265004010, 2265004011, 2265004015, 2265004016, 2265004025, 2265004026, 2265004030, 2265004031, 2265004035, 2265004036, 2265004040, 2265004041, 2265004046, 2265004051, 2265004055, 2265004056, 2265004066, 2265004071, 2265004075, 2265004076, 2265005010, 2265005015, 2265005020, 2265005025, 2265005030, 2265005035, 2265005040, 2265005045, 2265005055, 2265005060, 2265006005, 2265006010, 2265006015, 2265006025, 2265006030, 2265006035, 2265007010, 2265007015, 2265010010

This source category group includes large number of gasoline-powered nonroad sources, including lawn equipment, commercial and industrial equipment, off-road recreational vehicles, and others.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	2.162	2.531
NO_x	576.776	397.781
$PM_{2.5}$	109.939	121.212
SO_2	2.900	1.149
VOC	3006.140	2370.287

CURRENT CONTROL REQUIREMENT

Through the Southwest Pennsylvania Air Quality Partnership (SPAQP), a rebate program is in place in Allegheny County for lawn equipment, offering rebates for the purchase of electric or battery-powered equipment in exchange for gasoline-powered equipment. Qualifying equipment includes lawnmowers, trimmers, leaf blowers, chainsaws, and power washers at participating retailers. Nonroad sources must also meet federal standards for specific source types. Types of equipment can seasonal in use (lawn equipment: summer, snow blowers: winter, etc.).

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Additional replacement programs would encourage the trading of gasoline-powered equipment by providing funds to offset the purchase cost of electric or battery-powered equipment. The program(s) would operate in a similar fashion to lawn equipment replacement program. Control efficiency would be 100% and could be implemented in one year. Due to the number of different sources in this category group, many types or large numbers of equipment would likely need to be exchanged. The largest pollutant from this source category group is VOC, which is an insignificant contributor to nonattainment in the county. It is unlikely that additional programs would generate substantial $PM_{2.5}$ or NO_x emission reductions.

<u>Source Category</u>: Off-Highway Equipment (Diesel)

Associated Source Classification Codes: 2270002003, 2270002006, 2270002009, 2270002015, 2270002018, 2270002021, 2270002024, 2270002027, 2270002030, 2270002033, 2270002036, 2270002039, 2270002042, 2270002045, 2270002048, 2270002051, 2270002054, 2270002057, 2270002060, 2270002066, 2270002069, 2270002072, 2270002075, 2270002078, 2270002081, 2270003010, 2270003020, 2270003030, 2270003040, 2270003050, 2270003060, 2270003070, 2270004031, 2270004036, 2270004046, 2270004056, 2270004066, 2270004071, 2270004076, 2270005010, 2270005015, 2270005020, 2270005025, 2270005030, 2270005035, 2270005040, 2270005045, 2270005055, 2270005060, 2270006005, 2270006010, 2270006015, 2270006025, 2270006030, 2270006035, 2270007015, 2270010010

This source category group includes diesel-powered commercial equipment, such as construction and mining equipment, industrial equipment, lawn equipment, and others. The largest emissions are for construction equipment.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	3.024	3.714
NO_x	2850.765	1564.032
$PM_{2.5}$	238.059	102.212
SO_2	6.969	2.453
VOC	295.067	188.472

CURRENT CONTROL REQUIREMENT
Regulations established at §2105.93 of ACHD Article XXI – Air Pollution Control restrict the operation of diesel-powered equipment at idle to no greater than five consecutive minutes, allowing for exceptions due to safe operation considerations, engine temperature requirements, maintenance and diagnostic purposes, queuing, and emergency situations. Nonroad sources must also meet federal standards for specific source types.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES
According to EPA's listing of verified retrofit technologies for diesel-powered vehicles and equipment, the Caterpillar, Inc. Diesel Particulate Filter (DPF) is a verified technology possessing the ability to reduce primary $PM_{2.5}$ emissions for off-road construction equipment.

Retrofit technology: Nonroad Diesel Engine Retrofit with Catalyzed Particle Filter: Retrofit eligible construction equipment in the NAA with the Caterpillar DPF.

1. Control Efficiency by Pollutant
The Caterpillar DPF applies to nonroad, 4-cycle, non-exhaust gas recirculation equipped vehicles and equipment ranging from model year 1996 to 2005, and within the rated horsepower range of 174.2 to 301.5 horsepower. Application of this technology is documented to reduce PM emissions by 89%.

2. Potential Emission Reductions by Pollutant
Construction vehicles that may fall within the compatible model year and horsepower ranges specified in EPA's technology verification listing include (but are not limited to) the following: tractors/loaders/backhoes (SCC 2270002066), skid steer loaders (SCC 2270002072), rough terrain forklifts (SCC 2270002057), rubber tire loaders (SCC 2270002060), rollers (2270002015), bores/drill rigs (SCC 2270002033), crawler tractors (SCC 2270002069), and excavators (2270002036). Projected 2021 $PM_{2.5}$ emissions from these categories are 56.681 tons (55% of the $PM_{2.5}$ inventory). Assuming that 50% of the equipment would fall within the compatible model year, potential reductions from the projected 2021 emissions could be as follows:

Pollutant	Reductions from 2021
NH_3	

NO_x	
$PM_{2.5}$	25.223
SO_2	
VOC	
3. Cost per Ton of Pollutant Reduced The California Air Resources Board (ARB) estimates costs of retrofit technology to range up to $7,000 for equipment rated up to 100 horsepower, up to $9,000 for equipment rated between 100 and 275 horsepower, and $10,500 for equipment rated between 275 and 400 horsepower. In 2007, EPA published a report with DPF retrofit cost effectiveness information for nonroad vehicles with an approximate range of between $20,000 and $68,000 per ton of PM reduced.	
4. Date by which the Technology or Measure Could be Reasonably Implemented The installation of typical DPF devices on applicable vehicles could be implemented within one year of initiation.	

Source Category: Off-Highway Equipment (Other)

Associated Source Classification Codes: 2267001060, 2267002003, 2267002015, 2267002021, 2267002024, 2267002030, 2267002033, 2267002039, 2267002045, 2267002054, 2267002057, 2267002060, 2267002066, 2267002072, 2267002081, 2267003010, 2267003020, 2267003030, 2267003040, 2267003050, 2267003070, 2267004066, 2267005055, 2267005060, 2267006005, 2267006010, 2267006015, 2267006025, 2267006030, 2267006035, 2268002081, 2268003020, 2268003030, 2268003040, 2268003060, 2268003070, 2268005055, 2268005060, 2268006005, 2268006010, 2268006015, 2268006020, 2268010010

This source category group includes off-road equipment and vehicles that are fueled by liquefied petroleum gas (LPG) and compressed natural gas (CNG).

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	407.837	167.530
$PM_{2.5}$	6.411	7.948
SO_2	1.235	1.478
VOC	99.184	25.942
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No feasible, cost effective options were identified.		

<u>Source Category</u>: Gasoline Refueling

Associated Source Classification Codes: 2201000062

This source category includes emissions from refueling of gasoline vehicles.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	0.000	0.000
SO_2	0.000	0.000
VOC	65.428	38.279
CURRENT CONTROL REQUIREMENT Stage II vapor recovery systems.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
VOCs were determined to have a negligible effect on $PM_{2.5}$ formation, so no RACM analysis was performed on this onroad source.		

<u>Source Category</u>: Gasoline Vehicles (Light Duty)

Associated Source Classification Codes: 2201110080, 2201210080, 2201310080, 2201320080

This source category group includes gasoline-fueled motorcycles, passenger cars, passenger trucks, and light commercial trucks.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	289.698	175.830
NO_x	8306.288	2696.005
$PM_{2.5}$	189.698	124.196
SO_2	70.211	19.283
VOC	6781.052	3005.009

CURRENT CONTROL REQUIREMENT

Onroad vehicles are subject to federal emission standards. In addition, a vehicle inspection and maintenance (I/M) program is in place in the NAA for light duty vehicles. Gasoline light duty vehicles show a large decrease in emissions from 2011 to 2021 based on current controls.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Establish an Employer Rideshare Program that provides incentives or encouragement for employers to offer a carpool/ridesharing program to employees.

1. Control Efficiency by Pollutant

Control efficiencies for a commuter benefit program involve a reduction in the total vehicle miles traveled (VMT) by individuals participating in the program.

2. Potential Emission Reductions by Pollutant

Several factors are considered when calculating the emissions reduction associated with this control including number of jobs, trip lengths, average vehicle occupancy, program participation rates, and frequency. Based on SPC estimates, there were 905,840 jobs in Allegheny County in 2015, with 75.6% of the workforce driving to work alone and for an average commute time of 26.7 minutes. Estimates of reductions cannot be calculated from these numbers alone, but there is a potential for $PM_{2.5}$ and NO_x reductions from such a program, depending on participation rates and actual VMTs reduced.

3. Cost per Ton of Pollutant Reduced

The cost associated with implementation of an Employer Rideshare Program can be difficult to measure and can vary depending on the level of participation by employers. Participation in an existing regional program may require minimal annual costs on behalf of the employer. For example, the SPC has a program in place, the CommuteInfo program, for which individuals can register to participate in a carpool matching service. The CommuteInfo program also provides resources and information to help regional employers learn about commuter options. While there is no cost associated with participation in this program, minimal administrative expenses may be incurred by the employer to promote employee participation in the program.

4. Date by which the Technology or Measure Could be Reasonably Implemented

It is expected that an Employee Rideshare Program could be implemented within one year or less.

<u>Source Category</u>: Gasoline Vehicles (Heavy Duty)

Associated Source Classification Codes: 2201420080, 2201430080, 2201510080, 2201520080, 2201530080, 2201540080, 2201610080

This source category group includes gasoline-fueled buses, refuse trucks, single-unit short- and long-haul trucks, combination short-haul trucks, and motor homes.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	1.882	1.995
NO_x	195.200	80.850
$PM_{2.5}$	3.361	2.412
SO_2	1.080	0.378
VOC	97.905	54.937
CURRENT CONTROL REQUIREMENT Onroad vehicles are subject to federal emission standards.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No options were identified. Heavy duty gasoline vehicles represent a small amount of the onroad mobile source inventory. RACM options were focused on diesel-fueled heavy duty vehicles.		

Source Category: Ethanol E-85 Vehicles (Light Duty)

Associated Source Classification Codes: 2205210080, 2205310080, 2205320080

This source category includes ethanol E-85-fueled light duty cars and trucks.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	13.511
NO_x	0.000	120.630
$PM_{2.5}$	0.000	9.294
SO_2	0.000	2.593
VOC	0.000	90.250
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No options were identified. These are already clean vehicles with small amounts of emissions in comparison to the rest of the onroad mobile inventory.		

Source Category: Diesel Refueling

Associated Source Classification Codes: 2202000062

This source category includes emissions from refueling of diesel vehicles.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.000	0.000
NO_x	0.000	0.000
$PM_{2.5}$	0.000	0.000
SO_2	0.000	0.000
VOC	14.316	13.814
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
VOCs were determined to have a negligible effect on $PM_{2.5}$ formation, so no RACM analysis was performed on this onroad source.		

<u>Source Category</u>: Diesel Vehicles (Light Duty)

Associated Source Classification Codes: 2202210080, 2202310080, 2202320080

This source category group includes diesel-fueled passenger cars, passenger trucks, and light commercial trucks.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	1.687	5.086
NO_x	277.068	361.145
$PM_{2.5}$	14.757	14.172
SO_2	0.577	1.564
VOC	107.839	111.260
CURRENT CONTROL REQUIREMENT Onroad vehicles are subject to federal emission standards, as well as diesel vehicle idling restrictions.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES No options were identified. Similar to heavy duty gasoline vehicles, these emissions represent a small amount of the onroad mobile source inventory in comparison to light duty gasoline and heavy duty diesel vehicles. Additionally, the best viable option for diesel passenger vehicles would likely be ridesharing, as evaluated for light duty gasoline vehicles above.		

Source Category: Diesel Vehicles (Heavy Duty)

Associated Source Classification Codes: 2202410080, 2202420080, 2202430080, 2202510080, 2202520080, 2202530080, 2202540080, 2202610080, 2202620080

This source category group includes diesel-fueled buses, refuse trucks, single-unit short- and long-haul trucks, combination short- and long-haul trucks, and motor homes.

EMISSIONS INVENTORY (annual tons)

Pollutant	2011 tons	2021 tons
NH_3	10.390	12.216
NO_x	4464.471	2428.913
$PM_{2.5}$	241.970	115.759
SO_2	6.264	7.290
VOC	313.335	162.108

CURRENT CONTROL REQUIREMENT

Onroad diesel engine retrofits for school buses, trucks, and transit buses using EPA-verified technologies have been implemented. Diesel vehicle idling restrictions are in place.

TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES

Option 1

Additional Diesel Retrofits: According to EPA's listing of verified retrofit technologies, a number of different add-on control devices are verified to reduce direct $PM_{2.5}$ emissions from school buses, trucks, and transit buses. For this analysis, a single technology was selected to quantify the emissions reduction potential. The retrofit technology was chosen based on its applicability (to both buses and heavy duty trucks) and its control effectiveness. The "Purifilter Plus" system from manufacturer Engine Control Systems is a combination of a diesel particulate filter (DPF) and electrical panel for active regeneration at the garage/maintenance yard. It applies to heavy-duty trucks and urban buses (4-cycle non-exhaust gas recirculation equipped vehicles), ranging from model year 1994 to 2006.

1. Control Efficiency by Pollutant

Application of this technology is documented to reduce PM emissions by 90%.

2. Potential Emission Reductions by Pollutant

The exact number of eligible vehicles is unknown. Assuming that 50% of the diesel vehicles could be retrofitted, the following reduction may be estimated:

Pollutant	Reductions from 2021
NH_3	
NO_x	
$PM_{2.5}$	52.091
SO_2	
VOC	

3. Cost per Ton of Pollutant Reduced

According to EPA, DPFs generally cost between \$5,000 to \$15,000 including installation, depending on engine size, filter technology and installation requirements. According to EPA's 2007 publication on the cost-effectiveness of heavy-duty diesel retrofits (EPA 420-B-07-006), the cost effectiveness of such a technology should be between \$12,400-\$50,500 for school buses, \$28,400-\$69,900 for class 6 & 7 trucks, and \$12,100-\$44,100 for class 8b trucks.

4. Date by which the Technology or Measure Could be Reasonably Implemented

The retrofit program could be implemented within one year of initiation.

Option 2

Low Emissions Specification for Public or Private Fleets: Since most light-duty fleets replace vehicles

more frequently than every ten years, it is expected that most light-duty fleet vehicles will be meeting the most stringent light-duty criteria pollutant requirements and that additional reductions that could be achieved by replacing light-duty fleet vehicles with the most recent model year vehicles would be minimal. In contrast, specifying low emission standards for heavy-duty fleets could, even if just for a few vehicles, could have a more significant impact on $PM_{2.5}$ emissions in the region. Therefore, this analysis is focused on replacing heavy-duty diesel fleet vehicles with those meeting the latest emission standards.	
1. Control Efficiency by Pollutant This measure can achieve a 4.1% reduction in heavy-duty truck $PM_{2.5}$ emissions, 3.6% reduction in NO_x emissions, 4.1% reduction in SO_2 emissions.	
2. Potential Emission Reductions by Pollutant This option was focused on reducing emissions from the 1991 through 2006 model years for diesel short and long haul single-unit or combination trucks (SCCs: 2202520080, 2202530080, 2202610080, 2202620080). Older vehicles are likely already under consideration for upgrade or replacement, and newer vehicles would be subject to the latest emission standards. It was assumed that 50% of the eligible trucks would be replaced with comparable trucks meeting newer emission standards.	
Pollutant	Reductions from 2021
NH_3	
NO_x	43.720
$PM_{2.5}$	2.373
SO_2	0.149
VOC	
3. Cost per Ton of Pollutant Reduced N/A	
4. Date by which the Technology or Measure Could be Reasonably Implemented This program could be implemented by 2021.	
Option 3 Additional Diesel Idling Requirements for Buses and Trucks.	
1. Control Efficiency by Pollutant This option aims to reduce emissions from idling of buses and trucks. ACHD already has a regulation in place to limit idling from school buses and diesel powered motor vehicles (Article XXI Air Pollution Control). It limits idling to 5 minutes in most situations and it seems difficult to reduce idling durations further. However, this regulation has an exemption for trucks idling in order to "power a heater, air conditioner, or any ancillary equipment during sleeping and resting in a truck cab or sleeper berth." This specific type of idling also known as "extended idling" can be reduced by using EPA-verified technologies. Such technologies include Electrified Parking Spaces (EPS) and Auxiliary Power Units (APUs). An EPS is a system that can supply heating, cooling, and electrical power to a truck while the engine is turned off. It operates independently of the truck's engine, thus reducing main engine idling which results in lower emissions. Emissions reductions are difficult to quantify exactly since upstream emissions are emitted by the EPS. For the purpose of this analysis, these were not included. An APU system is a device that contains an EPA emission-certified engine that can supply cooling, heating, and electrical power. It is thus a mobile alternative to EPS. It operates independently of the truck's engine and can therefore reduce main engine idling, which in turn results in lower emissions. Again, for the purpose of this study, emissions from the APU were not included. This analysis thus provides the maximum emission reduction achievable through idling reduction.	
2. Potential Emission Reductions by Pollutant The potential emission reductions from reduced idling could be estimated by assuming that 100% of extended idling emissions from combination long-haul trucks in the NAA were eliminated. The EPA MOVES model could be used to simulate the reductions in emissions.	
3. Cost per Ton of Pollutant Reduced	

APUs would likely be more appropriate for the NAA given the relatively small number of trucks, and high upfront cost of truck electrification. The cost of the technology is $7,750, but with fuel savings due to diesel consumption reduction (from idling reduction). According to EPA, a typical combination long-haul truck idles between 1,600 and 2,400 hours a year, which uses 960 to 1,440 gallons of fuel (EPA SmartWay), corresponding to 0.6 gallons of fuel per hour of idling.
4. Date by which the Technology or Measure Could be Reasonably Implemented Given the small number of trucks that can benefit from APUs, the entire program could be implemented within one year of initiation.

Source Category: CNG Vehicles (Heavy Duty)

Associated Source Classification Codes: 2203420080

This source category includes CNG-fueled buses.

EMISSIONS INVENTORY (annual tons)		
Pollutant	2011 tons	2021 tons
NH_3	0.084	0.177
NO_x	16.351	20.094
$PM_{2.5}$	0.199	0.311
SO_2	0.019	0.039
VOC	3.196	3.650
CURRENT CONTROL REQUIREMENT None.		
TECHNOLOGICALLY FEASIBLE EMISSION CONTROL TECHNOLOGIES		
No options were identified. These are already clean vehicles with small amounts of emissions.		

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Appendix J.2

RACT Analysis

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RACT Analysis

This document provides details of the Reasonably Available Control Technology (RACT) evaluation for the Allegheny County, PA $PM_{2.5}$ nonattainment area (NAA). RACT is defined as 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.

RACT evaluation was performed for the major stationary point source facilities in the NAA. A major source is generally defined as a stationary point source with the potential to emit 100 tons/year or more of any air pollutant (as defined by Section 302 of the CAA). Certain conditions for smaller sources can also qualify a source as major, such as hazardous air pollutant (HAP) emissions, shared property with other sources, types of processes, and other factors. Major sources are often referred to as “Title V” sources, since they are required to obtain an operating permit according to provisions in CAA Title V and 40 CFR Part 70.

Since VOC (and NH_3) are insignificant precursors for the NAA, and since carbon monoxide (CO) and HAPs are not considered to be precursors of $PM_{2.5}$, only sources that are major for PM, SO_2, or NO_x were considered for the RACT evaluation.

The methodology used for the RACT analysis is as follows:

1. Identify all current major stationary point sources in the NAA. Sources that are major for $PM_{2.5}$, SO_2, or NO_x were included in the RACT evaluation. Major sources that are classified as major for other reasons were excluded from the analysis.

2. Identify the different processes (or process groups) for the applicable major source facilities and the current controls for the processes.

3. Identify potential RACT alternatives for the process groups, with emphasis on the largest processes (or process groups).

4. Evaluate the technological and economic feasibility of any potential RACT alternatives.

RACT evaluations are required for different analyses in Allegheny County, including evaluations for other NAAQS designations and permitting projects. Some of the information compiled for this analysis is similar in content to current or previous RACT evaluations for PM_{10}, SO_2, and NO_x. However, the $PM_{2.5}$ RACT analysis provided in this SIP should not be used to satisfy any requirements for other RACT evaluations.

Unless mentioned in the Control Strategy (Section 3) of the SIP as a modification since base year 2011,[1] processes were not required to install controls or to meet limits for RACT (or better) in order to demonstrate attainment for this SIP. No RACT findings in this analysis would advance the attainment date or be needed to show attainment by 2021. Emissions were held constant from base case to future case for most of the sources that were evaluated for RACT (see Appendix D.1 for a summary of projected emissions).

[1] Major sources included in the control strategy: U. S. Steel Clairton, GenOn Cheswick, ATI Allegheny Ludlum, and Bay Valley (now Riverbend).

Sources that were identified for the RACT evaluation (from step 1 above) are listed in the table below. Collectively, these sources represent 87.1% of the $PM_{2.5}$, 86.7% of the NO_x, and 98.0% of the SO_2 in the projected 2021 actual point source emissions inventory (excluding airport and helipad emissions).

Major Sources Identified for RACT Evaluation

Facility	Major Pollutants
Allegheny Energy Springdale (now Springdale Energy)	Major source for PM, NO_x
ATI Allegheny Ludlum	Major source for PM, SO_2, NO_x
Bay Valley (now Riverbend)	Major source for NO_x
Bellefield Boiler	Major source for NO_x
Energy Center Pittsburgh (North Shore)	Major source for NO_x
GenOn Brunot Island	Major source for PM, SO_2, NO_x
GenOn Cheswick	Major source for PM, SO_2, NO_x
Pittsburgh Allegheny County Thermal (PACT)	Major source for NO_x
Universal Stainless	Major source for NO_x
University of Pittsburgh – Main Campus	Major source for NO_x
U. S. Steel Clairton	Major source for PM, SO_2, NO_x
U. S. Steel Edgar Thomson	Major source for PM, SO_2, NO_x
U. S. Steel Irvin	Major source for PM, SO_2, NO_x

For the sources included in the RACT analysis (in the table above), the results from steps 2 through 4 of the RACT methodology are summarized on the following pages. Individual processes/units (or process groups) are shown along with capacities, potential-to-emit (PTE) emissions (for $PM_{2.5}$, SO_2, and NO_x), current controls, and evaluation of alternatives, if applicable. PTE emissions are based on the current source configurations and are given in tons/year (tpy). North American Industry Classification System (NAICS) codes and Source Classification Codes (SCC) are used to identify specific source types and processes.

PTE emissions are based on the maximum capacity to emit under the physical design of the unit and within the permitted or regulated restrictions to operate. For many processes, PTE emissions are equal to the permitted (allowable) limits. Total facility PTE emissions were calculated as the sum of all processes/groups, which can be considerably higher than actual emissions for some sources, especially for facilities where processes cannot operate simultaneously at maximum levels.

For some processes, if PTE emissions are not calculated, typical actual emissions (as used in the attainment demonstration) were listed in place of PTEs. Actual emissions from recent inventories were also used in the evaluation of sources to examine typical operations and emissions from a process. (Note: 2018 was a typical production year for all facilities above and represents the most recent look at emissions that can be expected from normal operation with current controls in place.)

For examination of reasonable alternative controls, several EPA resources were used, including the RACT/BACT/LAER Clearinghouse (RBLC),[2] the Menu of Control Measures (MCM) for NAAQS Implementation,[3] and the Control Cost Manual.[4] Determinations from the RBLC were examined over the past 10 years (from Jan. 1, 2009 through July 1, 2019) for comparison to existing controls. Economic analysis of alternatives was based on estimates of total costs (capital costs plus operating/indirect costs) and/or cost effectiveness (ratio of cost per ton of pollutant). Reasonable controls included operation and work practices and/or permitted limits for some processes.

Several sources that are major sources for VOC were excluded from the analysis due to insignificance (see Section 5.7 of the SIP). Sources that are major for VOC must be evaluated for RACT based on ozone nonattainment area requirements, however, so they are accounted for in other RACT analyses. These sources include:

- Buckeye Pipeline – Coraopolis
- Eastman Chemical Resins, Inc.
- Gulf Oil – Neville Island
- Pittsburgh Terminal – Coraopolis
- Pittsburgh Terminal – Neville Island
- Liberty Polyglas Pultrusions
- Neville Chemical Company
- PPG – Springdale
- Sun Oil (Sunoco) – Pittsburgh

Several sources are minor for PM and precursors but are classified as major sources due to solid waste incinerator rules. These sources have been excluded from the RACT analysis. These sources include:

- Allegheny County Sanitation Authority (ALCOSAN)
- Allied Waste – Imperial
- Ashland, Inc. – Neville Island (Polyester Resins)
- Kelly Run Landfill
- Monroeville Landfill

Some additional minor sources are classified as major sources because they share property with a major source, providing operational or other support for the major source. These sources have been excluded from the RACT analysis. These sources include:

- AKJ Industries
- Harsco Metals (Braddock Recovery)
- TMS (Tube City) Slag Processing – Braddock

[2] https://cfpub.epa.gov/RBLC/index.cfm?action=Home.Home&lang=en
(Note: BACT = Best Available Control Technology; LAER = Lowest Achievable Emission Rate)

[3] https://www.epa.gov/air-quality-implementation-plans/menu-control-measures-naaqs-implementation

[4] EPA Air Pollution Control Cost Manual, 6th Edition: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-analysis-modelstools-air-pollution

All other minor sources have been excluded from the RACT analysis. These sources are not subject to RACT requirements, but many inventoried sources have controls comparable to RACT and must follow permit provisions that are similar to those for larger sources.

Major facilities that have permanently closed since the base case of this SIP have also been excluded from the RACT analysis. These sources no longer have ACHD operating permits, and three of the sources have removed (or are in the process of removing) all process equipment from the corresponding properties. Any operation at these locations would require new source review, similar to any new source applying for an installation and/or operating permit. These sources include:

- General Electric (GE) – Bridgeville
- Guardian Industries
- Koppers Inc. – Clairton
- Shenango, Inc.

An additional major source, Kelman Bottles (formerly Glenshaw Glass), has been inoperative since 2011 but is currently under a maintenance plan through early 2021. Only one of the processes is eligible for restart, and a reactivation plan request along with implementation of BACT would be required in order to restart operations. Therefore, this source has been excluded from the RACT analysis, since BACT would be a higher level of control than RACT.

The Pittsburgh International Airport is an additional point source with considerable NO_x emissions (550.2 tons/year) in the actual emissions inventories in Appendix D of this SIP, but this source is not inventoried by ACHD. It is added to the NEI by EPA to account for surface-level emissions from commercial and military aircraft take-offs and landings, ground support equipment, and other operations. It's inventoried as a stationary point source in NEI, because it's associated with an actual location, but it's better classified as a nonroad mobile source. Emissions are presumably regulated according to federal requirements for aircraft and related equipment. No RACT evaluation was therefore performed for this source. (Note that the Pittsburgh International Airport point source is different from the Allegheny County Airport Authority, Air Force Reserve, and PA Air National Guard point sources that are located at the airport and are inventoried by ACHD.)

NO_x Control Technologies

Every facility evaluated was a major source for NO_x. The following are general technologies that were identified for the control of NO_x from combustion devices (boilers, turbines, etc.). Resources for these controls included EPA's MCM and EPA's Alternative Control Techniques (ACT) Documents.[5]

- Combustion Optimization
  - Tune-Ups
  - Reduced Air Preheat
  - Low Excess Air (Oxygen Trim)
- Staged Combustion
  - Fuel/Air Staging
  - Fuel Reburning

[5] NO_x Emissions from Industrial/ Commercial/ Institutional Boilers: http://www.epa.gov/ttncatc1/dir1/icboiler.pdf
NO_x emissions from Iron and Steel Mills: http://www.epa.gov/ttn/catc/dir1/iron_act.pdf
NO_x Emissions from Stationary Combustion Turbines:
http://www.epa.gov/groundlevelozone/SIPToolkit/ctg_act/199301_nox_epa453_r-93-007_gas_turbines.pdf

- Additions to Combustion (Air or Fuel)
    - Water/Steam Injection
    - Flue Gas Recirculation (FGR)
    - Fuel Induced Recirculation (FIR)
- Low-NO_x Burning
    - Low-NO_x Burners (LNB)
    - Ultra-Low NO_x Burners (ULNB)
    - Lean Combustion
    - Catalytic Combustion
- Post Combustion Control
    - Selective Catalytic Reduction (SCR)
    - Regenerative Selective Catalytic Reduction (RSCR)
    - Selective Non-Catalytic Reduction (SNCR)

Many processes have limits based on presumptive NO_x RACT limits for the state of Pennsylvania, which are federally enforceable via 25 Pa. Code § 129.97 and ACHD Title V operating permits.

$PM_{2.5}$ Control Technologies

The following are general technologies that were identified in the MCM and other resources for the control of PM. The U. S. Steel, GenOn, Allegheny Ludlum, and Springdale facilities are major sources of PM.

- Electrostatic Precipitators (Wet or Dry)
- Baghouses/Fabric Filters
- Wet Scrubbers
- Cyclone Separators
- Dust Collectors
- Capture Hoods
- Road Sweeping

SO_2 Control Technologies

The following are general technologies that were identified in the MCM and other resources for the control of SO_2. The U. S. Steel, GenOn, and Allegheny Ludlum facilities are major sources of SO_2.

- Flue Gas Desulfurization (FGD) (Wet or Dry)
- Coke Oven Gas Desulfurization
- Spray Dryer Absorbers
- Dry Sorbent Injection (DSI)
- Coal Cleaning/Washing

The U. S. Steel facilities include SO_2 limits for many processes that were based on the SO_2 SIP for the 2010 NAAQS for the Allegheny, PA area, submitted to EPA on Sept. 29, 2017. These limits were also included in ACHD installation permits that are federally enforceable (IPs 0052-I017, 0051-I006, 0050-I008).

<u>FACILITY</u>: Allegheny Energy Springdale (Springdale Energy)

NAICS 221121	Description Electric Bulk Power Transmission and Control
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	308.0
$PM_{2.5}$	187.9
SO_2	59.0

Springdale Energy Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
General Electric LM6000PC Simple Cycle Combustion Turbines (Units 1-2)	20100201	424 MMBtu/hr (48 MW) each, Natural Gas (NG) or fuel oil	98.0	17.0	6.0	Water Injection	Meets RACT.

Evaluation

The Allegheny Energy Springdale (now Springdale Energy) simple cycle turbines are Nebraska General Electric LM6000PC dual fuel (natural gas and No. 2 fuel oil) units, installed in 1999. Each turbine has a capacity of 424 MMBtu/hr while firing natural gas. The turbines are equipped with water injection for NO_x control. Each unit has dedicated Continuous Emission Monitoring System (CEMs) for NO_x emissions. The turbines share the same stack S1.

<u>NO_x</u>

These turbines are subject to New Source Standards of Performance (NSPS) for Stationary Combustion Turbines (40 CFR 60 Subpart KKKK), which limits the turbines to less than 25 ppm NO_x at 15% oxygen when natural gas is fired and less than 74 ppm NO_x at 15% oxygen when No. 2 fuel oil is fired. These limits are more stringent than the PA presumptive RACT limits of 42 ppm for natural gas and 96 ppm for fuel oil (25 Pa. Code § 129.97) for simple cycle turbines. The turbines feature lean combustion, combustors with reduced residence time, and water injection controls. Tune-ups are required on an annual basis to optimize the fuel performance. The turbines are also restricted to total combined hours of operation (for both turbines) of 4450 hours/year.

Low-NO_x controls are feasible for these turbines but would be no more effective than the current water injection system. Catalytic combustion is considered to be technically infeasible because it is not commercially available for turbines the size of Units 1-2. SNCR is technically infeasible since the appropriate temperature range for SNCR is approximately 1600 to 2000 °F, and the turbine exhaust temperature is much lower at 850 °F. Lower temperatures reduce the reaction rates and increase ammonia slip from the stack.

SCR is a technically feasible control for the simple cycle turbines and would have an estimated 84% control efficiency (a reduction of 82.3 tpy for these turbines). SCR was determined to be cost-prohibitive, however, with total annualized costs of $938,500/yr and a cost effectiveness of $11,400/ton of NO_x

removed.

RBLC NO_x determinations for turbines installed over the last 10 years were examined for the following codes (referring to turbine type, size, and fuel):

15.110 – Large Combustion Turbines, Simple-Cycle, >25 MW; Gas Fired
15.190 – Large Combustion Turbines, Simple-Cycle, >25 MW; Liquid Fuel

The simple cycle combustion turbines are emitting NO_x near the rates that new installations with water injection controls are achieving. For example, Sabine Pass LNG Terminal, LA, with similar turbines and water injection controls, is limited to 20 ppm of NO_x. Stack test and Continuous Emissions Monitoring System (CEMS) results show that the Springdale turbines are meeting levels of 21 ppm. NO_x RACT for these turbines is therefore considered to be continued operation at permitted limits along with required annual tune-ups.

$PM_{2.5}$

Actual emissions from these turbines are generally very low (2018 actuals were less than 1.0 tpy). Similar sources on the RBLC database indicate the use of clean fuels and good combustion practices to be reasonable controls. RACT for these turbines is the use of clean fuels according to permit conditions.

SO_2

The turbines are limited to the use of low sulfur (0.05% maximum) fuel oil for SO_2 control. While ultra-low sulfur distillate oil (0.0015%) would be a option for these turbines during hours when oil is fired, actual emissions are very low (less than 1.0 tpy). Springdale is also not a major source of SO_2; therefore, the use of 0.05% sulfur fuel oil is adequate for RACT. SO_2 during natural gas combustion is limited the sulfur content of natural gas (see the evaluation for the combined cycle turbines below).

Springdale Energy Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Siemens Westinghouse Model 501F Combined Cycle Turbines (Units 3-4)	20100201	2,094 MMBtu/hr (209 MW) each (NG)	210.0	166.0	53.0	Low-NO_x Burners (LNB) and Selective Catalytic Reduction (SCR)	Meets RACT.

Evaluation

These turbines are Siemens-Westinghouse W501F natural gas fired combined cycle combustion turbines, installed in 2001. Each turbine has a capacity of 2,094 MMBtu/hr. The turbines are equipped with dry low-NO_x burners and with SCR; neither has duct burners. Each unit has dedicated CEMS for NO_x emissions. The turbines share the same stack S2.

NO_x

These turbines were subject to LAER requirements for NO_x upon installation in 2001. The turbines utilize only natural gas for 2.5 ppm NO_x at 15% O_2, which is lower than 4 ppm required by PA presumptive RACT. These turbines feature dry low-NO_x burners (LNB), SCR, and annual tune-ups that significantly reduce the potential NO_x emissions. It is unlikely that additional controls would be economically feasible for these units and in some cases the additional controls may not be compatible with the existing control configuration (i.e., technically infeasible).

RBLC NO_x determinations for turbines installed over the last 10 years were examined for the code 15.210 (Combined Cycle & Cogeneration >25 MW; Natural Gas Fired). The combined cycle combustion turbines are emitting NO_x near the rates that new installations with dry low-NO_x and SCR controls are achieving. Similar units in the U.S. with the same controls are limited to 2 to 5 ppm NO_x. Stack test/CEMS results show that the Springdale combined cycle turbines are achieving levels of 2.1 ppm. NO_x RACT for these turbines is therefore considered to be continued operation at permitted limits along with required annual tune-ups.

$PM_{2.5}$

Upon installation, BACT was required for particulate matter (PM) emissions from the combined combustion turbines. (Note: For the PTE emissions above, $PM_{2.5}$ is assumed to be equal to PM_{10}.) Units 3 & 4 are limited to 0.012 lb/MMBtu of particulate matter. The exhaust is controlled using fuel selection, inlet air filters, fuel filters, and combustion controls. Further reductions in particulate matter are difficult to achieve due to the nature of the particulate matter in the exhaust gas. Post-combustion controls, such as baghouses and electrostatic precipitators, are impractical due to the high pressure drops associated with these units. Actual $PM_{2.5}$ emissions from these units are mostly due to condensable emissions (in 2018, condensables were 58.4 tpy and filterables were 27.4 tpy).

SO_2

There are no add-on controls that are technically feasible for this type of application. Therefore, RACT is determined to be the use of low sulfur fuel, based on the grain content of SO_2 in natural gas. SO_2 emissions from Units 3 &4 are limited to 0.00286 lb/MMBtu, and actual emissions in 2018 were less than 8 tpy of SO_2.

Springdale Energy Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Ammonia Tanks	30187017	11,765 gallons	--	--	--	Vapor Balancing and Bottom Loading	Not evaluated.

Remarks

Not evaluated, as there are no emissions of PM, SO_2, or NO_x.

Springdale Energy Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cooling Tower	38500101	148,690 gallons/min	--	4.9	--	Mist Eliminators	Meets RACT.

Evaluation

The cooling tower is limited to drift emissions of 0.0005% of circulating water flow, which is considered to be RACT for PM from cooling towers. A search of 99.009 – Industrial Process Cooling Towers show drift rates of 0.0 to 0.0015% for sources in the in the RBLC database. Actual $PM_{2.5}$ emissions from this tower are generally very low (less than 1.0 tpy).

FACILITY: ATI Allegheny Ludlum

NAICS 331110	Description Iron and Steel Mills and Ferroalloy Manufacturing
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	1122.1
$PM_{2.5}$	475.0
SO_2	105.6

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Electric Arc Furnaces (F1 and F2)	30300904	66 tons/hr each, Steel Scrap, Lime, Fluxes	267.9	73.5	97.3	DEC Baghouses, (primary), canopy hoods, AOD baghouse (F1 secondary), canopy baghouse (F2 secondary)	Meets RACT.
Argon-Oxygen Decarburization Vessel (AOD)	30300999	100 tons/hr, Steel, Lime, Fluxes	9.6	109.5	3.6	AOD Baghouse	Meets RACT.

Evaluation

This process includes two electric arc furnaces (EAFs) with a maximum transfer rate of 112 tons of hot metal per heat per furnace, using scrap steel and lime as inputs. The two EAFs were installed in 2003 and 2004, and an oxygen stirring system (where pure oxygen is injected into the bath after melting) was added in 2005. Steel from the EAFs is transferred into the Argon-Oxygen Decarburization (AOD) vessel, where gaseous mixtures containing argon and oxygen are blown into the vessel to reduce the carbon content of the steel.

<u>NO_x</u>
NO_x emissions from the EAFs and AOD are exclusively the result of thermal NO_x formation, generated when nitrogen reacts with oxygen in a high temperature environment. While residence time and oxygen concentration affect the formation of thermal NO_x, it is primarily dependent on temperature. Techniques for controlling or minimizing the formation of NO_x through the thermal NO_x mechanism include: reducing the local oxygen concentration at the peak flame temperature, reducing the residence time of peak flame temperature, maintaining peak flame temperatures below 2372 °F, and decreasing the furnace release rate. There are no other identified NO_x controls for such EAF/AOD units. Actual NO_x emissions in 2018 from the EAF/AOD were 110.1 tpy.

<u>$PM_{2.5}$</u>
The EAFs are controlled by a water cooled direct evacuation (DEC) System with two primary baghouses, canopy hoods, and a canopy baghouse. The AOD

is controlled by a baghouse that is shared by the EAFs as a secondary control. Each baghouse has an estimated control efficiency of 99.5% and is limited to 0.0052 gr/dscf for PM emissions. A search of the RBLC (codes 81.200 – Steel Production) shows that other EAFs (Nucor Steel, AL, ERMS Pueblo, CO) have similar limits for PM, and the current controls are considered to be RACT for ATI Allegheny Ludlum. Actual $PM_{2.5}$ emissions in 2018 from the EAF/AOD were 29.7 tpy.

SO_2

There are no identified SO_2 controls for such EAF/AOD units, and RACT is considered to be good process operation and scrap management. Actual SO_2 emissions in 2018 from the EAFs/AOD were 20.0 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Horizontal EAF Ladle Pre-Heater	10200603	4.5 MMBtu/hr, NG	2.2	0.2	0.0	None	Meets RACT.
Vertical EAF Ladle Pre-Heaters (2)	10200602	10.5 MMBtu/hr, each, NG	10.1	0.7	0.1	None	Meets RACT.
Bloom Horizontal AOD Ladle Pre-heaters (4)	10200602	15 MMBtu/hr, each, NG	7.0	1.1	0.1	Oxy-fuel burners.	Meets RACT.
American Horizontal AOD Ladle Pre-Heater (3)	10200603	8 MMBtu/hr, each, NG	11.5	0.8	0.1	None	Meets RACT.
AOD Vessel Pre-Heater	10200603	6 MMBtu/hr, NG	2.9	0.2	0.0	None	Meets RACT.
56 inch Tandem Mill Pre-Heater	10200603	3 MMBtu/hr, NG	1.5	0.1	0.0	None	Meets RACT.
Continuous Caster Tundish Pre-Heater (No.1 & 2)	10200603	2.5 MMBtu/hr, each, NG	2.4	0.2	0.0	None	Meets RACT.

Evaluation

Several pre-heaters are used at the facility for the heating of ladles at various points during the transfer of hot metal.

NO_x

No control options are considered cost-effective for these processes, including tune-ups, since emission reductions would be relatively low for each individual pre-heater. RACT for these units are the current limits along good engineering and air pollution control practices. Actual NO_x emissions in 2018 for these pre-heaters were 4.6 tpy.

$PM_{2.5}$, SO_2

$PM_{2.5}$ and SO_2 emissions are low for these processes, and no evaluation was performed. Actual emissions in 2018 were 0.5 tpy for $PM_{2.5}$ and <0.1 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Continuous Caster Torch Cutter (No.1, 2, & 3)	10200603	1.2 MMBtu/hr, each, NG	1.7	0.2	0.0	AOD Baghouse	Meets RACT.
Plate Burners/Torch Cutters #1-2	30300922	3 MMBtu/hr, each, NG	2.9	0.2	0.0	Baghouse	Meets RACT.

Evaluation

These torch cutters are relatively small sources of emissions, and the baghouses are considered to be RACT for PM. Actual emissions in 2018 were 0.5 tpy for $PM_{2.5}$ and <0.1 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Loftus Soaking Pits (Nos. 9 to 23)	10200602	26 MMBtu/hr, each, NG	187.3	13.7	1.1	None	Meets RACT.

Evaluation

The Loftus Soaking Pits are part of the hot-forming process and used for the reheat of ingots prior to hot rolling operations.

<u>NO_x</u>
Similar to the pre-heat furnaces above, no control options are considered cost-effective for these processes, since emission reductions would be relatively low for each individual soaking pit. RACT for these units are the current limits along good engineering and air pollution control practices. Actual NO_x emissions in 2018 for the soaking pits were <0.1 tpy.

<u>$PM_{2.5}$, SO_2</u>
$PM_{2.5}$ and SO_2 emissions are low for the soaking pits, and no evaluation was performed. Actual emissions in 2018 were <0.1 tpy for $PM_{2.5}$ and SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
56" Tandem Mill	30300935	38 tons/hr, Steel Slabs	--	74.9	--	Mist Eliminator	Meets RACT.
United Mill	30300935	15 tons/hr, Steel Slabs	--	29.6	--	Mist Eliminator	Meets RACT.
Z Mill	30300935	10 tons/hr, Steel Slabs	--	15.8	--	Mist Eliminator	Meets RACT.

Evaluation

The Tandem, United and Z Mills include mist eliminators as PM controls. No other controls were identified on the RBLC database (code 81.200 – Steel Production), and the current mist eliminators are considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from these mills were 8.0 tpy. (Note: The Tandem Mill has not operated in recent years.)

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Annealing Furnace, No. 1 A&P Line	30390003	49 MMBtu/hr, NG	38.8	1.7	0.1	None	Meets RACT.
Annealing Furnace, No. 2 A&P Line	30390003	44 MMBtu/hr, NG	34.7	1.5	0.1	None	Meets RACT.

Evaluation

These annealing furnaces are sources of fugitive emissions that exhaust indoors.

NO_x

In general, annealing relieves cooling stresses induced by hot-or-cold working and softens the steel to improve its machinability or formability. This is accomplished by subjecting the steel to a controlled temperature profile or cycle with moderate peak temperatures. As compared with most iron and steel processes, which take place at temperatures of 2,000-3,000°F, annealing is accomplished at moderate temperatures usually below 1,000°F. Because of these lower temperatures, NO_x emissions from these processes are lower.

Tune-ups are conducted for these furnaces, and no other control option is considered to be cost-effective. LNB or flue gas recirculation (FGR) would be feasible for these furnaces, but the emission reductions are low enough to make these options cost-prohibitive. RACT was determined to be operation at the current permitted limits. Actual NO_x emissions in 2018 from these furnaces were 12.8 tpy.

$PM_{2.5}$, SO_2

$PM_{2.5}$ and SO_2 emissions are low for these processes, and no evaluation was performed. Actual emissions in 2018 were 0.6 tpy for $PM_{2.5}$ and <0.1 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
H_2SO_4 Pickling – HNO_3/HF Pickling, No. 1-2 A&P Lines	30300910	86 tons/hr, Steel Slabs	134.1	1.9	--	Water Wash Packed Bed Scrubbers	Meets RACT.

Evaluation

The two pickling lines use hydrofluoric and nitric acid to remove scale from steel slabs by oxidation. In the process of oxidation, nitric acid is converted to NO_x. The pickling operations are routed to a wet chemical packed bed scrubber, designed to reduce acidic, particulate, and NO_x emissions.

SCR could be a feasible control in addition to the existing scrubber system and has been used at other facilities (Thyssenkrupp Stainless, AL). However, the addition of such equipment would not be needed for attainment for this SIP. The closest $PM_{2.5}$ monitor is Harrison, which has shown attainment of the $PM_{2.5}$ standards since designation. The potential reductions of NO_x (or PM) from controls would be inconsequential to the $PM_{2.5}$ attainment demonstration. RACT is therefore considered to be continued operation of the current controls at the permitted limits. Actual emissions in 2018 were 19.1 tpy of NO_x and 0.9 tpy of $PM_{2.5}$ from the pickling operations.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
AOD Mold Dryers (24)	10200603	2 MMBtu/hr, each, NG	21.1	1.7	0.2	None	Not evaluated.
Strip Dryers (2 lines)	10200603	1.5 MMBtu/hr each, NG	0.9	0.1	--	None	Not evaluated.

Evaluation

The drying operations are small sources of pollutants, utilizing natural gas only. While the combined NO_x PTE is relatively high for the AOD dryers, total NO_x emissions from these processes are generally low (0.3 tpy in 2018) with negligible amounts of $PM_{2.5}$ and SO_2 (<0.1 tpy in 2018). No evaluation was performed.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Kolene Heater, No.2 A&P Line	10200603	4.5 MMBtu/hr; 17 tons/hr, NG	2.2	0.2	0.0	None	Not evaluated.
Kolene Descaler, No.2 A&P Line	30300999	17 tons/hr	--	2.2	--	Water Wash Packed Bed Scrubber	Meets RACT.

Evaluation

The Kolene heater/descaler processes have small emissions, and the packed bed scrubber is considered to be RACT for the descaler. Actual emissions from these processes in 2018 were 0.2 tpy for NO_x, 0.3 tpy for $PM_{2.5}$, and <0.1 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boilers No. 1 & 2	10200602	34 MMBtu/hr, each, NG	32.7	2.4	0.2	None	Meets RACT.

Evaluation

Boilers No. 1 and 2 are Johnston fire-tube scotch marine-type package boilers of a single-burner design, installed in 1983. These boilers fire natural gas only and exhaust to a single stack.

A search of the RBLC Code 13.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces <100 MMBtu/hr; Natural Gas) shows that LNB is a typical NO_x control for such boilers. However, similar to pickling line above, the installation of LNB or other controls are not needed for this process. Reductions are not needed for the attainment demonstration of this SIP. RACT is the continued compliance with existing regulatory and permitting requirements for these boilers. Actual emissions in 2018 from the boilers were 5.1 tpy for NO_x, 0.4 tpy for $PM_{2.5}$, and <0.1 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Walking Beam Furnaces (2) - Hot Rolling Processing Facility (HRPF)	30300933	465 MMBtu/hr, NG, each	213.9	32.2	1.8	Ultra-Low NO_x Burners	Meets RACT.
Active Hot Boxes (3) - Hot Rolling Processing Facility (HRPF)	30300934	10 MMBtu/hr, NG, each	6.9	0.7	0.1	Ultra-Low NO_x Burners	Meets RACT.
Car Bottom Furnaces (4) - Hot Rolling Processing Facility (HRPF)	30300934	21.2 MMBtu/hr, NG, each	24.5	2.1	0.2	Ultra-Low NO_x Burners	Meets RACT.

Evaluation

The Hot Rolling Processing Facility (HRPF) is a newer facility at ATI Allegheny Ludlum, and these processes underwent BACT review upon proposal for installation in 2010. Each unit includes ultra-low NO_x burners (ULNB) for the control of NO_x, and the units fire natural gas only. ULNB reduces both flame temperature and oxygen concentration during some phases of combustion which lowers both thermal NO_x and fuel NO_x production.

<u>NO_x</u>

The furnaces are limited to NO_x emission rates of 0.07 lb/MMBtu (Walking Beams) and 0.088 lb/MMbtu (Car Bottoms). A review of the RBLC database (codes 81.200 – Steel Production) shows that similar walking beam units are meeting the same limit (Gerdau Macsteel, MI). These processes are considered to be meeting RACT, and further evaluation is needed. Actual NO_x emissions in 2018 from these units were 32.5 tpy.

<u>$PM_{2.5}$, SO_2</u>

$PM_{2.5}$ and SO_2 emissions are low for these processes, and no evaluation was performed. Actual emissions in 2018 were 7.4 tpy for $PM_{2.5}$ and 0.4 tpy for SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
HRPF Reversing Roughing Mill	30300931	4.5 mil tons/yr, specialty steel	--	12.6	--	Wet Electrostatic Precipitator	Meets RACT.

HRPF 7-Stand Hot Finishing Mill	30300931	4.0 mil tons/yr, specialty steel	--	35.1	--	Two Wet Electrostatic Precipitators	Meets RACT.

Evaluation

These mills were part of the HRPF facility and included electrostatic precipitators (ESP) as BACT controls. Emissions from the ESP devices are limited to 13.0 mg/m³, and no other controls for mills were identified on the RBLC database (under code 81.200 – Steel Production). Actual $PM_{2.5}$ emissions in 2018 from these mills were 0.4 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
HRPF Slab Grinder	30300912	300,000 tons/yr, specialty steel	--	7.2	--	Baghouse	Meets RACT.
HRPF Plasma Torch Cutting	30300922	30,000 tons/yr, specialty steel	3.5	0.0	--	Baghouse	Meets RACT.

Evaluation

These processes were part of the HRPF installation and include baghouses for PM control, considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from these processes were <0.1 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
HRPF Cooling Towers 1-3	38500101	144,000 gal/min, total	--	12.6	--	Mist Eliminators	Meets RACT.

Evaluation

These cooling towers were part of the HRPF installation and include mist eliminators that are limited to 0.005% drift. This control is considered to be RACT for these towers. Actual $PM_{2.5}$ emissions in 2018 from these towers were 0.8 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cooling Towers - EAF, AOD, mold water, compressor (7 total)	38500101	36,000 gal/min, total	--	9.6	--	None	Meets RACT.

Evaluation

These towers are not controlled for mist/drift emissions, and add-on controls are not feasible for existing cooling towers. Current permit limits are considered to be RACT for these towers. Actual $PM_{2.5}$ emissions in 2018 were 9.1 tpy from the towers.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Slab Grinders #23-24	30300912	20 tons/hr each, Steel Slabs	--	17.5	--	Baghouse	Meets RACT.
Wet Grinder	30300912	8 tons/hr, Steel Slabs	--	0.5	--	Mist Eliminator	Meets RACT.
Shotblasts	30400340	30 tons/hr, Coils	--	2.2	--	Baghouse	Meets RACT.

Evaluation

There are no other identified controls for these processes, and the current controls are considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from these processes were 3.4 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Space Heaters	10200603	160 MMBtu/hr combined, NG	91.2	6.7	0.5	None	Not evaluated.

Remarks

While the NO_x PTE is high for the space heaters, actual emissions are generally much lower. Controls such as LNB are feasible options for space heaters, but the potential benefits from reductions would be minor for ATI Allegheny Ludlum. Actual NO_x emissions in 2018 were 9.4 tpy, with 0.7 tpy of $PM_{2.5}$ and 0.1 tpy of SO_2.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Paved/Unpaved Roads	30300999	--	--	2.8	--	Sweeping, Water, Chemical Suppression	Meets RACT.
Silos & Material Handling	30501613	5 to 224 tons	--	0.6	--	Full Enclosures w/Bin Vent Collectors	Meets RACT.

Evaluation

These processes have small emissions, and the current controls are considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from these processes were 0.4 tpy.

ATI Allegheny Ludlum Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Emergency Generator #1 - Hot Rolling Processing Facility (HRPF)	20200102	2,250 KW, NG/Diesel (3,015 hp)	3.2	0.0	0.0	None	Not evaluated.
Other emergency generators, fire pump	30300999	6,500 HP, diesel	7.4	0.2	0.1	None	Not evaluated.

Remarks

These processes are used for emergency purposes only, and it is unlikely that additional controls would be technically and economically feasible for these units. No evaluation was performed for these units. Actual emissions in 2018 from these units were 0.4 tpy of NO_x and <0.1 tpy of $PM_{2.5}$ and SO_2.

FACILITY: Bay Valley (Riverbend)

NAICS 311422	**Description** Specialty Canning
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	123.0
$PM_{2.5}$	14.4
SO_2	1.2

Bay Valley (Riverbend) Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Combustion Engineering traveling grate water-tube boiler; retrofitted with natural gas burners (B001)	10200602	75 MMBtu/hr, NG	43.3	2.6	0.2	None	Meets RACT.

Evaluation

NO_x

Bay Valley (now Riverbend) Boiler 1 is permitted to fire natural gas (NG) only (based on IP 0079-I005) and is limited to 108.6 ppm NO_x at 3% O_2. There are no controls installed for this boiler or exhaust stack (shared with Boiler 2). Stack test results shows that NO_x rates of 0.10 lb/MMBtu are being achieved for this boiler, which is equal to PA presumptive RACT requirements of 0.10 lb/MMBtu for a boiler >50 MMBtu/hr. This boiler is not subject to 40 CFR Part 63, Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters).

Many of the identified controls are infeasible due to the boiler design, as it was originally used as coal-fired unit. Other options do not show cases in the RBLC where the controls have been installed in the last 10 years. SNCR requires a higher temperature range than the exhaust temperature range of 660-840 °F. Technically feasible options include tune-ups, SCR, LNB, and LNB+FGR. Tune-ups would lead to less than 1.0 tpy of reductions. LNB+FGR would lead to a reduction of 37.4 tpy and with a cost-effectiveness of $3,200/ton of NO_x removed. SCR would lead to similar reductions as LNB+FGR, but with a high annualized cost of $696,000/yr (cost effectiveness of $8,100/ton). Therefore, LNB+FGR would be the most feasible and cost-effective control for this boiler.

However, presumptive RACT is being achieved with stack test results, which is suitable for RACT for this SIP. Actual NO_x emissions from this boiler were 18.4 tpy in 2018. Additionally, since Boiler 1 shares an exhaust stack with Boiler 2, which is meeting lower limits, NO_x concentrations from Boiler 1 can be diluted while Boiler 2 is operating.

$PM_{2.5}$, SO_2

Bay Valley is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants were less than 1.0 tpy in 2018.							
Bay Valley (Riverbend) Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Combustion Engineering traveling grate water-tube boiler; retrofitted with natural gas burners (B002)	10200602	91 MMBtu/hr, NG	14.3	3.2	0.3	Low NO_x Burners	Meets RACT.
Evaluation NO_x Upon conversion to natural gas use only for all boilers at Bay Valley (IP 0079-I005), Boiler 2 was required to install new burners to replace damaged NG burners. Low-NO_x burners were installed as BACT requirements for new sources, and Boiler 2 is limited to 30 ppm NO_x at 3% O_2. Like Boiler 1, many alternative or additional controls are infeasible due to the boiler design, as it was originally designed for as a coal-fired unit. A feasible addition to the LNB controls would include FGR for staged combustion. A review of determinations for RBLC code 13.310 (Commercial/Institutional Size Boiler/Furnaces <100 MMBtu/hr; Natural Gas) show that similar boilers with LNB are achieving rates in a range of 0.05 to 0.014 lb/MMBtu/hr. Stack test results show that a rate of 0.08 lb/MMBtu is achieved by Boiler 2, which which falls within the range found in the RBLC determinations. Additionally, this boiler has been used sparingly since installation of the LNB burners, with no emissions reported in the past three years. No additional NO_x controls are warranted for RACT for this boiler. $PM_{2.5}$, SO_2 Bay Valley is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants were less than 1.0 tpy in 2018.							
Bay Valley (Riverbend) Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Babcock & Wilcox traveling grate water-tube boilers; retrofitted with natural gas burners (2 boilers, B003-B004)	10200602	85 MMBtu/hr total, NG	38.6	3.0	0.2	None	Meets RACT.
Evaluation NO_x Boilers 3 & 4 are similar to Boiler 1, but with lower ratings (42.5 MMBtu/hr each) and a limit of 86 ppm NO_x at 3% O_2. There are no controls installed for these boilers or exhaust stack (shared with Boiler 8). Stack tests show that NO_x rates of 0.08 lb/MMBtu are being achieved for these boilers, which is							

lower than PA presumptive RACT requirements of 0.10 lb/MMBtu.

Alternative options for these boilers are similar to those for Boiler 1. Since presumptive RACT is being achieved with stack test results, these boilers are considered to be meeting RACT. Combined actual NO_x emissions from the boilers were 14.7 tpy in 2018. Additionally, since Boilers 3 & 4 share an exhaust stack with Boiler 8, which is meeting BACT, NO_x concentrations from these boilers can be diluted while Boiler 8 is operating.

$PM_{2.5}$, SO_2

Bay Valley is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants were less than 1.0 tpy in 2018.

Bay Valley (Riverbend) Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Zurn keystone package boiler (B008)	10200601	210 MMBtu/hr, NG	24.2	5.4	0.4	Low-NO_x Burners; Flue Gas Recirculation (FGR)	Meets RACT.

Evaluation

NO_x

Restart of this Boiler 8 in 2013 with natural gas use only (IP 0079-I004) required BACT for installation. NO_x controls include LNB and FGR, and Boiler 8 is limited to 0.036 lb/MMBTU and 30 ppm NO_x at 3% O_2. Stack test results show that a rate of 0.028 lb/MMBtu is being achieved by Boiler 8.

A review of determinations for RBLC code 12.310 (Industrial Size Boilers/Furnaces between 100-250 MMBtu/hr; Natural Gas) show that similar boilers with LNB+FGR (or with ultra-low NO_x burners) are achieving rates in a range of 0.012-0.040 lb/MMBtu/hr (for example, Plaquemine (LA)). Actual emissions of NO_x for this boiler were 1.9 tpy in 2018. No additional controls are needed for this source.

$PM_{2.5}$, SO_2

Bay Valley is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants were less than 1.0 tpy in 2018.

Bay Valley (Riverbend) Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Miscellaneous (emergency generators, fugitives)	30200530	--	2.6	0.2	0.1	None	Not evaluated.

Remarks

These are small miscellaneous and/or emergency sources that were not evaluated for RACT.

FACILITY: Bellefield Boiler

NAICS 221330	**Description** Steam and Air-Conditioning Supply
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	304.6
$PM_{2.5}$	20.9
SO_2	88.4

Bellefield Boiler Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Boiler 1 (B001)	10300602	74 MMBtu/hr (NG)	32.4	2.6	0.2	None	Meets RACT.

Evaluation

Boiler No.1 has a capacity of 74 MMBtu/hr, designed by Babcock & Wilcox and originally installed in 1957. It was originally designed as coal and gas-fired chain grate boilers. The boiler is not subject to any NESHAP or MACT standards. All boilers at Bellefield share a common stack.

<u>NO_x</u>
Bellefield's Title V renewal application (June 15, 2018) proposed that a NO_x rate from Boiler No. 1 be restricted to a limit of 0.10 lb/MMBtu, which is equal to the presumptive RACT for natural-gas-fired boilers with a heat input capacity greater than 50 MMBtu/hr. The amount of natural gas combusted in Boiler No. 1 is limited to 70,476 scf per hour or 617.37 mmscf in any consecutive 12-month period.

Similar to the evaluation for similar equipment at Bay Valley (given above), LNB+FGR would be a feasible and cost-effective control for this boiler. However, the presumptive RACT limit would be suitable for RACT for this SIP. Stack tests in 2018 show that a rate of 0.09 lb/MMBtu is being achieved for this boiler. Actual NO_x emissions from this boiler were 9.0 tpy in 2018.

<u>$PM_{2.5}$, SO_2</u>
Bellefield is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited to 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants from Boiler 1 were less than 0.5 tpy in 2018.

Bellefield Boiler Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**

Boiler (B003)	10300601 – NG; 10300501 – fuel oil	128 MMBtu/hr – NG; 119 MMBtu/hr - fuel oil;	72.2	2.6	22.4	None	Meets RACT.

Evaluation

Boiler No.3 has a capacity of 128 MMBtu/hr while firing natural gas, designed by Erie City and originally installed in 1977. It was originally designed as a coal and gas-fired chain grate boiler. Annual tune-ups are required by the Boiler Area Source Rule, 40 CFR 63, Subpart JJJJJJ; the boiler is not subject to any NESHAP or MACT standards.

The amount of natural gas combusted in Boiler No. 3 is limited to 121,905 scf per hour or 533.94 mmscf in any consecutive 12-month period. Operation with fuel oil is limited to 430 hours per year, and only during periods of emergency, gas curtailment, or gas supply interruption and during maintenance, periodic testing, and startups. Fuel oil is required to meet current ASTM specifications for No. 2 fuel oil with a maximum sulfur content of 0.05% by weight.

NO_x

Boiler 3 has a limit of 72.2 tpy for NO_x, for an effective rate by heat input of 0.13 lb/MMBtu, which is higher than presumptive PA RACT limit of 0.10 lb/MMBtu. LNB+FGR would be a feasible and cost-effective control for this boiler, and controls or lower limits will be considered during the permitting process and ozone RACT review for this plant. Stack tests show that this boiler is meeting the current permitted limit, and actual NO_x emissions from this boiler were 18.1 tpy in 2018. Additionally, since all Bellefield boilers share the same exhaust stack, Boiler 3 emissions can be diluted while other boilers with controls and/or lower rates are operating. For the purposes of this SIP, which does not rely on modifications or reductions from Bellefield in order to demonstrate attainment, RACT for this boiler is considered to be compliance with the current limit along with tune-ups.

$PM_{2.5}$, SO_2

Bellefield is not a major source for either $PM_{2.5}$ or SO_2. PM emissions from Boiler 3 are limited to 0.008 lb/MMBtu (during NG use) and 0.015 lb/MMBtu (during fuel oil use), and SO_2 is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during emergency fuel oil use). RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants from Boiler 3 were less than 0.5 tpy in 2018.

Bellefield Boiler Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Boiler 5 (B005)	10300602	74 MMBtu/hr (NG)	32.4	2.6	0.2	None	Meets RACT.

Evaluation

Boiler No.5 has a capacity of 74 MMBtu/hr, designed by Erie City and installed in 1965. It was originally designed as a coal and gas-fired chain grate boiler. The boiler is not subject to any NESHAP or MACT standards.

NO_x

Bellefield's Title V renewal application proposed that a NO_x rate from Boiler No. 5 be restricted to a limit of 0.10 lb/MMBtu, which is equal to presumptive RACT. The amount of natural gas combusted in Boiler No. 5 is limited to 70,476 scf per hour or 617.37 mmscf in any consecutive 12-month period. LNB+FGR would be a feasible and cost-effective control for this boiler. However, the presumptive RACT limit would be suitable for RACT for this SIP. Stack tests in 2017 show that a rate of 0.10 lb/MMBtu is being achieved for this boiler. Actual NO_x emissions from this boiler were 14.5 tpy in 2018.

$PM_{2.5}$, SO_2

Bellefield is not a major source for either $PM_{2.5}$ or SO_2. PM emissions are limited to 0.008 lb/MMBtu, and SO_2 is limited to the sulfur content in natural gas. RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants from Boiler 5 were less than 0.5 tpy in 2018.

Bellefield Boiler Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boiler 6, Package Boiler (B006)	10300601 - NG; 10300501 - Fuel Oil	179 MMBtu/hr (NG or Fuel Oil)	85.3	6.5	32.1	Flue Gas Recirculation	Meets RACT.

Evaluation

Boiler No.6 has a capacity of 179 MMBtu/hr, designed by Erie City/Zurn package boiler and originally installed in 1965. Annual tune-ups are required by the Boiler Area Source Rule, 40 CFR 63, Subpart JJJJJJ; the boiler is not subject to any NESHAP or MACT standards.

The amount of natural gas combusted in Boiler No. 6 is limited to 170,476 scf per hour or 1493.37 mmscf in any consecutive 12-month period. Operation with fuel oil is limited to 430 hours per year, and only during periods of emergency, gas curtailment, or gas supply interruption and during maintenance, periodic testing, and startups. Fuel oil is required to meet current ASTM specifications for No. 2 fuel oil with a maximum sulfur content of 0.05% by weight.

NO_x

Bellefield's Title V renewal application proposed that a NO_x rate from Boiler No. 6 be restricted to a limit of 0.10 lb/MMBtu, which is equal to presumptive RACT. Boiler 6 is equipped with FGR for NO_x control. LNB would be a feasible and cost-effective additional control for this boiler. However, the presumptive RACT limit would be suitable for RACT for this SIP. Stack tests in 2017 show that a rate of 0.10 lb/MMBtu is being achieved for this boiler. Actual NO_x emissions from this boiler were 14.5 tpy in 2018.

$PM_{2.5}$, SO_2

Bellefield is not a major source for either $PM_{2.5}$ or SO_2. PM emissions from Boiler 6 are limited to 0.008 lb/MMBtu (during NG use) and 0.015 lb/MMBtu (during fuel oil use), and SO_2 is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during emergency fuel oil use). RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants from Boiler 6 totaled 0.5 tpy in 2018.

Bellefield Boiler Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boiler 7, Package Boiler (B007)	10300601 - NG; 10300501 - Fuel Oil	188 MMBtu/hr (NG or Fuel Oil)	52.8	3.2	33.2	Low-NO_x Burners	Meets RACT.

Evaluation

Boiler No.7 has a capacity of 188 MMBtu/hr, designed by IBW Volcano boiler and originally installed in 1994. The amount of natural gas combusted in Boiler No. 7 is limited to 179,048 scf per hour or 608.76 mmscf in any consecutive 12-month period. A limit of 3400 hours of operation (39% capacity factor) during any consecutive twelve-month period has been proposed for this boiler. Operation with fuel oil is limited to 430 hours per year, and only during periods of emergency, gas curtailment, or gas supply interruption and during maintenance, periodic testing, and startups. Fuel oil is required to meet current ASTM specifications for No. 2 fuel oil with a maximum sulfur content of 0.05% by weight.

NO_x

Boiler 7 is equipped with LNB for NO_x control and is also equipped with NO2 CEMS. Boiler 7 has a limit of 52.8 tpy for NO_x. FGR or SCR would not be cost-effective add-on controls to LNB for this boiler due to the limited time of operation of 3400 hours/yr. Stack tests show that this boiler is meeting the current permitted limit, and actual NO_x emissions from this boiler were 3.5 tpy in 2018. For the purposes of the SIP, RACT for this boiler is considered to be compliance with current emissions and operation limits.

$PM_{2.5}$, SO_2

Bellefield is not a major source for either $PM_{2.5}$ or SO_2. PM emissions from Boiler 7 are limited to 0.008 lb/MMBtu (during NG use) and 0.015 lb/MMBtu (during fuel oil use), and SO_2 is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during emergency fuel oil use). RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions from both pollutants from Boiler 3 were less than 0.5 tpy in 2018.

Bellefield Boiler Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boiler 8a, Package Boiler (B008a)	10300602	87 MMBtu/hr (NG)	20.9	3.1	0.2	Low-NO_x Burners with Optional Flue Gas Recirculation	Meets RACT.

Evaluation

Boiler No.8a has a capacity of 87 MMBtu/hr. Boiler 8a is a placeholder in the Bellefield permit for a rental boiler to supply steam during peak periods in the winter. Only a natural gas boiler equipped with a low-NO_x burner can be rented, limited to NO_x emissions of 0.055 lb/MMBtu. There were no emissions of Boiler 8a in 2018. RACT for this boiler is determined to be compliance with permitted conditions, clean fuels, and good work practices.

Bellefield Boiler Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Emergency Generators A & B	20200401	771 HP (5.4 MMBtu/hr) each, Diesel	8.6	0.3	0.1	None	Not evaluated.

Remarks

ACHD has determined that it is not necessary to conduct a RACT evaluation for the emergency generators. RACT for these sources are proper operation and maintenance according to manufacturer's specification. Additional controls would be technically and economically feasible for units. Each emergency generators usage is limited to 20,000 gallons/yr and 500 hours/yr of operation. Actual emissions from these units less than 0.01 tpy for NO_x, $PM_{2.5}$, or SO_2 in 2018.

FACILITY: **Energy Center Pittsburgh (North Shore)**

NAICS 221330	**Description** Steam and Air-Conditioning Supply
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	213.4
$PM_{2.5}$	19.6
SO_2	4.6

Energy Center Pittsburgh Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Two Babcock & Wilcox forced draft, water tube boilers (B001 & B002)	10300501 - Fuel Oil 10300602 - NG	92.0 MMBtu/hr, each (NG or Fuel Oil)	116.8	6.8	2.8	Oxygen Trim	Meets RACT.

Evaluation

Boilers No. 1 and 2 are Babcock and Wilcox Type D package boilers, each with a rated heat input capacity of 92.0 MMBtu/hr, installed in 1964. Each boiler has dual fuel capabilities; they can fire either natural gas or No. 2 fuel oil and each exhausts to its own stack, S001 and S002, respectively. No. 2 fuel oil is used only as a backup fuel in emergency situations, including where natural gas is not available or during periods of natural gas curtailment. Natural gas usage in each boiler shall not exceed the maximum potential usage of 90,200 scf/hr and 790 million scf/yr, and No. 2 fuel oil combusted in each boiler shall not exceed 660 gal/hr and 330,000 gallons in any consecutive twelve-month period.

NO_x

Oxygen trim systems are installed on Boilers 1 and 2. These systems automatically control fuel and air feed rates to minimize excess oxygen and reduce thermal NO_x formation. The Title V permit requires the oxygen trim equipment to be properly operated and maintained.

Stack tests in 2017 during natural gas usage show that Boiler 1 is emitting at 0.12 lb/MMBtu and Boiler 2 is emitting at 0.14 lb/MMBtu, which are above presumptive RACT. LNB with/without FGR would be feasible additional controls for these boilers, and controls and/or lower limits will be considered during the permitting process and ozone RACT review for this plant. These boilers generally operate well below maximum capacity with natural gas and rarely use fuel oil. In 2018, actual NO_x emissions from Boilers 1 and 2 were 17.9 tpy (total). For the purposes of the SIP, RACT for this boiler is considered to be compliance with the current limit.

$PM_{2.5}$, SO_2

Energy Center is not a major source for either $PM_{2.5}$ or SO_2. PM emissions from the boilers are limited to 0.008 lb/MMBtu (during NG use) and 0.015

lb/MMBtu (during fuel oil use), and SO_2 is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during emergency fuel oil use). RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions of these pollutants from the boilers were less than 0.2 tpy in 2018.

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Babcock & Wilcox forced draft, water tube boiler (B003)	10300501 - Fuel Oil 10300601 - NG	131.1 MMBtu/hr (NG or Fuel Oil)	77.3	4.8	2.2	Oxygen Trim	Meets RACT.

Evaluation

Boiler No. 3 is a Babcock and Wilcox Type D package boiler with a rated heat input capacity of 131.1 MMBtu/hr, installed in 1972. It has dual fuel capabilities; it can fire either natural gas or No. 2 fuel oil. Boiler 3 exhausts to its own stack, S003. It has oxygen trim equipment, which is required to be properly operated and maintained.

NO_x

Based on permit conditions, Boiler 3 is limited to 0.145 lb/MMBtu and 93.0 tpy on NO_x. Hourly emissions are restricted 19.01 lb/hr when natural gas is burned and 22.65 lb/hr when No. 2 fuel oil is burned. Natural gas usage is restricted to 1,125 million scf/yr and No.2 fuel oil usage to 940 gallons/hr. No.2 fuel oil is only allowed as a backup fuel in emergency conditions.

Stack tests in 2017 during natural gas usage show that Boiler 3 is emitting at 0.10 lb/MMBtu, which is equal to presumptive RACT. LNB with/without FGR and/or SCR would be feasible additional controls which could be considered during the permitting process and ozone RACT review for this plant. However, compliance with the presumptive RACT limit is sufficient for RACT for this boiler. In 2018, actual NO_x emissions were 13.8 tpy.

$PM_{2.5}$, SO_2

Energy Center is not a major source for either $PM_{2.5}$ or SO_2. PM emissions from the boilers are limited to 0.008 lb/MMBtu (during NG use) and 0.015 lb/MMBtu (during fuel oil use), and SO_2 is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during emergency fuel oil use). RACT for these pollutants is the continued use of clean fuels and good work practices. Actual emissions of these pollutants were less than 0.1 tpy in 2018.

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Unilux forced draft, water tube boiler (B004)	10300602	24.0 MMBtu/hr (NG)	4.0	0.8	0.1	LNB, Oxygen Trim	Meets RACT.

Evaluation

Boiler is a Unilux hot water boiler fitted with low-NO_x burners and an oxygen trim system. The boiler has a rated heat input capacity of 24.0 MMBtu/hr.

It burns only natural gas and exhausts to its own stack (S004). Annual tune-ups are performed for this boiler, which is presumptive RACT for NG boilers < 50 lb/MMBtu.

NO_x emissions are limited to 0.038 lb/MMBtu and 4.00 tons/yr. While FGR and SCR add-on controls are technically feasible, neither would be cost-effective for this boiler. RACT is considered to be adherence to existing permit requirement and good practices. Actual emissions in 2018 from this boiler were less than 0.01 tpy for any pollutant.

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Nebraska Boiler (B005)	10300602	46.1 MMBtu/hr (NG)	1.2	0.1	0.0	None	Not evaluated.

Remarks

This boiler is located on Allegheny General Hospital property and only operates during an emergency situation. It is limited to natural gas for 500 hours in any 12 consecutive months. There were no emissions in 2018.

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Three Emergency Generators	20300101 - Fuel Oil 20300201 - NG	350 kW; 250 kW & 250 kW (NG or Fuel Oil)	8.4	0.3	0.4	None	Not evaluated.

Remarks

The total power production from these units is 850 kW, and each emergency generator is limited to 500 hrs/yr of operation. Actual NO_x emissions from these sources were 0.2 tpy in 2018, with less than 0.01 tpy of $PM_{2.5}$ or SO_2.

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cooling Tower, Main, induced draft	38500101	33,000 gal/min	--	3.6	--	None	Not evaluated.

Remarks

The cooling tower is estimated at 0.010% drift loss, which is higher than newer cooling towers (from RBLC code 99.099, a range of drift rates of 0.0001 to 0.0015% for BACT sources). Actual $PM_{2.5}$ emissions from this tower are generally very low (in 2018, $PM_{2.5}$ emissions were less than 0.1 tpy).

Energy Center Pittsburgh Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cooling Towers, No. 6 & No. 7, induced draft	38500101	Combined 7,200 gal/min	0.0	3.1	0.0	Drift Eliminators	Meets RACT.

Evaluation

These cooling towers are limited to drift emissions of 0.005%, which is higher than BACT sources (see above) but sufficient for RACT for these towers. Actual $PM_{2.5}$ emissions from these towers are generally very low (in 2018, $PM_{2.5}$ emissions were less than 0.1 tpy).

FACILITY: GenOn Brunot Island

NAICS 221121	Description: Electric Bulk Power Transmission and Control
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	330.1
$PM_{2.5}$	102.2
SO_2	133.8

GenOn Brunot Island Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Combustion Turbine in Simple Cycle Mode 1A	20100101	22 MW 300 MMBtu/hr (No. 2 Fuel Oil)	175.0	2.4	99.3	None	Meets RACT.

Evaluation

The simple cycle GE Frame 5N combustion turbine 1A fires No. 2 fuel oil, has no emission controls and a capacity of 300 MMBtu/hr (22 MW). Three units were installed in 1972. In May 2014, two of the three simple cycle combustion turbines were retired. (Note: these retirements were not used in the control strategy; projected emissions used in the attainment demonstration were based on ERTAC and are similar to base case.) This 1A turbine, because of its construction date, is not subject to 40 CFR 60, Subpart KKKK (Standards of Performance for Stationary Combustion Turbines) or 40 CFR 60, Subpart GG (Standards of Performance for Stationary Gas Turbines).

NO_x

The 2011 Brunot Island Title V operating permit restricts utilization of the simple cycle turbine to 36% annually. NO_x emissions are limited to 0.370 lb/MMBtu. Brunot Island is part of an emissions averaging plan with the Cheswick generating facility to meet the presumptive RACT requirements for NO_x via a system-wide averaging plan permitted under 25 Pa. Code § 129.98. Feasible NO_x controls for this turbine are LNB and water injection (see the Springdale simple cycle turbines). However, presumptive RACT limits under the averaging plan are suitable for RACT for this turbine. Actual NO_x emissions in 2018 were 0.1 tpy.

$PM_{2.5}$

The turbine is limited 0.005 lb/MMBtu of particulate matter. PM is generally very low for this turbine (actual $PM_{2.5}$ emissions in 2018 were <0.1 tpy), and no controls are warranted.

SO_2

The SO_2 PTE is high for this turbine due to fuel oil emissions factors, but actual emissions are generally very low based on the limited utilization of these turbines (actuals emissions in 2018 were <0.1 tpy). The turbines are limited 0.21 lb/MMBtu each, using No.2 fuel oil with a maximum sulfur content of 0.2%. While lower content of fuel oil could be used for additional control of SO_2, RACT is considered to be the limited utilization of this turbine.

GenOn Brunot Island Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Combustion Turbine and HRSG in Combined Cycle Mode 2A	20100201	63 MW 918 MMBtu/hr (NG)	51.7	30.0	11.5	Water Injection with SCR	Meets RACT.
Combustion Turbine and HRSG in Combined Cycle Mode 2B	20100201	63 MW 918 MMBtu/hr (NG)	51.7	30.0	11.5	Water Injection with SCR	Meets RACT.
Combustion Turbine and HRSG in Combined Cycle Mode 3	20100201	63 MW 918 MMBtu/hr (NG)	51.7	30.0	11.5	Water Injection with SCR	Meets RACT.

Evaluation

Each of the three combined cycle GE Model 700B turbines are fired by natural gas and have a heat rating 918 MMBtu/hr (63 MW). Each turbine is equipped with water injection and SCR, has a 240 MMBtu/hr (12.5 MW) Heat Recovery Steam Generator (HRSG), and exhausts to its own 125-ft tall stack. Exhaust gas stream concentrations of NO_x from each unit are monitored by CEMS. These units were installed in 1973-1974 and were converted from oil to natural gas usage in 2001. These turbines, because of their construction date, are not subject to 40 CFR 60, Subpart KKKK or 40 CFR 60, Subpart GG.

<u>NO_x</u>
Each turbine is limited to 3.5 ppm NO_x at 15% O_2 during any 3-hour time period at or above 60% of full load, with an emission limit of 51.7 tpy. A search of the RBLC database for code 15.210 (Combined Cycle & Cogeneration >25 MW; Natural Gas Fired) shows that similar turbines with water injection and SCR are limited to 6 ppm NO_x at 15% O_2 (Fairview Energy, PA, Valley Energy, NY, and Kleen Energy, CT). Actual NO_x emissions in 2018 were 7.7 tpy total from these turbines. The current controls and limits are considered to be RACT for these turbines.

<u>$PM_{2.5}$</u>
Each turbine is limited to 0.015 lb/MMBtu of particulate matter. (Note: For the PTE emissions above, $PM_{2.5}$ is assumed to be equal to PM_{10}.) Post-combustion controls are impractical due to the high pressure drops associated with these turbines. PM is generally low for these turbines (actual $PM_{2.5}$ emissions in 2018 were 4.1 tpy).

<u>SO_2</u>
SO_2 emissions are limited to 0.00286 lb/MMBtu for these turbines, based on the sulfur content of natural gas supplied. Actual emissions in 2018 were <0.1 tpy, and no controls are warranted.

GenOn Brunot Island Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Multi-Cell Cooling Tower	38500101	84,000 gal/min	0.0	9.8	0.0	Mist Eliminators	Meets RACT.

Evaluation

There is no PTE for $PM_{2.5}$ for the cooling tower, and the above PTE is for PM_{10}. The cooling tower is limited to drift emissions of 0.0005% of circulating water flow, which is considered to be RACT for PM from cooling towers. A search of 99.009 – Industrial Process Cooling Towers show drift rates of 0.0001 to 0.0015% for BACT sources in the in the RBLC database. Actual $PM_{2.5}$ emissions from this tower are generally very low (in 2018, emissions of 0.3 tpy).

GenOn Brunot Island Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Aqueous Ammonia Aboveground Storage Tank (AST)	30187017	20,500 gallons	--	--	--	Vapor Balancing and Bottom Loading	Not evaluated.

Remarks

Breathing loss emissions of NH_3 only.

GenOn Brunot Island Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
No.2 Fuel Oil ASTs (7 total)	40301021	1,637,908 to 765,810 gallons	--	--	--	Conservation Vents	Not evaluated.

Remarks

Working/breathing loss emissions of VOC only.

FACILITY: GenOn Cheswick

NAICS 221112	**Description** Fossil Fuel Electric Power Generation
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	5637.4
$PM_{2.5}$	560.3
SO_2	13923.5

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Main Boiler, Tangentially Fired	10100211	5,500 MMBtu/hr (nominal annual capacity), bituminous and sub-bituminous coal	5621.0	554.0	13911.0	Low NO_x Burners (LNB) w/separated overfire air (OFA); SCR; electrostatic precipitator (ESP) with flue gas conditioning; FGD	Meets RACT.

Evaluation

The Cheswick Main Boiler burns bituminous coal and synfuel and has a nominal annual capacity of 5,500 MMBtu/hr (637 MW) with a 6,000 MMBtu/hr maximum hourly capacity. Controls for the boiler include low-NO_x burner technology with separated overfire air (OFA), SCR, ESP, and FGD. The main boiler discharges to a 552-ft stack, equipped with NO2 and SO_2 CEMS. The boiler was installed in 1970, with SCR equipment installed in 2003 and the FGD system fully installed in 2011. The Main Boiler is subject to 40 CFR Part 63 Subpart UUUUU (National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units), which requires tune-ups every 36 calendar months.

<u>NO_x</u>
The Main Boiler is subject to presumptive RACT limitations for NO_x: 0.12 lb/MMBtu when the inlet temperature to the SCR is equal to or greater than 600 °F and 0.35 lb/MMBtu when the inlet temperature to the SCR is less than 600 °F. (The SCR system is inoperative when SCR inlet temperature is less than 600 °F due to formation of sulfates that can clog the catalyst.) NO_x emissions are limited to 5,621 tpy. Cheswick is also part of a NO_x emissions averaging plan with the Brunot Island facility. Compliance with the Main Boiler's short-term and long-term limits is determined through CEMS data.

A search of the RBLC database for code 11.110 (Utility and Large Industrial Size Boilers/Furnaces >250 MMBtu/hr; Coal) shows that similar boilers with LNB with OFA have limits in the range of 0.05 to 0.08 lb/MMBtu during SCR operation (Karn Weadock, MI, Detroit Edison Monroe, MI, Coleto Creek, TX). Cheswick CEMS results for 2018 show an average of 0.14 lb/MMBtu during combined hours of operation with SCR (82% of operating hours) and without SCR (18% of operating hours). Actual NO_x emissions in 2018 were 1,064 tpy from the Main Boiler. The current presumptive RACT limits and averaging plan are sufficient for NO_x RACT for Cheswick.

PM$_{2.5}$
The Main Boiler includes an electrostatic precipitator (ESP) with flue gas conditioning for the control of particulate matter. (Note: The above limit for PM$_{2.5}$ from the Main Boiler is based on an allowable calculation for PM$_{10}$.) ESP is generally used for large coal-fired electric generation units. A search of the RBLC database for code 11.110 shows that ESP devices, along with fabric filters/baghouses in conjunction with ESP, have been installed at similar boilers (Detroit Edison Monroe, MI, Tenaska Trailblazer, TX, American Municipal Power, OH), with limits in the range of 436 to 801 tpy of PM$_{10}$. Actual PM$_{2.5}$ emissions in 2018 from the Main Boiler were 39.9 tpy of filterable PM$_{2.5}$ and 53.9 tpy of condensable PM$_{2.5}$. The current ESP system is sufficient for RACT from the Main Boiler.

SO_2
The flue gas desulfurization (FGD) system underwent BACT review upon proposal for installation in 2007 (installation was completed for full operation in mid-2011) and has a SO_2 removal efficiency of 98%. The current permitted emissions limit is 3,176 lb/hr on a daily average basis (13,911 on an annual basis), based on modeling performed for the SO_2 2010 NAAQS Data Requirements Rule (DRR). (This limit may be revised in the future but will be similar to the current limit). A search of the RBLC database for code 11.110 shows that similar FGD systems (American Municipal Power, OH, Detroit Edison Monroe, MI, Gibbons Creek, TX) show a range of 3,410 to 6,052 tpy for SO_2 limits. Actual SO_2 emissions in 2018 were 3,381.0 tpy from the Main Boiler. The current FGD system is sufficient for RACT for the Main Boiler.

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	PM$_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Auxiliary Boiler; Stoker Fired	10100501	160 MMBtu/hr, No. 2 fuel oil	10.2	3.0	11.7	None	Meets RACT.

Evaluation

The Auxiliary Boiler (manufactured by Riley Stoker) has a capacity of 160 MMBtu/hr, is uncontrolled, and discharges to stack S002. The Auxiliary Boiler fires No. 2 fuel oil and it is used to provide steam for building heat purposes during periods when the Main Boiler is not operating. The Auxiliary Boiler is subject to 40 CFR Part 63 Subpart DDDDD (NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters), which requires an annual tune-up.

NO_x
In order to meet presumptive RACT, the Auxiliary Boiler is limited in annual heat input to the boiler is limited to less than 140,160 MMBtu per consecutive 12-month period. This is equivalent to an annual capacity factor of 10.00%. Actual NO_x emissions from the Auxiliary Boiler are generally low (<1 tpy in 2018). RACT is considered to be the limited usage of this boiler.

PM$_{2.5}$
Particulate matter from the auxiliary boiler is limited to 0.015 lb/MMBtu. Actual PM$_{2.5}$ emissions are generally very low (<0.1 tpy in 2018). RACT is considered to be the limited usage of this boiler.

SO_2

Fuel oil for the Auxiliary Boiler must meet ASTM specifications, with a maximum sulfur content of 0.05% by weight at all times. Actual SO_2 emissions are generally very low (<0.1 tpy in 2018). RACT is considered to be the limited usage of this boiler.

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
FGD Limestone/Gypsum Material Handling	--	392,214 Tons Limestone/yr; 576,351 Tons Gypsum/yr	--	3.2	--	Fugitive Dust Controls, Minimum Moisture Content, Maximum Silt Content, Silo Baghouses	Meets RACT.

Evaluation

The limestone and gypsum handling system underwent BACT review upon proposal for installation in 2007. A search of the RBLC database (code 99.000 – Mineral Products) shows that controls for the limestone and gypsum handling processes are similar to controls at other facilities and are considered to be RACT.

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cooling Tower (3 cells)	38500101	13,000 gallons per minute	--	0.2	--	Mist Eliminator	Meets RACT.

Evaluation

There is no calculated PTE for $PM_{2.5}$ from the cooling tower, so the PTE for PM_{10} is shown above. The cooling tower is limited to drift emissions of 0.0011% of circulating water flow, which is considered to be RACT for PM from cooling towers. A search of 99.009 – Industrial Process Cooling Towers show drift rates of 0.0001 to 0.0015% for BACT sources in the in the RBLC database. Actual $PM_{2.5}$ emissions from this tower are generally very low (in 2018, emissions of $PM_{2.5}$ were 0.1 tpy).

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Diesel Air Compressors, No. 1 & 2	20200401	465 hp (each)	3.2	0.1	0.3	None	Meets RACT.

Evaluation

These compressors are restricted to 500 hours of operation in any 12-month period (including operation for maintenance checks and readiness testing for no more than 100 hours per year). Sulfur content is limited to no higher than 0.0015% sulfur content by weight (15 ppm). RACT is considered to be operation according to these limits and to specifications for these compressors.

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Aqueous Ammonia ASTs (4 total)	30187017	42,000 gallons each	--	--	--	Vapor Balancing and Bottom Loading	Not evaluated.
Fuel Oil Storage Tank	40301021	150,000 gallons	--	--	--	None	Not evaluated.

Remarks

Working/breathing loss emissions of NH_3 and VOC only.

GenOn Cheswick Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coal Handling and Storage	30510303	Unloading 1800 tons/hr; Conveying 600 tons/hr	--	3.0	--	Fugitive Dust Control Measures	Meets RACT.
Ash Handling, Processing, and Storage	30500999	151,110 tons/yr (Fly Ash); 70,000 tons/yr (Bottom Ash)	--	--	--	Fabric Filters, Wet Suppression	Meets RACT.
Plant Roads	30501090	Approx. 37,313 VMT (Paved); 15,100 VMT (Unpaved)	--	0.3	--	Wet Suppression, Chemical Treatment, Traffic Speed Control	Meets RACT.
Facility Space Heaters (7 total)	10200603	3.25 MMBtu/Hr – combined (kerosene)	--	--	--	None	Not evaluated.

Evaluation

There are no calculated PTEs for these processes, and typical actual emissions of $PM_{2.5}$ (and as used in the modeling demonstration) are shown above. A search of the RBLC database (codes 99.000 – Mineral Products and 99.100 – Fugitive Dust Sources) shows that controls for these sources are similar to controls at other facilities and are considered to be RACT.

FACILITY: Pittsburgh Allegheny County Thermal (PACT)

NAICS 221330	**Description** Steam and Air-Conditioning Supply
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	506.0
$PM_{2.5}$	22.2
SO_2	44.0

PACT Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
M21 Keystone O-type Package Boiler (B001)	10300601 – NG 10300501 – Fuel Oil	150 MMBtu/hr (NG or Fuel Oil)	126.5	5.8	21.6	Oxygen Trim	Meets RACT.
M21 Keystone O-type Package Boiler (B004)	10300601 – NG 10300501 – Fuel Oil	150 MMBtu/hr (NG or Fuel Oil)	126.5	5.8	21.6	Oxygen Trim	Meets RACT.

Evaluation

Boilers 1 & 4 are water-tube O-type package boilers manufactured by Indeck Keystone Energy, each with a capacity of 150 MMBtu/hr. Each boiler has a single burner with dual fuel capabilities, firing either natural gas or No. 2 fuel oil. The boilers exhaust to a common stack S001. Each boiler uses a Foxboro Oxygen Trim system that automatically controls fuel and air feed rates to minimize excess oxygen which reduces thermal NO_x formation. No. 2 fuel oil combustion in each boiler is limited to 1,080 gallons each in any one-hour period and 540,035 gallons in any consecutive twelve-month period.

<u>NO_x</u>

The boilers are limited to a rate of 0.22 lb/MMBtu for NO_x, which is higher than PA presumptive RACT for either natural gas or fuel oil use. Stack tests from 2017 show that each boiler is emitting at an average NO_x rate of 0.19 lb/MMBtu while combusting natural gas. LNB with/without FGR would be feasible controls for these boilers, and controls or lower limits will be considered during the permitting process and ozone RACT review for this plant. These boilers generally operate well below maximum capacity with natural gas and rarely use fuel oil. In 2018, actual NO_x emissions from Boilers 1 and 4 were 23.7 tpy (total). For the purposes of the SIP, RACT is considered to be compliance with the current limits.

<u>$PM_{2.5}$</u>

Each boiler is limited to 0.008 lb/MMBtu during natural gas use or 0.015 lb/MMBtu during fuel oil use. Actual $PM_{2.5}$ emissions in 2018 were less than 0.1

tpy (total) from both boilers. No controls are required.

SO_2
Each boiler is limited to the sulfur content in natural gas (during NG use) and 0.05% sulfur by weight percent in fuel oil (during fuel oil use). Actual SO_2 emissions are generally very low for these boilers (<0.1 tpy total in 2018), and RACT is considered to be the limited usage of fuel oil for this boiler.

PACT Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
M21 Keystone O-type Package Boiler (B002)	10300601	150 MMBtu/hr (NG)	126.5	5.3	0.4	None	Meets RACT.
M21 Keystone O-type Package Boiler (B003)	10300601	150 MMBtu/hr (NG)	126.5	5.3	0.4	None	Meets RACT.

Evaluation

Boilers 2 & 3 are water-tube O-type package boilers manufactured by Indeck Keystone Energy, each with a capacity of 150 MMBtu/hr. Each boiler has a single burner and fires only natural gas. The boilers exhaust to a common stack S001 (shared with Boilers 1 & 4). Each boiler uses a Foxboro Oxygen Trim system that automatically controls fuel and air feed rates to minimize excess oxygen which reduces thermal NO_x formation. These boilers are identical to Boilers 1 and 4, except that they are limited to natural gas use only.

NO_x
The boilers are limited to a rate of 0.22 lb/MMBtu for NO_x, which is higher than PA presumptive RACT for either natural gas or fuel oil use. Stack tests from 2017 show that Boilers 2 and 3 have average NO_x rates of 0.18 lb/MMBtu and 0.22 lb/MMBtu, respectively, while combusting natural gas. Similar to Boilers 1 and 4, LNB with/without FGR would be feasible controls, which will be considered during the permitting process and ozone RACT review for this plant. These boilers generally operate well below maximum capacity. In 2018, actual NO_x emissions from Boilers 2 and 3 were 45.3 tpy (total). For the purposes of the SIP, RACT is considered to be compliance with the current limits.

$PM_{2.5}$
Each boiler is limited to 0.008 lb/MMBtu during natural gas use. Actual $PM_{2.5}$ emissions in 2018 were less than 0.1 tpy (total) from both boilers. No controls are required.

SO_2
Each boiler is limited to the sulfur content in natural gas. Actual SO_2 emissions are very low from these boilers (<0.1 tpy total in 2018), and no controls are required.

PACT Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Two Aboveground Storage Tanks, No. 2 Fuel Oil	40400414	25,000 gallons each (No. 2 Fuel	--	--	--	None	Not evaluated.

		Oil)					
Remarks Working/breathing loss emissions of VOC only.							

FACILITY: Universal Stainless

NAICS 331110	**Description** Iron and Steel Mills and Ferroalloy Manufacturing
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	197.5
$PM_{2.5}$	16.6
SO_2	16.9

Universal Stainless Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Electric Arc Furnace (EAF); Argon Oxygen Decarburization (AOD) Vessel	30400701; 30300928	175,200 tpy, molten steel, steel scrap	27.8	2.8	11.0	Baghouse	Meets RACT.

Evaluation

An electric arc furnace (EAF) produces alloy steel through the melting and refining of stainless steel scrap, limestone, flux, chrome, and other alloys. The molten steel from the EAF is transferred by ladle to the Argon Oxygen Decarburization (AOD) vessel, where argon and oxygen are blown through the molten steel bath. Emissions from the EAF, AOD vessel, and other units located in the Melt Shop are captured and controlled by the Melt Shop Baghouse. Electricity is the sole heat/energy source of the EAF and AOD.

<u>NO_x</u>

NO_x emissions from the EAF and AOD are exclusively the result of thermal NO_x formation, generated when nitrogen reacts with oxygen in a high temperature environment. While residence time and oxygen concentration affect the formation of thermal NO_x, it is primarily dependent on temperature. Techniques for controlling or minimizing the formation of NO_x through the thermal NO_x mechanism include: reducing the local oxygen concentration at the peak flame temperature, reducing the residence time of peak flame temperature, maintaining peak flame temperatures below 2372 °F, and decreasing the furnace release rate. There are no other identified NO_x controls for such EAF/AOD units. Actual NO_x emissions in 2018 from the EAF/AOD were 13.3 tpy.

<u>$PM_{2.5}$</u>

The baghouse is limited to 0.0052 gr/dscf of particulate matter emissions. A search of the RBLC (codes 81.200 – Steel Production) shows that other EAFs (Nucro Steel, AL, ERMS Pueblo, CO) have similar limits for PM, and the current controls are considered to be PM RACT for Universal Stainless. Actual $PM_{2.5}$ emissions in 2018 from the EAF/AOD were 5.5 tpy.

<u>SO_2</u>

There are no identified SO_2 controls for such EAF/AOD units, and RACT is considered to be good process operation and scrap management. Actual SO_2 emissions in 2018 from the EAF/AOD were 6.5 tpy.

Universal Stainless Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Electro-Slag Holding Furnace; Remelt Furnaces (4 total)	30300921	4 MMBtu/hr, NG; 7 tons/hr, total	1.7	1.8	0.0	Baghouse (except for Holding Furnace)	Meets RACT.

Evaluation

The Holding Furnace is completely contained within the Electro-Slag Remelt Shop Building, and the remelt furnaces exhaust to the Remelt Shop Baghouse. Emissions from these sources are small, and the current baghouse is considered to be RACT. Actual emissions in 2018 from these processes were 1.6 tpy for NO_x and <0.1 for $PM_{2.5}$ and SO_2.

Universal Stainless Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Annealing Furnaces (24 total); Plate Warming Furnace	30390003; 10200603	187.7 MMBtu/hr total, NG	68.9	6.2	0.5	Low-NO_x Burners (except plate warming)	Meets RACT.
Reheat Furnaces (19 total)	30390003	177.8 MMBtu/hr total, NG	61.5	1.5	0.5	Low-NO_x Burners	Meets RACT.
Teeming Ladle Heaters (2 total); Transfer Ladle Heater	30490003	8.9 MMBtu/hr, each, NG	8.0	0.2	0.1	Low-NO_x Burners.	Meets RACT.
AOD Reline Heater	30300921	8.9 MMBtu/hr, NG	2.7	0.1	0.0	Low-NO_x Burners.	Meets RACT.

Evaluation

The furnaces and heaters are all contained within plant buildings.

NO_x

All units except for the plate-warming furnace are controlled by low-NO_x burners (LNB), with limits of less than 0.10 lb/MMBtu. The current controls are considered to be RACT. The total NO_x emissions from these units in 2018 were 29.3 tpy.

$PM_{2.5}$, SO_2

$PM_{2.5}$ and SO_2 emissions from these sources are generally very low, and no evaluation was performed. Actual emissions in 2018 from these processes were 0.1 tpy for $PM_{2.5}$ and 0.3 tpy for SO_2.

Universal Stainless Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Miscellaneous Space Heaters (112)	10500106	13.53MMBtu/hr total, NG	5.8	0.5	0.0	None	Meets RACT.

Evaluation

The space heaters are small sources of emissions and are located within plant buildings. No evaluation was performed. Actual $PM_{2.5}$ emissions in 2018 from the space heaters were 0.5 tpy for NO_x, <0.1 tpy for $PM_{2.5}$, and <0.1 tpy for SO_2.

Universal Stainless Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Gantry Grinders	30400340	8 tons/hr, alloy steel billets and ingots	--	0.1	--	Integral Dust Collector	Meets RACT.
Midwest Grinders	30400340	10 tons/hr, alloy steel billets and ingots	--	0.1	--	Baghouse	Meets RACT.
Western Gear Billet Grinder	30400340	6.8 tons/hr, alloy steel billets	--	0.1	--	Baghouse	Meets RACT.
Plant Roads	30300833	1.0 mi. paved roads; 0.8 mi. unpaved roads; 70,000 ft^2 parking lots	--	1.7	--	Wet Suppression, Chemical Treatment, Paved Road Sweeping	Meets RACT.
Cooling Towers (5)	38500101	5,800 gal/min	--	1.9	--	Mist Eliminators	Meets RACT.
Melt Shop Slag Processing, Storage and Handling	30300999	27,500 tpy	--	0.2	--	Wet Suppression	Meets RACT.

Evaluation

These are small sources of PM, and the existing controls are considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from these processes were 2.4 tpy.

<u>FACILITY</u>: University of Pittsburgh – Main Campus

NAICS 611310	**Description** Colleges, Universities, and Professional Schools
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	118.7
$PM_{2.5}$	11.8
SO_2	5.0

Pitt Main Campus Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Surface Coating and Printing (CP1, SP1, SP2, PP1, PLS1)	40500101, 40200601	10,184 gal/yr, Paints, Solvents, Inks, Adhesives	--	--	--	Fabric Filter (SP1), None (CP1, SP1, PP1, PLS1)	Not evaluated.

Remarks

Emissions of VOC only.

Pitt Main Campus Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
117 Natural Gas-Fired Boilers, Space Heaters, and Water Heaters (B1-B22B, B26-B28G, B30A-B47, B49A-56B, H1A-H3E, and HW1-HW31)	10300602, 10300603	0.167 – 3.5 MMBtu/hr, (54.42 MMBtu/hr total), NG	33.5	1.8	0.2	None	Meets RACT.

Evaluation

ACHD has determined that it is not necessary to conduct a detailed RACT evaluation for the University of Pittsburgh – Main Campus ("Pitt") small boilers, space heaters, and water heaters. The total PTE from these sources across the Pitt campus is 33.5 tpy NO_x collectively, but they are small units individually. Total boiler fuel usage is limited to 462 MMCF/yr, and total heater fuel usage is limited to 159 MMCF/yr.

While control technologies are listed for such sources in the MCM (including LNB, SCR, oxygen trim, and water injection), the installation of controls of every unit would not be cost-effective, and the reduction of actual emissions would be very low. These sources emitted a total of 4.8 tpy of actual NO_x in

2018, along with negligible amounts of $PM_{2.5}$ and SO_2 (< 0.1 tpy). RACT for these units is the existing permit limits along with proper maintenance and operation of the equipment pursuant to manufactures specifications.

Pitt Main Campus Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Three Natural Gas-Fired Boilers (B23A, B23B, and B23C)	10300602, 10300603	8.67 - 10.7 MMBtu/hr, (28.04 MMBtu/hr total), NG	13.9	1.0	0.1	None	Meets RACT.

Evaluation

Similar to above, the medium boilers are relatively small sources with limited fuel usage (241 MMCF/yr). Actual emissions in 2018 from these sources were less than 0.6 tpy of NO_x along with negligible amounts of $PM_{2.5}$ and SO_2 (< 0.01 tpy). RACT for these units is the existing permit limits along with proper maintenance and operation of equipment.

Pitt Main Campus Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
67 Diesel-Fired Generators (DG1-DG13, DG16-DG37, DG40-DG54, DG56-DG74)	20300101	7 kW – 1750 kW (85.9 MMBtu/hr total), diesel	52.0	1.3	2.3	None	Meets RACT.

Evaluation

Although some of the diesel emergency generators are relatively large, they are all considered emergency generators and are limited to 400 hours/yr or less (58 generators are limited to 100 hours/yr). They are also used only when electrical power is not available or for a maximum of 3 hours/month for routine maintenance. The generator with the largest PTE is located at the Chevron Annex (DG63) with a potential of 3.3 tpy of NO_x. It is unlikely that additional controls would be technically and economically feasible for these units, and actual emissions in 2018 from these sources were 1.4 tpy of NO_x along with small amounts of $PM_{2.5}$ (0.1 tpy) and SO_2 (0.2 tpy). RACT for these units is the existing permit limits along with proper maintenance and operation of equipment. Note: Diesel storage tanks are also associated with this process, with emissions of VOC only.

Pitt Main Campus Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Four Natural Gas-Fired Generators (4 Cycle) (NG-6, NG-17, NG-18, NG19)	20200254	85 kW – 175 kW, NG	0.2	0.0	0.0	None	Not evaluated.

Remarks

Similar to the diesel generators, these natural gas generators are limited to 400 hours/year or less (three are limited to 100 hours/yr), and they are used only when electrical power is not available or for a maximum of 3 hours/month for routine maintenance. Actual emissions in 2018 from these sources were very small, less than 0.01 tpy for NO_x, $PM_{2.5}$, or SO_2.

Pitt Main Campus Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Six Natural Gas-Fired Package Boilers for Steam Production (Carillo St. Steam Plant: B48-1, B48-2, B48-3, B48-4, B48-5, and B48-6)	10300602	140 MMBtu/hr each, NG 135 MMBtu/hr each, No.2 fuel oil	19.1	7.7	2.4	Ultra-Low NO_x Burners with Flue Gas Recirculation, Very Low Sulfur No. 2 Fuel Oil	Meets RACT.

Evaluation

The Carillo Street boilers were permitted in 2009 and are equipped with ultra-low NO_x burner (ULNB) and flue gas recirculation (FGR) as BACT controls. During natural gas combustion, the boilers are limited to 12 ppm at 3% oxygen (and 9 ppm at 3% oxygen as an average over any 1-hour period) and 0.0115 lb/MMBtu at any time. When No. 2 fuel oil is burned, the boilers are limited to 55 ppm at 3% oxygen and 0.070 lb/MMBtu at any time. The total quantity of fuel is also restricted to 2,900 million cubic feet (MMCF) of natural gas per year and 417,000 gallons per year of No. 2 fuel oil. The boilers are subject to 40 CFR Part 63 Subpart JJJJJJ, which requires tune-ups biennially.

SCR would be a technically feasible additional control for these boilers, but would not be cost-effective with a total annualized cost of $969,830/yr (cost effectiveness of $56,600/ton of NO_x. The limits for the boilers are similar to other processes with similar technology (RBLC codes 12.200 and 12.300). No additional controls are warranted for RACT for this source. Actual emissions in 2018 from these boilers were 5.3 tpy of NO_x along with small amounts of $PM_{2.5}$ (0.1 tpy) and SO_2 (0.3 tpy). RACT for these units is the existing permit limits along with proper maintenance and operation of equipment.

FACILITY: U. S. Steel (USS) Clairton

NAICS 331110	**Description** Iron and Steel Mills and Ferroalloy Manufacturing
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	11768.9
$PM_{2.5}$	1370.5
SO_2	1988.5

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coke Batteries No. 1-3 Pushing	30300303	1,553,805 tons of coal charged per year	4.3	8.7	31.1	Pushing Emission Control (PEC) Baghouse (Serves Batteries 1-3)	Meets RACT.
Coke Batteries No. 13-15 Pushing	30300303	1,637,025 tons of coal charged per year	4.6	25.4	32.7	PEC Baghouse (Serves Batteries 13-15)	Meets RACT.
Coke Batteries No. 19-20 Pushing	30300303	2,004,580 tons of coal charged per year	8.4	7.2	34.1	PEC Baghouse (Serves Batteries 19-20)	Meets RACT.
Coke B Battery Pushing	30300303	1,491,025 tons of coal charged per year	13.5	23.1	32.9	PEC Baghouse (Serves B Battery)	Meets RACT.

Evaluation

Pushing emissions are captured by the Pushing Emission Control (PEC) system for each battery line, with hoods that capture fugitives and exhaust to baghouses with multiple compartments. There are no alternative controls for pushing emissions from similar by-product coke oven plants listed in the RBLC database (codes 81.100 – Coke Processes and 81.190 – Other Coke Processes).

The PEC systems have PM capture efficiencies of 90% for Batteries 1-3, 13-15, and 19-20, with B Battery having a capture efficiency of 95% due to a shed that is exclusive to that battery. The baghouses have the following PM control efficiencies by battery line:

- Batteries 1-3 – 99.2%
- Batteries 13-15 – 99.8%
- Batteries 19-20 – 99.3%
- B Battery – 99.2%

The capture and control efficiencies are considered to be PM RACT for the pushing processes for these batteries. Actual emissions of $PM_{2.5}$ in 2018 from the baghouses ranged from 1.0 tpy (Batteries 1-3) to 1.8 tpy (B Battery).

NO_x and SO_2 emissions associated with the gaseous emissions in the PEC streams are determined by the design of the batteries (see more explanation regarding the underfiring processes) and are not easily controlled. Dry sorbent injection (DSI) could be a technically feasible option for SO_2 control but with a high cost effectiveness (estimated at $56k-85k per ton per baghouse) and low removal efficiency (40%).

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coke C Battery Pushing	30300303	1,005,528 tons of coal charged per year	15.9	6.1	37.9	PEC Baghouse w/Stack	Meets RACT.

Evaluation

C Battery has a PROven (Pressure Regulated Oven) system with staged combustion, developed by Uhde Corporation. Operation of C Battery began in 2012. The C Battery PEC system is similar to the PEC systems for the other batteries (above), except that all baghouse compartments exhaust to a single stack.

The C Battery PEC system was determined to meet BACT requirements at the time of the installation. The PEC system has a PM capture efficiency of 90%, and the baghouse has a PM control efficiency of 99.0%. The capture and control efficiencies, along with a single stack for baghouse exhaust, are considered to be PM RACT for the pushing process from C Battery. Actual emissions of $PM_{2.5}$ in 2018 from the C Battery baghouse were 0.5 tpy.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coke Battery Fugitives, No. 1-3 (charging, leaks, soaking, hot car, uncaptured pushing)	30300302	517,935 tons of coal charged per year, each	9.4	48.9	84.2	Visible Emissions (VE) Restrictions, Work Practice Standards	Meets RACT.
Coke Battery Fugitives, No. 13-15 (charging, leaks, soaking, hot car, uncaptured pushing)	30300302	545,675 tons of coal charged per year, each	11.9	51.1	61.6	VE Restrictions, Work Practice Standards	Meets RACT.
Coke Battery Fugitives, No. 19-20 (charging, leaks, soaking, hot car, uncaptured pushing)	30300302	1,002,290 tons of coal charged per year, each	13.4	63.3	79.6	VE Restrictions, Work Practice Standards	Meets RACT.
Coke B Battery Fugitives (charging, leaks, soaking, hot car, uncaptured pushing)	30300302	1,491,025 tons of coal charged per year	0.2	21.9	8.8	Battery Shed, VE Restrictions, Work Practice Standards	Meets RACT.

Evaluation These processes are associated with leaks, uncaptured emissions, and other fugitives from the battery operations. Most of these emissions are uncontrolled but can be minimized by repairs, proper operation of equipment, and other work practices. There are no calculated PTE emissions of NO_x or $PM_{2.5}$ from these processes, and actual emissions (as used in the modeling demonstration) are shown above. PTE emissions of SO_2 shown above are based on the modeled maximum rates used in the SO_2 SIP. Aside from the B Battery shed and the PROven system (see below), there are no feasible controls for these processes. Installation of sheds or the PROven system at the other batteries would to be cost-prohibitive, as these controls were part of the design of the batteries and are not suitable as retrofit technologies.

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Coke C Battery Fugitives (charging, leaks, soaking, hot car, uncaptured pushing)	30300302	1,005,528 tons of coal charged per year	7.7	50.0	35.4	PROven system, VE Restrictions, Work Practice Standards	Meets RACT.

Evaluation Fugitive emissions from C Battery are similar in nature to fugitives associated with the other batteries, but emissions are minimized by the PROven system in addition to VE restrictions and work practice standards. PROven is an electronic control system that individually controls the pressure in each individual oven depending on the stage of coking that each oven is experiencing. The collector main is also maintained at a negative pressure to draw the off gases released and reduce fugitive emissions. The PROven system is considered to be RACT for C Battery.

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Coke Battery Combustion (Underfiring), No. 1-3	30300306	517,935 tons of coal charged per year, each	1672.0	190.2	132.0	Coke Oven Gas (COG) Grain Limits (H_2S)	Meets RACT.
Coke Battery Combustion (Underfiring), No. 13-15	30300306	545,675 tons of coal charged per year, each	1123.2	109.5	204.2	COG Grain Limits (H_2S)	Meets RACT.
Coke Battery Combustion (Underfiring), No. 19-20	30300306	1,002,290 tons of coal charged per year, each	2754.4	168.1	246.9	COG Grain Limits (H_2S)	Meets RACT.
Coke B Battery Combustion (Underfiring)	30300306	1,491,025 tons of coal charged per year	851.1	54.3	93.6	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

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 (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.

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 off-take 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 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 1-3)
- Gun-flue, with multiple combustion air ports per burner (Carl Still, Batteries 13-15 and B)
- Underjet (Koppers-Becker, Batteries 19-20)

NO_x

There are primarily two mechanisms in which NO_x emissions are formed: thermal NO_x and fuel NO_x. Thermal NO_x is generated when nitrogen reacts with oxygen (in the combustion air) in a high temperature environment. Fuel NO_x is generated from oxidation of nitrogen compounds in the fuel. In a coke oven battery, the far majority of NO_x 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.

The underfiring processes for these batteries, by virtue of design, is unsuitable for retrofit or add-on NO_x controls 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.

- 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 NO_x 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.

- 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.

- 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, 100 and 300 degrees cooler than what would be needed to ensure effective operation of an SCR. Because of the large exhaust airflow, preheating the exhaust would require additional fuel combustion that would significantly offset the emissions reductions achieved by the SCR. In addition, the retroactive installation of a post-combustion NO_x 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 and poor coke quality and can potentially compromise the integrity of the battery and the Clairton's ability to operate it safely.

- There are no known applications, demonstrated or commercially operational, of SNCR to a coke oven battery underfiring/combustion system. 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 NO_x 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 range, and provide sufficient residence time for the NO_x 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.

A review of the RBLC database (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 NO_x control nor been equipped with any add-on NO_x control.

Fuel switching to natural gas for underfiring is also not a feasible option. 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, NO_x 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 NO_x emissions from a coke battery).

NO_x RACT is determined to be the proper operation of the coke batteries at the permitted limits and according to good engineering and air pollution control practices. Actual NO_x emissions in 2018 from the combustion stacks ranged from 87.6 tpy (Battery 19) to 389.0 tpy (B Battery).

$PM_{2.5}$

$PM_{2.5}$ concentrations in the underfiring exhaust are limited to 0.030 gr/dscf for Batteries 1-3 and 19 and to 0.015 gr/dscf for Batteries 13-15, 20, and B. A review of the RBLC database (codes 81.112 and 81.190) show that no other coke batteries in the U.S. employ ESP, wet scrubbers, or baghouses for the control of PM from underfiring. Installation of such control devices would be cost-prohibitive and technically complex at Clairton due to the number of stacks, the limited space near the stacks, and the layout of the underfire streams (which are primarily underground). An ESP system was actually previously used for a now retired battery (Battery 21) at Clairton, and it showed poor performance for PM control. Actual emissions of $PM_{2.5}$ in 2018 from the combustions stacks ranged from 5.1 (Battery 14) to 17.6 tpy (Battery 13). RACT for $PM_{2.5}$ is considered to be the current permitted limits.

SO_2

SO_2 is limited to specific concentrations for each stack based on the based on SO_2 SIP for the 2010 NAAQS. The control of SO_2 is based on the H_2S content in the COG, which is a plant-wide limit of 35 gr/dscf for the U. S. Steel facilities. The SO_2 SIP limits are effectively lower than the plant-wide limit, varying by each combustion stack.

A review of the RBLC database shows that there are no known SO_2 controls installed at coke plants in the U.S. Wet scrubbers or dry sorbent injection (DSI) controls could be technically feasible (although difficult due to limited space available) but not economically feasible. Scrubbers could have a removal efficiency of up to 71% but with $10-11 million in capital costs and $40-50k/ton cost effectiveness per battery stack. DSI would lead to less removal efficiency (about 40%), with $9-10 million in capital costs and $30-40k/ton cost effectiveness per battery stack.

SO_2 RACT for the underfiring processes is considered to be the limit of H_2S in the COG. Actual SO_2 emissions in 2018 from the combustion stacks ranged from 23.7 tpy (Battery 15) to 126.0 tpy (C Battery).

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Coke C Battery Combustion (Underfiring)	30300306	1,005,528 tons of coal charged per year	461.2	16.6	140.3	PROven system, COG Grain Limits (H_2S)	Meets RACT.

Evaluation

The evaluation for C Battery underfiring is similar to above, except that the PROven system is designed with staged combustion as a NO_x control. C Battery was determined to be BACT upon installation, with no better controls available.

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Quench Tower No. 1 (Serves Batteries 1-3)	30300304	1,553,805 tons of coal per year	0.7	23.6	3.3	Baffles, Washing & Maintenance	Meets RACT.
Quench Tower B (Serves Battery B)	30300304	1,491,025 tons of coal per year	0.9	22.6	17.9	Baffles, Washing & Maintenance	Meets RACT.

Evaluation

These quench towers, built at the time of the installation of each battery line/group, are controlled by a single set of baffles along with limits to the total dissolved solids (TDS) level of the quench water and requirements for baffle cleaning and inspections under 40 CFR 63, Subpart CCCCC (National Emission Standards for Coke Ovens: Pushing, Quenching, and Battery Stacks), as incorporated into the Clairton Title V operating permit.

No alternative controls for existing quench towers have been identified on the RBLC database (codes 81.100 and 81.190). Similar coke batteries, either by-product or non-recovery, utilize similar baffle and washing systems (Gateway Energy, IL, Middletown Coke, OH). An examination of international technologies shows that low emission quenching is available for new towers, as well as dry quenching (see more below). Adherence to the baffle washing and maintenance requirements for these existing towers is considered to be RACT.

The baffles are primarily for the control of PM, and there are no known controls of NO_x or SO_2 for quenching processes. (Note: NO_x actuals are shown above, as there are no calculated PTEs for NO_x from the quench towers.)

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Quench Tower No. 5A (Serves Batteries 13-15)	30300304	1,637,025 tons of coal per year	0.9	24.9	33.1	Baffles (LEQT), Washing & Maintenance	Meets RACT.
Quench Tower No. 7A (Serves Batteries 19-20)	30300304	2,004,580 tons of coal per year	1.0	30.5	31.6	Baffles (LEQT), Washing & Maintenance	Meets RACT.
Quench Tower C (Serves Battery C)	30300304	1,005,528 tons of coal per year	1.6	15.3	21.9	Baffles (LEQT), Washing & Maintenance	Meets RACT.

Evaluation

These Low Emission Quench Towers (LEQTs) are tall towers (50 m) designed with a Kiro-Nathaus baffle system, which include two sets of louver-like baffles arranged in a chevron pattern, to control particulate matter by mechanical deflection and electrostatic adsorption. The system was designed to mimic the control levels of dry quenching applications in Europe and Asia while avoiding the issues associated with dry quenching. Tower C was the first of its kind to be installed in the U.S. and began operation in 2012. In 2013, two new quench towers of the same design (5A and 7A) began operation as replacements to older towers 5 and 7.

Upon installation of these sources, double baffles were found to be BACT versus alternative shorter quench towers with single baffles. Dry quenching is a possible alternative but not advantageous at Clairton for several reasons:

- Dry quenching applications have shown increases in SO_2 and other gases compared to wet quenching
- Cycle times for dry quenching (about 12 minutes) are considerably higher than wet quenching (about 6 minutes) and increases the risk of incomplete carbonized coke and gas explosions
- Cost associated with dry quenching are approximately 10-15 times higher than with wet quenching
- Dry quenching requires a large area of space that is not available at Clairton

The LEQTs are therefore considered the most appropriate control for quenching emissions for the Clairton plant. (Note: NO_x actuals are shown above, as there are no calculated PTEs for NO_x from the quench towers.)

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boiler No. 1 (Babcock & Wilcox)	10200707	760 MMBtu/hr (COG and/or NG)	1740.0	66.6	196.1	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

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 1 has a heat input capacity of 760 MMBtu/hr 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. Boiler 1 has a CEMS for continuous monitoring of NO_x concentrations.

<u>NO_x</u>

Boiler 1 has been tuned and modified for optimal efficiency and uses fuel staging and low excess air to reduce the NO_x 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. The Clairton boilers are limited to 0.54 lb/MMBtu for NO_x at any time, and CEMS results have shown rates <50% of the limit for Boiler 1.

Several control options for Boiler 1were evaluated and found to be infeasible, as described below:

- Water/steam injection can lead to significant operational drawbacks, including reduced thermal efficiency, reduced steam production, and increased equipment corrosion.
- Boiler 1 has been tuned for low excess air to reduce NO_x emissions. Further suppression/reduction of air by any means could lead to incomplete combustion and increased emissions of other pollutants.
- Low-NO_x reductions would not achieve rates lower than already being achieved with stack test results. Furthermore, LNB and OFA are not available for cyclone-fired boilers.
- SCR or SNCR are not feasible options due to the temperature range of the Boiler 1 exhaust as well as the high costs for these systems.

NO_x RACT was determined to be compliance with permitted limits and proper operation of the boiler according to good engineering and air pollution control practices.

<u>$PM_{2.5}$</u>

$PM_{2.5}$ is limited 0.02 lb/MMBtu from the boiler exhaust, which is considered to be RACT for COG combustion. Control devices such as ESP or baghouses are not in use at other coke facility boilers, and they would be impractical due to the nature of the boiler exhaust. With conditioned downriver COG from the by-product plant as the primary fuel (supplemented by NG as necessary), the exhaust gas is relatively low in PM compared to other processes such as coal-fired boilers. The majority of PM emissions are formed as condensables, for which typical PM control devices are less effective. Actual $PM_{2.5}$ emissions from Boiler 1 in 2018 were 14.8 tpy.

<u>SO_2</u>

The Clairton boilers are limited to an aggregate limit of 518.8 tpy as implemented by the SO_2 2010 NAAQS SIP. (Note: The above PTE for SO_2 for Boiler 1 and for the other boilers below has been apportioned to each boiler according to maximum capacities.) As part of the controls in the SIP, a new vacuum carbonate unit (VCU) packing system was developed for additional desulfurization of the downriver COG stream used for the Clairton boilers and the other U. S. Steel Mon Valley Works plants (Edgar Thomson and Irvin). The new VCU system has lowered H_2S concentrations from average of 11.0 gr/dscf to 3.0 gr/dscf in the downriver COG, based on 2014-2017 monitored H_2S data. Add-on controls such as scrubbers or DSI would be technically feasible, with estimated 40-56% control efficiencies, but with high cost effectiveness values (for Boiler 1: $18k/ton for a scrubber and $32k/ton for DSI). RACT for the Clairton boilers is considered to be the aggregate SO_2 limit and the use of the VCU-conditioned downriver COG. Actual SO_2 emissions from Boiler 1 in 2018 were 179.3 tpy.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boiler No. 2 (Combusting Engineering)	10200707	481 MMBtu/hr (COG and/or NG)	1285.0	42.1	124.1	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Boiler 2 is similar to Boiler 1, except that it is a four-wall fired unit instead of a cyclone-type. It is also swing-loaded instead of base-loaded, continuously operated at varying load throughout the year to satisfy the plant's primary steam demands.

The evaluation for Boiler 2 is similar to that for Boiler 1. No control options were found to be practical or cost-effective. Actual emissions from Boiler 2 were 303.7 tpy for NO_x, 16.5 tpy for $PM_{2.5}$, and 202.7 for SO_2.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Boilers R1 and R2 (Riley Stoker)	10200707	229 MMBtu/hr (COG and/or NG), each	1050.0	40.1	118.2	COG Grain Limits (H_2S)	Meets RACT.
Boilers T1 and T2 (Erie City Zurn)	10200707	156 MMBtu/hr (COG and/or NG)	716.0	27.3	80.4	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

These four boilers are package wall-fired-type units that operate when either Boiler 1 or 2 are down, in order to provide the required steam demands for the plant. Annual outages for these boilers are planned during periods of lower steam demand (e.g. summer).

The evaluation for these boilers is similar to that for Boilers 1 and 2, except that these boilers are limited-usage units. Actual emissions for these boilers in 2018 totaled 75.1 tpy for NO_x, 6.5 tpy for $PM_{2.5}$, and 54.6 tpy for SO_2.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Desulfurization Plant (SCOT stack)	30399999	6,394,800 tons of coke per year (COG	2.6	7.9	105.1	Afterburner	Meets RACT.

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Evaluation

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 where hydrogen sulfide (H_2S) and other sulfur compounds are removed. SO_2 emissions are generated from the oxidation of H_2S present in COG when it is combusted.

Desulfurization processes vary considerably from coke production plant to coke plant. At Clairton, the Desulfurization Plant 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 H_2S 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 H_2S stream, and an acid offgas stream. The H_2S 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, which is a generative-type unit that uses oxygen-firing and FGR afterburners for NO_x control.

The Desulfurization Plant itself is a control for SO_2 from the facility, and the SO_2 PTE is a limit from the SO_2 2010 NAAQS SIP. There are no identified add-on controls that would reduce emissions from this process, and RACT for this process is optimized operation according to good work practices. Actual emissions of SO_2 in 2018 from the SCOT stack were 55.1 tpy.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Keystone Cooling Tower	30399999	75,000 gal/min of water circulation	--	101.1	--	Mist Eliminators	Meets RACT.

Evaluation

The Keystone Cooling Tower is a 5-cell, induced draft, non-contact cooling tower that is used to cool process water for the Clairton By-Product Plant. It is equipped with mist eliminators for the control of emissions.

The Keystone Cooling Tower is a very difficult source to evaluate. The emissions given above are for actual $PM_{2.5}$ emissions, as derived from 2011 stack test results, and as used in the attainment demonstration. However, the calculated potential emissions from this source are less than 1.0 tpy, based on AP-42 emission factors and 98% control efficiency.

Emission rates for cooling towers from the RBLC database were examined for the following codes:

81.190 – Other Coke Processes
81.390 – Other Steel Manufacturing
99.009 – Industrial Process Cooling Towers

Cooling towers >20,000 gal/min of water circulation with drift/mist eliminators show emission rates in the range of <1.0 to 20.5 tpy (example: Lake Charles Chemical Complex, LA). Clairton stack test results may be an overestimation of emissions. Otherwise, it is possible that total dissolved solids (TDS) in river water make-up are higher than expected or adjacent process fugitives are being drawn into the cooling tower. More testing is needed for a better assessment of emissions and controls for this source, including drift emissions testing. For the purposes of this SIP, mist eliminators are considered to be RACT for the Keystone Cooling Tower.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Wastewater Surge Tanks / Anhydrous Ammonia Loading Station	39999993	12.5 MMBtu/hour, propane (assist gas)	19.0	0.0	1.5	Ammonia Flare	Meets RACT.

Evaluation

An enclosed flare is used to control emissions from wastewater treatment surge tanks and anhydrous ammonia loading station. The flare has a minimum destruction efficiency of 98%, and flare operating hours is limited to 2,920 hours per year for the wastewater surge tanks and 1,400 hours per year for the ammonia loading station. There are no identified controls that would reduce emissions associated with the flaring. Actual NO_x emissions in 2018 from this process were 13.9 tpy. A search of the RBLC database (code 19.300 – Flares) shows that ammonia flares with 99% destruction efficiency have been determined as BACT (example: Peony Chemical Facilty, TX). For this SIP, the current flare with 98% efficiency is considered to be RACT.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Continuous Barge Unloader No. 1	30300305	4,598,635 tons of coal per year	--	0.8	--	VE Restrictions	Meets RACT.
Continuous Barge Unloader No. 2	30300305	3,641,605 tons of coal per year	--	0.7	--	VE Restrictions	Meets RACT.

Evaluation

There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. ACHD considers visible emissions restrictions as RACT for these processes.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Pedestal Crane Unloader	30300305	2,792,250 tons of coal per year	--	0.5	--	None	Not evaluated.
Clam Shell Unloader	30300305	2,978,400 tons of coal per year	--	0.5	--	None	Not evaluated.
Coal Transfer, Boom Conveyor	30300305	8,240,605 tons of coal per year	--	2.1	--	None	Not evaluated.

Surge Bins and Bunkers	30300316	8,240,605 tons of coal per year	--	0.2	--	None	Not evaluated.

Remarks

There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. There are no identified controls for these processes. Actual $PM_{2.5}$ emissions in 2018 were 0.4 tpy (total) from these processes.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
No.1 Primary/Secondary Pulverizers	30300310	4,598,635 tons of coal per year	--	5.6	--	VE Restrictions	Meets RACT.
No. 2 Primary/Secondary Pulverizers	30300310	3,641,605 tons of coal per year	--	5.0	--	VE Restrictions	Meets RACT.

Evaluation

There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. ACHD considers visible emissions restrictions as RACT for these processes. Actual $PM_{2.5}$ emissions in 2018 from the pulverizers were less than 0.1 tpy.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coke Transfer 1 (Batteries 1-3, B, C)	30300309	3,568,240 tons of coke per year	--	12.7	--	None	Not evaluated.
Coke Transfer 2 (Batteries 13-15, 19-20)	30300309	2,825,830 tons of coke per year	--	10.0	--	None	Not evaluated.

Remarks

There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. Actual $PM_{2.5}$ emissions in 2018 from coke transfer were 0.7 tpy.

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Coke Screening Station No. 1 (Batteries 1-3)	30300312	2,411,190 tons of coke per year	--	1.8	--	None	Not evaluated.
Coke Screening Station No. 2 (Batteries 13-15, 19-20)	30300312	2,825,830 tons of coke per year	--	2.1	--	None	Not evaluated.

Remarks There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. Actual $PM_{2.5}$ emissions in 2018 from these stations were 0.1 tpy.							

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Coke Screening Station No. 4 (B and C Batteries)	30300312	1,157,050 tons of coke per year	--	3.4	--	Baghouse	Meets RACT.
Evaluation There is no calculated PTE for $PM_{2.5}$ from this process, and the PTE for PM_{10} is shown above. This screening station required BACT review upon installation in 2013, which included a baghouse for capture of PM emissions. Actual $PM_{2.5}$ emissions in 2018 from this station were 0.3 tpy.							

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Coke Storage Pile, Wind Erosion (2 piles)	30300316	80,000 tons of coal (normal inventory)	--	6.9	--	VE Restrictions	Meets RACT.
Coke Screening (Peters Creek, South Yard)	30300312	3,066,000 tons of coke per year	--	34.0	--	None	Not evaluated.
Evaluation There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. Visible emissions restrictions are considered RACT for coke pile erosion. Actual $PM_{2.5}$ emissions in 2018 from coke pile erosion and screening were 0.4 tpy. (Note: Coal storage is not listed as a process, as coal pile erosion is assumed to be > 2.5 µm (PM_{10} only).							

USS Clairton Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Fugitive Emissions (Plant Roadways)	30300834	Paved roads = 7.84 miles; Unpaved roads = 1.17 miles	--	30.5	--	Road Dust Control Program	Meets RACT.
Evaluation There is no calculated PTE for $PM_{2.5}$ from roadways, and the PTE for PM_{10} is shown above. Road dust is primarily PM_{10}, and actual $PM_{2.5}$ emissions in 2018 from plant roadways were 0.4 tpy.							

USS Clairton Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Fugitive Emissions (abrasive blasting of coke oven doors)	30399999	Approx. 18 coke oven doors per week	--	1.3	--	None	Not evaluated.
Fugitive Emissions (misc.)	30399999	--	--	2.4	--	None	Not evaluated.
Coke By-Product Recovery	39999996	8,240,605 tons of coal charged per year	--	2.5	--	Gas Blanketing	Not evaluated.
Aeration Basins WWTP	30399999	--	--	1.1	--	None	Not evaluated.

Evaluation

There are no calculated PTEs for $PM_{2.5}$ from these processes, and the PTEs for PM_{10} are shown above. Actual $PM_{2.5}$ emissions in 2018 from these processes were less than 0.1 tpy.

FACILITY: U. S. Steel (USS) Edgar Thomson

NAICS 331110	Description Iron and Steel Mills and Ferroalloy Manufacturing
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	3942.8
$PM_{2.5}$	1278.6
SO_2	3932.6

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Blast Furnace No. 1 Casthouse	30300825	1,350,000 tpy, Coke, Iron-Bearing Materials, Fluxes	26.2	243.2	116.3	Casthouse Baghouse	Meets RACT.
Blast Furnace No. 3 Casthouse	30300825	1,132,000 tpy, Coke, Iron-Bearing Materials, Fluxes	16.4	175.0	97.5	Casthouse Baghouse	Meets RACT.

Evaluation

In the Edgar Thomson (ET) blast furnaces, iron bearing materials, slag, or fuel and flux is fed to the furnace top. Heated air and fuel are blown into the bottom in a blast method. The blast air burns the fuel to produce heat and initiate chemical reactions and melting of the iron, while the balance of the fuel and part of the gas remove the oxygen in metal. Gas exits from the top and is directed to a wet venturi scrubber system, and slag and hot metal exit the bottom through the casthouses that exhaust to a single baghouse with four louvered compartments. Emissions that are not captured by the baghouse exit the roof monitors of the casthouses as fugitives. The facility is subject to the federal regulation 40 CFR Part 63, Subpart FFFFF (NESHAP for Integrated Iron and Steel Manufacturing).

NO_x

There are no practical ways to control the NO_x emissions within the blast furnace operation itself. Add-on controls such as SCR after the baghouse would be infeasible due to the temperature increases that would be required. RACT is considered to be good engineering practices, including material compositions within the furnace that lead to lower emissions. NO_x emissions from the casthouses are assumed to be fugitive emissions only, and actual NO_x emissions in 2018 from the casthouses were 8.8 tpy total.

$PM_{2.5}$

The casthouse baghouse collects fugitive emissions that are generated from the tapping of the blast furnace into iron runners, which directs the iron into rail cars to be transported to the BOP facility. There are no calculated PTEs for $PM_{2.5}$ from the casthouses (roof monitors or baghouse), and PTEs for PM_{10} are shown above. The casthouse baghouse emissions are limited to a particulate matter concentration of 0.01 gr/dscf. A search of the RBLC database (code 81.200 – Steel Production) showed no installations of controls at blast furnace casthouses. Total actual $PM_{2.5}$ emissions in 2018 from the casthouses were 8.3 tpy, and the current controls are considered to be RACT for these processes.

SO_2

Similar to NO_x, there are no practical ways to control SO_2 from the furnaces, and approximately 10% of casthouse SO_2 emissions are assumed to be fugitives that exit via the roof monitor. DSI is a technically feasible option for controls at the baghouse but would not be cost-effective ($22,935/ton). The PTEs given above are based on limits used for the SO_2 SIP demonstration for the 2010 NAAQS. Total actual SO_2 emissions in 2018 from the casthouses were 193.9 tpy.

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Blast Furnace No. 1 Stoves	39000702	495 MMBtu/hour (total), Blast Furnace Gas (BFG), COG, & NG	637.2	80.3	431.4	COG Grain Limits (H_2S)	Meets RACT.
Blast Furnace No. 3 Stoves	39000702	495 MMBtu/hour (total), BFG, COG & NG	637.2	80.3	394.2	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Each of the two blast furnaces has three stoves that are used to preheat the blast air prior to injection into the furnace. Atmospheric air, or cold blast air, is injected under pressure into the stoves. Blast Furnace Gas (BFG) is utilized as the main fuel source for the stoves and is enriched with COG and natural gas for a consistent fuel gas flow to the stoves while the blast furnaces are operating. Waste gases from combustion are routed to a stack for each set of stoves.

NO_x

Oxygen sensors are located in each furnace, and there is an automation program that adjusts the oxygen to fuel ratio. The automation results in a fuel-rich, low-oxygen environment, which acts to suppress NO_x formation.

LNB is technically feasible and has previously been installed in furnace stoves at other iron and steel facilities. However, stack testing for the stoves have shown an average NO_x rate of 0.013 lb/MMBTU while firing BFG and COG, which is lower than rates achieved with LNB included in the RBLC database (code 81.200) for blast furnace stoves (e.g., 0.06 lb/MMBtu at Nucor Steel, LA). FGR and OFA are technically infeasible as blast air cannot be recycled from the blast furnace. SCR, RSCR, and SNCR are considered to be technically infeasible because the operations are too sporadic, switching from heat to blast, with large swings in temperatures and NO_x concentrations.

NO_x RACT for the blast furnace stoves is considered to be the current limits along with good engineering practices. While the PTEs are high for the stoves, actual emissions are generally much lower. Total actual NO_x emissions in 2018 from the stoves were 42.9 tpy.

$PM_{2.5}$

There are no calculated PTEs for $PM_{2.5}$ from these processes, and PTEs for PM_{10} are shown above. Particulate matter is limited to 0.05 gr/dscf for BFG, 0.02 gr/dscf for COG, and 0.008 gr/dscf for NG used as fuel the stoves. There are no identified PM controls on the RBLC database for blast furnace stoves. Similar to the Clairton boilers, typical PM control devices such as ESP or baghouses would likely be ineffective for the stoves based on the nature of the fuel mix. The current limits are considered to be PM RACT for the stoves. Total actual $PM_{2.5}$ emissions in 2018 from the stoves were 28.8 tpy.

SO_2

The PTEs given above are based on limits used for the SO_2 SIP demonstration for the 2010 NAAQS. There is no specific limit for the sulfur content in BFG used at ET, but analytical testing has shown H_2S concentrations of about 15 gr/dscf, which is lower than the plant-wide of 35 gr/dscf with the use of COG. Additionally, the COG utilized at ET is part of the downriver COG stream, which is showing concentrations of 3 gr/dscf after the installation of the new VCU system at Clairton. The combined use of BFG/COG/NG fuel mix therefore results in H_2S concentrations in the range of 3 (or less) to 15 gr/dscf.

There are no cases of SO_2 controls implemented at other blast furnaces in the RBLC database. Possible add-on controls could include a wet scrubber (with caustic soda) or DSI, but neither option would be cost-effective (with cost effectiveness values in the range of $56k-$119k per ton per blast furnace, varying by furnace and type of control).

SO_2 RACT for the stoves is considered to be the current emissions limits and sulfur content limits, along with good engineering practices. Total actual SO_2 emissions in 2018 from the stoves were 431.9 tpy.

USS Edgar Thomson Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
BFG Flare	30390024	3 MMcf/hour, BFG	86.7	13.1	394.2	None	Meets RACT.

Evaluation

In the event that not all BFG can be consumed as a fuel, the excess is flared. The BFG flare design capacity is 26,280 MMCF of BFG per year or 3 MMCF/hr. The flare does not have any restrictions on usage overall, but by the nature of the process, it is limited to periods when there is excess BFG fuel only.

Add-on controls are not available for flares because the flame is not enclosed, and thus the exhaust cannot be captured. Flare studies performed by EPA as part of development of the new source performance standards for refineries (40 CFR 60, Subpart J) showed that, 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 pollutants. In general, reductions of emissions from flares are based on good engineering practices (to reduce smoking/opacity) and on minimization of fuel burned (prevention measures).

While the PTEs are high for this process, specifically for SO_2, actual emissions are generally much lower. (Note: There is no calculated PTE for $PM_{2.5}$ from the flare, and the PTE for PM_{10} is shown above.) Actual emissions in 2018 from this process were 11.1 tpy for NO_x, 0.1 tpy for $PM_{2.5}$, and 27.4 tpy for SO_2.

USS Edgar Thomson Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Basic Oxygen Process (BOP) Shop	30300999	3,467,500 TPY, Hot Metal (Iron), Fluxes,	90.5	308.8	29.1	Baghouses, Capture Hoods, Scrubber, COG	Meets RACT.

		Scrap, Alloy Additives				Grain Limits (H_2S)	

Evaluation

Liquid steel is produced at two Basic Oxygen Process (BOP) furnaces, identified as the F and R vessels, at the BOP building (shop). The BOP gas cleaning system collects and cleans process gas laden with particulate matter. PM is controlled by capture hoods and baghouses, and the scrubber exhaust discharges through an individual stack. BOP fugitives not captured by the controls exit the shop by way of the roof monitor.

NO_x

There are no practical ways to control fugitive NO_x emissions within the BOP shop. Add-on controls such as SCR after the scrubbers would be infeasible due to the temperature increases that would be required (similar to the casthouse baghouses above). RACT is considered to be good engineering practices for the control of NO_x from the shop. Actual NO_x emissions in 2018 from the BOP shop were 61.6 tpy (total from all emission release points).

$PM_{2.5}$

There is no calculated PTE for $PM_{2.5}$ from the BOP Shop, and the PTE for PM_{10} is shown above. PM is controlled from the BOP shop by capture hoods from the vessels and by a number of baghouses, including the mixer/desulfurization, secondary, flux material/handling, and transfer baghouses. The capture hood system is limited to a PM concentration of 0.02 gr/dscf, the mixer baghouse is limited to a PM concentration of 0.01 gr/dscf, and the secondary baghouse is limited to 0.005 gr/dscf. No other control options for such processes were identified from the RBLC database (code 81.200), and the current controls and limits are considered to be RACT. While the PTE is high for the BOP shop overall, actual $PM_{2.5}$ emissions in 2018 from the BOP shop were 42.8 tpy (total from all emission release points).

SO_2

The PTEs given above are based on limits used for the SO_2 SIP demonstration for the 2010 NAAQS. COG used as fuel at the BOP shop is limited to the sulfur content in the downriver COG. No other SO_2 controls have been identified for the BOP shop. RACT is considered to be the current emissions limits and sulfur content limits, along with good engineering practices. Total actual SO_2 emissions in 2018 from the BOP shop were 19.4 tpy (total from all emission release points).

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Ladle Metallurgy Facility (LMF), Dual-Strand Caster	30300999, 39000702	3,467,500 TPY, Steel (Liquid), COG, Fluxes, Scrap, Alloy Additives	12.0	16.0	23.0	LMF Baghouse, Dust Collectors	Meets RACT.
Vacuum Degasser	30300999	1,200,000 TPY, Steel (Liquid), Alloying Materials, Fluxes	0.0	0.6	0.0	None	Not evaluated.

Evaluation

The liquid steel is tapped from the BOP vessels and transferred to the ladle metallurgy facility (LMF) or to the vacuum degasser, where the properties of the steel can be more precisely refined according to customer specifications. Refined liquid steel is then charged to the dual-strand continuous caster, where steel slabs are produced and cut to specifications. PM is controlled by a baghouse as well as dust collectors, with small amounts of fugitives exiting through a roof monitor.

NO$_x$

There are no identified controls for NO$_x$ for the LMF or dual-strand casting operations, and emissions are generally small from these operations. RACT is considered to be good engineering practices for the control of NO$_x$ from the processes. Actual NO$_x$ emissions in 2018 from the LMF and dual-strand caster were 5.7 tpy (total from all emission release points).

PM$_{2.5}$

The LMF baghouse was subject to BACT review upon installation in 2009. Emissions from the baghouse are limited to a PM concentration of 0.0052 gr/dscf at any time and 16.0 tpy. A recent installation included in the RBLC database (Gerdau Macsteel Monroe, MI) shows a similar limit of 17.0 tpy for a baghouse and evacuation system. The dust collectors also control miscellaneous emissions inside the facility, minimizing fugitive releases through the roof monitor. Actual PM$_{2.5}$ emissions in 2018 were 2.4 tpy (total from all emission release points).

SO$_2$

SO$_2$ is limited to 23.0 tpy from the dual-strand continuous caster, and the COG sulfur content limit also applies to the LMF/caster facility. The limit for a similar operation in the RBLC database (New Steel Haverhill, OH) shows a higher limit (38.6 tpy) than ET. RACT for SO$_2$ is considered to be the current permitted and sulfur content limits. Actual NO$_x$ emissions in 2018 from the LMF and dual-strand caster were 1.0 tpy (total from all emission release points).

USS Edgar Thomson Process/Group	**SCC**	**Capacity/Fuel**	**NO$_x$ PTE (tpy)**	**PM$_{2.5}$ PTE (tpy)**	**SO$_2$ PTE (tpy)**	**Controls**	**RACT**
Riley Boilers (No. 1 through 3)	10200704	525 MMBtu/hr, BFG, COG, & NG, each	2400.0	345.0	2439.3	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Three identical wall-fired Riley Boilers, each with a rated capacity of 525 MMBtu/hr, are operated at ET. These boilers were built in 1943 and exhaust to a new single stack constructed in 2017. The majority of the steam produced from the three boilers is used to drive two steam turbine generator sets and two turbo blowers for blast furnace use. Each boiler is equipped with three Peabody burners fueled by a mixture of BFG, COG, and NG. Each boiler has NO$_x$ CEMS for continuous monitoring of emissions.

The requirements of 40 CFR Part 60, Subpart D (Standards of Performance for Fossil-Fuel-Fired Steam generators for Which Construction is Commenced After August 17, 1971) are not applicable to the Riley Boilers because these units were installed in 1943, prior to the construction commencement applicability dates in the regulations, and there have been no modification or reconstruction approvals issued to the source for these units.

NO$_x$

NO$_x$ emissions from Boilers 1-3 are limited to 0.55 lb/MMBtu and 800 tpy each (2,400 tpy total). Stack testing for the boilers have shown an average NO$_x$ rate of 0.015 lb/MMBTU while firing BFG and COG. A search of the RBLC database (code 11.390 – Large Industrial Boilers >250 MMBtu/hr; Other Gaseous Fuel/Mixtures) shows that this rate is lower than rates achieved with LNB for similar boilers (0.02 lb/MMBtu at PTTGCA Petrochemical Complex, OH).

Add-on controls such as SCR and SNCR could be feasible but not cost-effective (values of $9,285/ton and $52,170/ton, respectively). RSCR has not been tested for alternative fuels such as BFG and COG. NO_x RACT for the boilers is considered to be the current limits, along with good engineering and fuel practices. While the PTE is high for the boilers, actual emissions are generally much lower. Total actual NO_x emissions in 2018 from the boilers were 210.0 tpy.

$PM_{2.5}$

There is no calculated PTE for $PM_{2.5}$ from the boilers, and the PTE for PM_{10} is shown above. Particulate matter is limited to 0.05 gr/dscf for BFG, 0.02 gr/dscf for COG, and 0.008 gr/dscf for NG used as fuel the boilers. There are no identified PM controls in the RBLC database for such boilers. Similar to the Clairton boilers, typical PM control devices such as ESP or baghouses would likely be ineffective for the ET boilers based on the nature of the fuel mix, and the majority of PM emissions (about 75%) are formed as condensables. The current limits are considered to be PM RACT for the boilers. Total actual $PM_{2.5}$ emissions in 2018 from the boilers were 59.4 tpy.

SO_2

The PTE given above is based on an aggregate limit for all three boilers, as used in the SO_2 SIP demonstration for the 2010 NAAQS. There are no identified SO_2 controls in the RBLC database for such boilers. Similar to the blast furnace stoves (above), the combination of BFG/COG/NG leads to a H_2S content in the range of 3-15 gr/dscf, or less. Add-on controls such as scrubbers or DSI could be technically feasible, with estimated 40-47% control efficiencies, but with high cost effectiveness values (in the range of $72k-$82k per ton per boiler, varying by boiler and type of control). RACT for the Clairton boilers is the aggregate SO_2 limit and the use of the VCU-conditioned downriver COG. Total actual SO_2 emissions in 2018 from the boilers were 704.0 tpy.

USS Edgar Thomson Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Blast Furnace Slag Pits	30300809	581,565 TPY, Blast Furnace Slag	--	1.7	--	None	Not evaluated.

Remarks

PM emissions are small from this process, and no RACT evaluation was conducted.

USS Edgar Thomson Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Blast Furnace Recycling Cooling Tower	38500101	15,000 gal/min	--	0.4	--	Drift Eliminator	Meets RACT.
Caster Internal Machine Cooling Tower	38500101	14,316 gal/min	--	0.1	--	Drift Eliminator	Meets RACT.
Degasser Cooling Tower	38500101	5,250 gal/min	--	0.1	--	Drift Eliminator	Meets RACT.
BOP Hood Cooling Tower	38500101	30,000 gal/min	--	0.3	--	Drift Eliminator	Meets RACT.
BOP Gas Cleaning Cooling	38500101	20,000 gal/min	--	0.2	--	Drift Eliminator	Meets RACT.

Tower							
Caster Spray Water Cooling Tower	38500101	7,000 gal/min	--	0.1	--	Drift Eliminator	Meets RACT.
WSAC Cooling Towers	38500101	6,300 gal/min	--	2.6	--	None	Not evaluated.

Evaluation

There are no calculated PTEs for $PM_{2.5}$ from these cooling towers, and typical actual emissions for $PM_{2.5}$ (as used in the modeling demonstration) are shown above. $PM_{2.5}$ Emissions are small from these sources, and the use of drift eliminators (for all but one tower) is considered to be RACT.

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Plant Roads	30300833	--	--	1.8	--	Wet Suppression; Chemical Treatment; Paved Road Sweeping	Meets RACT.

Evaluation

There are no calculated PTEs for $PM_{2.5}$ from the roadways, and typical actual emissions for $PM_{2.5}$ (as used in the modeling demonstration) are shown above. The current controls for road dust are similar to those at other facilities and are considered to be RACT. Actual $PM_{2.5}$ emissions in 2018 from roadways were 1.8 tpy.

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Blast Furnace Miscellaneous Combustion (rail thawing, ladle drying)	39000702	--	31.6	2.8	7.6	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

There are no calculated PTEs for these emissions, and typical actual emissions are shown above (and as used in the attainment demonstration). The majority of emissions are associated with rail thawing for the blast furnace material handling processes at several locations adjacent to the blast furnaces. Rail thawing is an emergency process, occurring only during winter when rails can freeze. RACT for this process is assumed to be the H_2S content in the downriver COG.

USS Edgar Thomson Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Blast Furnace Breakdown	30300825	--	--	5.5	--	None	Not evaluated.

Plant-Wide Miscellaneous Combustion	10200603	--	5.0	0.4	0.0	None	Not evaluated.
Storage Piles	30300822	--	--	0.3	--	None	Not evaluated.

Reamrks

There are no calculated PTEs for $PM_{2.5}$ from these processes, and typical actual emissions for $PM_{2.5}$ (as used in the modeling demonstration) are shown above. These are processes are generally uncontrollable processes with small emissions.

FACILITY: U. S. Steel (USS) Irvin

NAICS 331110	Description Iron and Steel Mills and Ferroalloy Manufacturing
Potential-to-Emit Emissions, Facility (tpy)	
Pollutant	Total PTE (tpy)
NO_x	1863.1
$PM_{2.5}$	185.4
SO_2	1251.5

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
#1 Galvanizing Line Preheat/Galvanneal	30390003	68 MMBtu/hr, NG	13.1	1.8	0.2	None	Meets RACT.
#2 Galvanizing Line Preheat	30390003	18 MMBtu/hr, NG	31.5	0.6	0.0	None	Meets RACT.

Evaluation

The Continuous Galvanizing Lines melt pot preheat and galvanneal furnaces are used to melt the coating materials prior to galvanizing. They are uncontrolled but are fired by natural gas only, with no COG usage permitted.

NO_x

NO_x controls for these furnaces are generally infeasible. Galvanizing furnaces for steel-making are direct-fired units, and the use of OFA or FGR is not considered to be technologically feasible. Installation of LNB could lead to implications for burner flame length, temperature, and distribution. SCR/SNCR would require heating of the exhaust gas, and RSCR has not been tested on such furnaces. RACT is considered to be continued compliance with permit requirements. Actual NO_x emissions in 2018 from the galvanizing lines were 12.9 tpy.

$PM_{2.5}$, SO_2

$PM_{2.5}$ and SO_2 emissions are small for the galvanizing processes, and actual emissions in 2018 were 0.9 tpy of $PM_{2.5}$ and 0.1 tpy of SO_2. No evaluation of controls is warranted.

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT

64-Inch Pickling Line	30300910	1,047,174 tons/yr, Steel Coils	--	1.8	--	Packed Tower Scrubber	Meets RACT.
84-Inch Pickling Line	30300910	1,576,800 tons/yr, Steel Coils	--	18.3	--	Packed Tower Scrubber	Meets RACT.

Evaluation

The pickling lines remove scale (surface oxides) from hot rolled steel surfaces using a dilute hydrochloric acid (HCl) bath, with emissions controlled by packed tower scrubber. The packed tower scrubbers are considered to be RACT for such processes and are similar to scrubbers for pickling at other facilities (example: Thyssenkrupp Stainless, AL). PM emissions are small for these processes, and total actual $PM_{2.5}$ emissions in 2018 from the pickling lines were 0.1 tpy.

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
80 Inch Reheat Furnaces (1 through 5); Hot Strip Mill	39000702, 30300931	140 MMBtu/hr, COG and NG, each; 3,000,000 tons/yr, Steel Slabs and Rolling Oil	1100.7	91.3	475.8	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Five identical direct-fired reheat furnaces used to reheat incoming slabs prior to hot rolling on the roughing and finishing mill stands. The furnaces are fired with natural gas-enriched coke oven gas, exhausting to six stacks (one for each furnace, along with a waste stack). COG is the primary fuel for the reheat furnaces (generally about 90% of the fuel mix along with NG).

<u>NO_x</u>
The reheat furnaces have a combined PTE of 1,100.7 tpy, for an equivalent of 0.359 lb/MMBtu. Stack tests have shown lower emission rates in the range of 0.241-0.264 lb/MMBtu during mixed fuel use. Similar to the galvanizing furnaces, these furnaces are direct-fired units, and the use of OFA or FGR is not considered to be technologically feasible. (Additionally, the furnaces already reuse a portion of the exhaust stream for preheating.) SCR and SNCR for these furnaces have high cost-effective values ($19k/ton for SCR, $145/ton for SNCR), and RSCR has not been demonstrated as a control for reheat furnaces.

LNB or ULNB would be potential feasible and cost-effective controls for these furnaces. A review of RBLC determinations under code 81.290 (Other Steel Manufacturing Processes) show that similar reheat furnaces have installed LNB/ULNB as part of new installations, with limits in the range of 0.07-0.17 lb/MMBtu. However, as discussed in various sections of the SIP and appendices, there is little transformation of NO_x precursors in the near-field area of the Liberty site (downwind of Irvin) and little excess (<1%) of nitrate in the Liberty $PM_{2.5}$ concentrations. The potential reductions of NO_x from controls at these furnaces would likely be inconsequential to $PM_{2.5}$ attainment at Liberty and not needed for the purposes of this SIP.

RACT is considered to be compliance with the current NO_x PTE and good combustion practices for the hot strip mill furnaces. Actual NO_x emissions in 2018 from the hot strip mill were 331.3 tpy.

$PM_{2.5}$

There are no calculated PTEs for $PM_{2.5}$ from the furnaces, and the PTEs for PM_{10} are shown above. Particulate matter from each furnace is limited 7 pounds in any 60 minute period or 100 pounds in any 24-hour period. There are no identified PM controls in the RBLC database for reheat furnaces. Similar to the Clairton boilers, typical PM control devices such as ESP or baghouses would likely be ineffective for with the use of COG/NG fuel mix. The current limits are considered to be PM RACT, and total actual $PM_{2.5}$ emissions in 2018 from the hot strip mill were 26.6 tpy.

SO_2

Similar to other U. S. Steel processes, limits for the furnaces are derived from the SO_2 SIP demonstration for the 2010 NAAQS. The control of SO_2 is based on the H_2S content in COG, and the SO_2 SIP limits are effectively lower than the plant-wide limit of 35 gr/dscf of H_2S in COG.

There are no identified SO_2 controls in the RBLC database for such furnaces firing COG. Wet scrubber or DSI controls could be technically feasible (although difficult due to limited space available) but not economically feasible. Scrubbers could have removal efficiency of up to 63% but with cost-effectiveness values of $10k-14k per ton per furnace. DSI would lead to less removal efficiency (40%), with cost-effectiveness values of $22k-$29k per ton per furnace.

SO_2 RACT for the hot strip mill is considered to be the limit of H_2S in the COG and good combustion practices. Actual SO_2 emissions in 2018 from the hot strip mill were 336.6 tpy.

USS Irvin Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Boiler #1	10200707	79.8 MMBtu/hr, COG and NG	55.9	7.0	34.5	COG Grain Limits (H_2S)	Meets RACT.
Boiler #2	10200707	84.6 MMBtu/hr, COG and NG	59.3	7.4	36.6	COG Grain Limits (H_2S)	Meets RACT.
Boiler #3 and #4	10200707	41.6 MMBtu/hr, COG and NG, each	58.4	7.2	36.0	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Boilers No. 1 through 4 are package water-tube boilers of a single-burner design that were constructed in 1987. Steam output from these boilers varies with facility demands and load rates can vary quickly. These boilers primarily use COG as fuel.

NO_x

The boilers are limited to an effective rate of 0.16 lb/MMBtu. There are no controls found on the RBLC database for small boilers utilizing COG (code 13.390 – Industrial-Size Boilers/Furnaces <100 MMBtu/hr; Other Gaseous Fuel/Mixture). LNB technology would be feasible for these boilers, but the reductions would likely be relatively low based on the current effective rate. Similar to the reheat furnaces above, SCR/SNCR would not be cost effective, and RSCR has not been tested. Actual NO_x emissions in 2018 from the boilers were 45.4 tpy, and the current limits are considered to be RACT for the boilers.

$PM_{2.5}$

There are no calculated PTEs for $PM_{2.5}$ from the boilers, and the PTEs for PM_{10} are shown above. Particulate matter is limited to 0.02 gr/dscf for COG and 0.008 gr/dscf for NG used as fuel the boilers. There are no identified PM controls in the RBLC database for such boilers. Similar to other processes using COG/NG, typical PM control devices such as ESP or baghouses would likely be ineffective. PM emissions are generally small from these boilers, and the current limits are considered to be PM RACT for the boilers. Total actual $PM_{2.5}$ emissions in 2018 from the boilers were 3.6 tpy.

SO_2

Similar to other U. S. Steel processes, limits for the boilers are derived from the SO_2 SIP demonstration for the 2010 NAAQS. The control of SO_2 is based on the H_2S content in COG, and the SO_2 SIP limits by boiler are effectively lower than the plant-wide limit of 35 gr/dscf of H_2S in COG. There are no identified SO_2 controls in the RBLC database for such boilers firing COG. Wet scrubber or DSI controls could be technically feasible but not economically feasible, with cost effectiveness values of $27k-$91k per ton per boiler, varying by technology and boiler. SO_2 RACT for the boilers is considered to be the limit of H_2S in the COG and good combustion practices. Actual SO_2 emissions in 2018 from the boilers were 44.8 tpy.

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
COG Flares #1-3, Peachtree Flare (A/B)	30390024	6,750,000 cf/day, COG	167.5	21.4	530.0	COG Grain Limits (H_2S)	Meets RACT.

Evaluation

Flares are used at Irvin for the destruction of excess coke oven gas from the U. S. Steel Mon Valley Works as a whole (Clairton, ET, Irvin). Flaring generally only occurs when a major operation (such as a blast furnace or the Hot Strip Mill) is not in service or during a significant breakdown at Clairton (the origin of the coke oven gas). Flares #1-3 are at plant level, while the Peachtree Flare sits at high elevation on the extended Irvin plant property.

Similar to the ET BFG flare, add-on controls are not available because the flames are not enclosed and exhaust cannot be captured. Flare studies performed by EPA showed that changes or retrofits of existing flares do not normally result in a quantifiable reduction of pollutants. In general, reductions of emissions from flares are based on good engineering practices (to reduce smoking/opacity) and on minimization of fuel burned (prevention measures). The Irvin flaring can be a SO_2 control in itself, especially during breakdowns of the Clairton desulfurization plant, diverting the COG from use in combustion processes at the U. S. Steel facilities.

Actual emissions from the flares can vary greatly from year to year, based on the production levels and/or breakdowns at the Mon Valley Works. PTEs shown above are based on the maximum capacities of the flares, and actual emissions are generally much lower.

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Cold Reduction Mill	30300935	2,500,000 tons/yr, Steel Coils and Rolling Oil	--	0.3	--	Oil/Cyclonic Mist Eliminators	Meets RACT.

Evaluation

The No. 3 Five Stand Cold Reduction Mill consists of a steel roll uncoiler, five mill stands, hydraulic shear, and a roll coiler. The units are controlled for particulate matter by a particulate (oil mist) capture system with approximately 99.9% capture efficiency and five cyclone mist eliminators in series with an approximate control efficiency of 97%. Emissions are low for this process, and the controls are considered to be RACT.

USS Irvin Process/Group	SCC	Capacity/Fuel	NO_x PTE (tpy)	$PM_{2.5}$ PTE (tpy)	SO_2 PTE (tpy)	Controls	RACT
Continuous Annealing Furnace	30390004	45 MMBtu/hr, COG and NG	78.8	3.9	35.3	COG Grain Limits (H_2S)	Meets RACT.
HPH Annealing Furnaces (31)	30390004	4.9 MMBtu/hr each, COG and NG	99.8	13.3	52.6	COG Grain Limits (H_2S)	Meets RACT.
Open Coil Annealing (OCA) Furnaces (16)	30390004	5.4 - 9.0 MMBtu/hr, COG and NG	184.9	9.9	50.4	LNB; COG Grain Limits (H_2S)	Meets RACT.

Evaluation

The Continuous Annealing process consists of one furnace along with associated coiling, uncoiling, and cleaning equipment. The HPH Annealing process consists of 31 individual movable furnaces with 58 bases in one unit that treats coiled steel rolls. The Open Coil Annealing process consists of 14 individual furnaces that heat treat open coiled steel rolls. Each annealing furnace is fired with coke oven gas that is enriched with natural gas.

NO_x

In general, annealing relieves cooling stresses induced by hot-or-cold working and softens the steel to improve its machinability or formability. This is accomplished by subjecting the steel to a controlled temperature profile or cycle with moderate peak temperatures. As compared with most iron and steel processes, which take place at temperatures of 2,000-3,000 °F, annealing is accomplished at moderate temperatures below 1,000 °F. Because of these lower temperatures, NO_x emissions from these processes are inherently lower.

Three of the OCA furnaces are equipped with LNB, which is a feasible control for annealing furnaces. However, due to the amount of furnaces for the annealing processes, this would not be a cost-effective option. SCR and SNCR are also not cost-effective, as even a shared SCR for all of the annealing furnaces would have a cost-effectiveness of $13k/ton. RSCR has not been used for annealing furnaces.

Similar to the other Irvin combustion processes, compliance with current limits is considered to be RACT for the annealing furnaces. Actual NO_x emissions in 2018 from the annealing furnaces were 45.4 tpy total.

$PM_{2.5}$

There are no calculated PTEs for $PM_{2.5}$ from the annealing processes, and the PTEs for PM_{10} are shown above. Particulate matter is limited to 0.02 gr/dscf for COG and 0.008 gr/dscf for NG used as fuel the boilers. There are no identified PM controls in the RBLC database for such processes with COG used as fuel. Similar to other processes using COG/NG, typical PM control devices such as ESP or baghouses would likely be ineffective. PM emissions are generally small from the annealing furnaces, and the current limits are considered to be PM RACT. Total actual $PM_{2.5}$ emissions in 2018 from the annealing furnaces were 3.4 tpy.

<u>SO_2</u>

Similar to other U. S. Steel processes, limits for the annealing furnaces are derived from the SO_2 SIP demonstration for the 2010 NAAQS. The control of SO_2 is based on the H_2S content in the COG, and the SO_2 SIP limits by furnace are effectively lower than the plant-wide limit for H_2S content in COG. There are no identified SO_2 controls in the RBLC database for such furnaces firing COG. Wet scrubbers or DSI would be cost-prohibitive, with cost-effectiveness values in the range of $72k-$158k per ton per process, varying by technology. SO_2 RACT for the annealing furnaces is considered to be the limit of H_2S in the COG and good combustion practices. Actual SO_2 emissions in 2018 from the furnaces were 42.3 tpy.

USS Irvin Process/Group	**SCC**	**Capacity/Fuel**	**NO_x PTE (tpy)**	**$PM_{2.5}$ PTE (tpy)**	**SO_2 PTE (tpy)**	**Controls**	**RACT**
Cooling Tower / HPH Annealing	38500101	--	--	0.1	--	None	Not evaluated.
Cooling Tower / North Water Treatment	38500101	--	--	0.1	--	None	Not evaluated.
Plant Roads	30300834	--	--	0.0	--	None	Not evaluated.
Space Heaters, Miscellaneous NG Usage	10200603	160 MMBtu/hr combined, NG	13.2	1.0	0.1	None	Not evaluated.

Remarks

These are small sources of emissions, and no evaluation of controls is needed. Controls such as LNB are feasible options for space heaters, but the potential benefits from reductions would be minor for the Irvin Plant.

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