United States Steel

June 11, 2025

Mr. James Rebarchak
Regional Air Quality Program Manager
Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 E. Main Street
Norristown, PA 19401-4915

Submitted via OnBase

RE: U. S. Steel Fairless Plant
Significant Operating Permit Modification application, pursuant to 25 Pa. Code § 129.114(l)

Mr. Rebarchak,

United States Steel Corporation (U. S. Steel) owns and operates a steel finishing facility located in Fairless Hills, Bucks County, Pennsylvania (Fairless Plant). Cold-rolled products are finished into galvanized sheet products at the site.

On January 30, 2025, U. S. Steel provided the Pennsylvania Department of Environmental Protection (PADEP) an initial notification in accordance with 25 Pa. Code 129.115(a). On February 28, 2025, U. S. Steel provided the PADEP a case-by-case analysis in accordance with 25 Pa. Code 129.114 for Source ID 420 – Galvanizing Line Furnace.

On April 22, 2025, PADEP requested that U. S. Steel submit a Significant Operating Permit Modification application, pursuant to 25 Pa. Code § 129.114(l), no later than June 30, 2025. This submittal serves as the requested application. As requested by PADEP, the RACT III case-by-case analysis is also attached to the application in Appendix A. The permit fee has been mailed separately to PADEP, but a copy of the check is included.

Should you have any questions pertaining to this matter, please contact Michael Dzurinko by phone at 412-233-1467 or by email at mdzurinko@uss.com.

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Respectfully,

Kurt Barshick
Vice President
U. S. Steel – Mon Valley Works

2700-PM-BAQ0027 1/2021
Application

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

FOR OFFICIAL USE ONLY

OP #: _____

Date: _____

OPERATING PERMIT MODIFICATION APPLICATION

Section 1 – General Information

1.1 Application Type

Type of permit for which application is made:

☐ Minor Modification ☐ State-Only Operating Permit

☒ Significant Modification ☐ Title V Operating Permit

Existing Operating Permit No: Operating Permit #09-00006

1.2 Facility Information

Firm Name: United States Steel Corporation Federal Tax ID: 25-0996816

Facility Name: Mon Valley Works - Fairless Plant Plant Code: 13

NAICS Code: 332812 SIC Code: 3479

Description of NAICS Code: Metal Coating

Description of SIC Code: Manufacturing - Metal Coating And Allied Services

County: Bucks Municipality: Falls Township

Latitude: 40° 10 27.5736 Longitude: -74° 45 22.5570

Horizontal Reference Datum: World Geodetic System of 1984

Horizontal Collection Method: Geographic coordinates method based on interpolation-satellite

Reference Point: Plant entrance (general) - The general entrance to a plant

1.3 Permit Contact Information

Name: Michael Dzurinko Title: Senior Manager, Environmental

Address: U. S. Steel Irvint Plant, PO Box 878, MS 100

City: Dravosburg State: PA ZIP: 15034

Telephone: (412) 233-1467

Email: mdzurinko@uss.com

1.4 Small Business Question

Are you a small business as defined by the Pennsylvania Air Pollution Control Act? ☐ Yes ☒ No

Are you a small business as defined by the U.S. Small Business Administration? ☐ Yes ☒ No

1.5 Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No

Place confidential information on separate page(s) marked "Confidential".

In order to request confidential treatment for information in any document, you must submit a redacted version of the relevant document with the confidential information blacked out (and thus suitable for public disclosure), along with a letter of request containing a table identifying the page and line number of each redaction, along with a justification for each redacted item as to why it should be deemed confidential under the specific criteria allowed under 25 Pa. Code §127.12(d) and Section 13.2 of the APCA.

1.6 Certification of Truth, Accuracy and Completeness by a Responsible Official

I certify that, subject to the penalties of Title 18 Pa. C.S.A. Section 4904 and 35 P.S. Section 4009(b)(2), I am the responsible official having primary responsibility for the design and operation of the facilities to which this application applies and that the information provided in this application is true, accurate, and complete to the best of my knowledge, information, and belief formed after reasonable inquiry.

(Signed) _____ Date: 6/11/2025

Name (Typed): Kurt Barshick Title: Vice President - Mon Valley Works

Telephone: (412) 675-2600

Email: kbarshick@uss.com

Section 2 – Inventory of Units Being Modified		
Unit ID No.	Unit Name	Unit Type
None		

Section 3 – Facility Changes

Complete this section ONLY if the changes are for the entire facility. If changes are for a source or sources, skip this Section and complete Section 4 for each Source in which a change is proposed.

3.1 Describe all proposed changes to this facility:

U. S. Steel is proposing to incorporate the RACT III requirements as specified in 25 Pa. Code 129.111 through 129.115. As noted in the January 2025 initial notification and February 2025 U. S. Steel case-by-case RACT submittal, this includes the following:

- **Biennial tune-up**
  - **Source ID 048 – Gal3 Steam Boiler**
- **Install, maintain and operate in accordance with manufacturer's specifications and good operating practices**
  - **Source ID 422 – Galvanneal Furnace**
  - **Source ID 426 (part of) – Cambridge Space Heater; 2.5 MMBtu/hr**
- **Case-by-case – good operating practices**
  - **Source 420 – Galvanizing Line Furnace**

3.2 If the proposed facility changes involve any changes in actual emissions, please complete the following table. Attach another table if needed.

Pollutant Name	CAS Number	Change in Actual Emissions (+ or -)
	No change in air emissions	

3.3 Anticipated date on which proposed change is scheduled to occur: N/A

3.4 List the proposed revision language for the operating permit conditions. This includes all changes to the emissions, monitoring, testing, record-keeping, reporting requirements and work practice standard requirements. Write in the type of applicable requirements in the column provided. Attach another table if needed.

Citation Number	Type of Applicable Requirement	Existing Operating Permit Condition or Condition Number	Proposed Language for Permit Condition
129.115(f), 129.115(i) and 129.115(k)	Recordkeeping – Gal3 Steam Boiler Work Practice – Gal3 Steam Boiler	Section D Source ID 048 Condition #006 Section D Source ID 048 Condition #009	Include presumptive RACT III citation to existing permit conditions.
129.115(f) and 129.115(k)	Recordkeeping – Galv. Line Furnace Work Practice – Galv Line Furnace	Section D Source ID 420 Condition #006 Section D Source ID 420 Condition #009	Include case-by-case RACT III conclusions / citation (good operating practices) to existing permit conditions. Add requirement to "maintain and operate in accordance with manufacturer specifications."
129.115(f) and 129.115(k)	Work Practice – Galvanneal Furnace	N/A	Add presumptive RACT III Work Practice Requirement for Source ID 422 ("Install, maintain, and operate in accordance with manufacturer's specifications and good operating practices").
129.115(f) and 129.115(k)	Recordkeeping & Work Practice – Cambridge 2.5 MMBtu/hr space heater	N/A	Add presumptive RACT III Work Practice Requirement ("Install, maintain, and operate in accordance with manufacturer's specifications and good operating practices").
129.115(g)	Recordkeeping - Zinc Pot Dryer, Chem Treat Dryer and Space Heaters	N/A	Include RACT III exemption citation for recordkeeping of potential NOx emissions

3.5 Provide a listing of all changes in chronological order (additions and subtractions) made at a facility since the last submittal and attach it to this application. For example:

- March 2016 - Added shot blast booth 5, exempted by the attached Request for Determination.
- Dec 2017 - Installed new paint line in accordance with Plan Approval XX-XXXXX

None

3.6 For renewals, please review the current operating permit. If you are proposing any changes to the conditions of the permit, please provide the condition number, the requested change, and justification for the requested change.

Not applicable for this modification application (see changes noted in the table in Section 3.4)

Section 4 – Unit Information (duplicate this section for each unit as needed) –

N/A (sitewide incorporation of RACT requirements)

4.1 Unit Type: ☐ Combustion ☐ Incinerator ☐ Process ☐ Control Device

4.2 General Source Information (Combustion/Incinerator/Process)

a. Source ID: _____ b. Source Name: _____

c. Manufacturer: _____ d. Model No.: _____

e. Source Description: _____

f. Rated Capacity (for engines use BHP): _____ g. Installation Date: _____

h. Rated Power/Electric Output: _____

i. Exhaust Temperature: _____ Units: _____ j. Exhaust % Moisture: _____ k. Exhaust Flow Volume: _____ SCFM

4.3 General Control Device Information

a. Unit ID: _____ b. Unit Name: _____

c Used by Sources: _____

d. Type: _____

e. Pressure Drop (in. H_2O): _____ f. Capture Efficiency: _____

g. Flow Rate (specify unit): _____

h. Manufacturer: _____ i. Model No.: _____

j. Installation Date: _____

4.4 Proposed Changes to Unit N/A (sitewide incorporation of RACT requirements)

a. Describe all proposed changes to this unit:

b. If the proposed unit changes involve any changes in actual emissions, please complete the following table. Attach another table if needed.

Pollutant Name	CAS Number	Change in Actual Emissions (+ or -)

c. Anticipated date on which proposed change is scheduled to occur: _____

d. List the proposed revision language for the operating permit condition. This includes all changes to the emission, monitoring, testing, record-keeping, reporting requirements and work practice standard requirement. Write in the type of applicable requirements in the column provided. Attach another table if needed.

Citation Number	Type of Applicable Requirement	Existing Operating Permit Condition or Condition Number	Proposed Language for Permit Condition

Section 5 – Compliance Plan for the Facility			
		Yes	No
5.1	Will your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements during the permit duration?	☒	☐
5.2	Will your facility be in compliance with all applicable requirements presently scheduled to take effect during the term of the permit?	☒	☐

Compliance Review Form

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

Fully and accurately provide the following information, as specified. Attach additional sheets as necessary.

Type of Compliance Review Form Submittal (check all that apply)

☐ Original Filing
☒ Amended Filing

Date of Last Compliance Review Form Filing: 2/6/2024

Type of Submittal

☐ New Plan Approval
☐ Extension of Plan Approval
☐ Other: _____
☐ New Operating Permit
☐ Change of Ownership
☒ Renewal of Operating Permit
☐ Periodic Submission (@ 6 mos)

SECTION A. GENERAL APPLICATION INFORMATION

Name of Applicant/Permittee/("applicant")
(non-corporations-attach documentation of legal name)
United States Steel Corporation -Mon Valley Works - Fairless Plant

Address Camp Hollow Road
West Mifflin, PA 15122
c/o Michael Dzurinko

Telephone (412) 233-1467 **Taxpayer ID#** 25-1897152

Permit, Plan Approval or Application ID# Operating Permit #09-00006

Identify the form of management under which the applicant conducts its business (check appropriate box)

☐ Individual
☐ Municipality
☐ Proprietorship
☒ Public Corporation
☐ Private Corporation
☐ Syndicate
☐ Municipal Authority
☐ Fictitious Name
☐ Partnership
☐ Limited Partnership
☐ Government Agency
☐ Joint Venture
☐ Association
☐ Other Type of Business, specify below:

Describe below the type(s) of business activities performed.

United States Steel Corporation, a publicly traded corporation, manufactures and sells a wide variety of steel sheet, tubular, and tin products; coke and taconite pellets; and coal chemicals. U. S. Steel has several facilities throughout the United States and Europe. The Mon Valley Works - Fairless Plant manufactures galvanized steel sheets.

SECTION B. GENERAL INFORMATION REGARDING "APPLICANT"

If applicant is a corporation or a division or other unit of a corporation, provide the names, principal places of business, state of incorporation, and taxpayer ID numbers of all domestic and foreign parent corporations (including the ultimate parent corporation), and all domestic and foreign subsidiary corporations of the ultimate parent corporation with operations in Pennsylvania. Please include all corporate divisions or units, (whether incorporated or unincorporated) and privately held corporations. (A diagram of corporate relationships may be provided to illustrate corporate relationships.) Attach additional sheets as necessary.

Unit Name	Principal Places of Business	State of Incorporation	Taxpayer ID	Relationship to Applicant
United States Steel Corporation (U. S. Steel)	USA	Delaware	25-1897152	Self

SECTION C. SPECIFIC INFORMATION REGARDING APPLICANT AND ITS "RELATED PARTIES"

Pennsylvania Facilities. List the name and location (mailing address, municipality, county), telephone number, and relationship to applicant (parent, subsidiary or general partner) of applicant and all Related Parties' places of business, and facilities in Pennsylvania. Attach additional sheets as necessary.

Unit Name	Street Address	County and Municipality	Telephone No.	Relationship to Applicant
Clairton Plant	400 State Street	Allegheny/Clairton	(412) 233-1015	Self
Edgar Thomson Plant	1300 Braddock Avenue	Allegheny/Braddock	(412) 273-4730	Self
Irvin Plant	Camp Hollow Road	Allegheny/West Mifflin	(412) 675-7382	Self
Fairless Plant	Pennsylvania Avenue	Bucks/Fairless Hills	(412) 675-7382	Self

Provide the names and business addresses of all general partners of the applicant and parent and subsidiary corporations, if any.

Name	Business Address
U. S. Steel has no subsidiaries that operate in Pennyslvania	NA

List the names and business address of persons with overall management responsibility for the process being permitted (i.e. plant manager).

Name	Business Address
Kurt Barshick	P. O. Box 878, Dravosburg, PA 15034

Plan Approvals or Operating Permits. List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time 5 years prior to the date on which this form is notarized. This list shall include the plan approval and operating permit numbers, locations, issuance and expiration dates. Attach additional sheets as necessary.

Air Contamination Source	Plan Approval/ Operating Permit#	Location	Issuance Date	Expiration Date
Fairless Plant	09-00006	Fairless Plant, Fairless Hills, PA	11/19/2012; 12/22/2016; 10/11/2019; 12/19/2024	12/18/2029
Edgar Thomson Plant	See Attached List	Edgar Thomson Plant, Braddock, PA	See Attached List	See Attached List
Irvin Plant	See Attached List	Irvin Plant, West Mifflin, PA	See Attached List	See Attached List
Clairton Plant	See Attached List	Clairton Plant, Clairton, PA	See Attached List	See Attached List

Compliance Background. (Note: Copies of specific documents, if applicable, must be made available to the Department upon its request.) List all documented conduct of violations or enforcement actions identified by the Department pursuant to the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. Attach additional sheets as necessary. See the definition of "documented conduct" for further clarification. Unless specifically directed by the Department, deviations which have been previously reported to the Department in writing, relating to monitoring and reporting, need not be reported.

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status: Litigation Existing/Continuing or Corrected/Date	Dollar Amount Penalty
See Attached List						$
						$
						$
						$
						$
						$
						$
						$
						$
						$
						$

List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Litigation Existing/Continuing Or Corrected/Date
See Attached List				

CONTINUING OBLIGATION. Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional deviations occur between the date of submission and Department action on the application.

VERIFICATION STATEMENT
Subject to the penalties of Title 18 Pa.C.S. Section 4904 and 35 P.S. Section 4009(b)(2), I verify under penalty of law that I am authorized to make this verification on behalf of the Applicant/Permittee. I further verify that the information contained in this Compliance Review Form is true and complete to the best of my belief formed after reasonable inquiry. I further verify that reasonable procedures are in place to ensure that "documented conduct" and "deviations" as defined in 25 Pa Code Section 121.1 are identified and included in the information set forth in this Compliance Review Form.
Signature — Date: 6-11-2025
Kurt Barshick — Name (Print or Type)
Mon Valley Works - Vice President — Title

U. S. Steel – Mon Valley Works
Compliance Background – June 2025

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status: Litigation Existing/Continuing Or Corrected/Date	Dollar Amount Penalty
4/18/25	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Battery Fugitive Emissions Violations – 4Q 2023	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 5/16/2025. Settlement discussions ongoing.	$216,325
3/21/25	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Battery Fugitive Emissions Violations – 3Q 2023	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 4/17/2025. Settlement discussions ongoing.	$238,675
12/13/24	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Battery Fugitive Emissions Violations – 2Q 2023	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 1/12/2025. Settlement discussions ongoing.	$170,950
8/26/24	Edgar Thomson Plant	Article XX1/Permit #0051-OP23	Alleged BF Stove and BOP Scrubber CO exceedances	Notice of Violation #240801	Title V Permit Appeal Litigation is ongoing. NOV is neither an order or final action.	$12,300 (not assessed by ACHD – pending results of permit appeal)
6/20/24	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Battery Fugitive Emissions Violations – 1Q 2023	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 7/19/2024. Settlement agreement reached between USS and ACHD resulting in $1,800 reduction.	$77,725
5/2/24	Clairton Plant	Article XXI/Permit #0052-OP22	Self-reported C Quench Tower SO2 exceedance	Enforcement Order #240501	Final	$7,700
2/26/24	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged violations related to pushing coke without baghouse	Enforcement Order #240204	USS appealed on 3/27/2024. Appeal pending.	$1,991,000
2/2/24	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Battery Fugitive Emissions Violations – 4Q 2022	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 3/1/2024. Settlement agreement reached between USS and	$191,350

					ACHD resulting in $10,000 reduction.	
12/29/23	Clairton Plant	Article XXI/Permit #0052-OP22	Alleged Exceedances of H2S Ambient Air Standards	Enforcement Order #231203	USS appealed on 1/28/2024. USS disagrees with the penalty and the bases of the allegations in the Order. Appeal pending	$2,202,825
10/19/23	Clairton Plant	Article XXI/Permit #0052-OP22	Failure to conduct valid B Battery Combustion Stack test within two years	Enforcement Order #231002	Final. Penalty Paid. Test invalidated due to sample probe contamination. Re-test demonstrated compliance.	$2,860
7/11/23	Clairton Plant	Article XXI/Permit #0052	Alleged Battery Fugitive Emissions Violations - 3Q 2022	Settlement Agreement and Order #190604 – Stipulated Penalties	USS filed notice of dispute on 8/11/2023. Settlement agreement reached between US and ACHD resulting in $38,275 reduction.	$263,450
3/15/23	Clairton Plant	Article XXI/ Permit #0052	Alleged exceedance of battery fugitive emissions standards 2Q 2022	Settlement Agreement and Order #190604 – Stipulated Penalties	Final - Resolution Reached without the adjudication or admission of any issue of fact or law. USS filed notice of dispute on 4/14/2023. Settlement Agreement signed on 9/22/2023 between USS and ACHD to resolve 2Q21 through 2Q22 disputes in which ACHD will credit USS $325,065.	$307,800 (Alleged Violations/Penalty Reduced Per Settlement.)
12/16/2022	Edgar Thomson Plant	Article XXI, Permit #0051	Alleged Fugitive/Opacity Violations; Alleged Operations and Maintenance Violations	Complaint Filed by USEPA and ACHD on May 17, 2022 in United States District Court, Western District of Pennsylvania; Civil Action 2:22-cv-729	Final - Resolution Reached without the adjudication or admission of any issue of fact or law. USS, USEPA and ACHD entered a settlement as provided in a Consent Decree; as approved and entered by the Court on 12/16/2022. Final. Civil Penalty Paid.	$1,500,000 to USEPA and ACHD collectively
11/28/22	Clairton Plant	Article XXI/	Alleged Fugitive/Opacity	Settlement Agreement	Final - Resolution Reached without the	$458,225 (Alleged

		Permit #0052	Violations 1Q 2022	and Order #190604 – Stipulated Penalties	adjudication or admission of any issue of fact or law. USS filed notice of dispute on 12/28/2022. Settlement Agreement signed on 9/22/2023 between USS and ACHD to resolve 2Q21 through 2Q22 disputes in which ACHD will credit USS $325,065.	Violations/Penalty Reduced Per Settlement.)
3/24/22	Clairton Plant	Article XXI/ Permit #0052	Alleged violations related to pushing coke without baghouse.	Enforcement Order #220304	USS appealed on 4/22/22 Appeal Pending	$4,570,500
3/7/22	Clairton Plant	Article XXI	Alleged Exceedances of H2S Ambient Air Standards	Enforcement Order #220302	USS appealed on 4/5/22 Appeal Pending	$1,842,530
3/2/22	Clairton Plant	Article XXI/ Permit #0052	Alleged Battery Fugitive Emissions violations 2Q-4Q 2021	Settlement Agreement and Order #190604 – Stipulated Penalties	Final - Resolution reached without the adjudication or admission of any issue of fact or law. USS filed notice of dispute on 3/31/2022. Settlement Agreement signed on 9/22/2023 between USS and ACHD to resolve 2Q21 through 2Q22 disputes in which ACHD will credit USS $325,065.	$859,300 (Alleged Violations/Penalty Reduced Per Settlement.)
12/6/21	Clairton Plant	Article XXI	Visible Emissions from No. 1 Unit Pulverizer Building	Notice of Violation #211201	Final	NA
8/27/21	Clairton Plant	Article XXI	Anhydrous Ammonia Release	Enforcement Order #210801	Final	$5,500 assessed
6/4/21	Clairton Plant	Article XXI/ Permit #0052	Alleged Battery Fugitive Emission Violations 1Q 2021	Settlement Agreement and Order #190604 – Stipulated Penalties	Final	$201,500 assessed

4/1/21	Clairton Plant	Article XXI	Alleged Exceedances of H2S Ambient Air Standards	Notice of Violation #210302	Notice of Violation received on 3/7/2022. The NOV was not final action. See Enforcement Order #220302 issued on March 7, 2022 (as noted above.)	NA
3/12/21	Clairton Plant	Article XXI/ Permit #0052	Alleged Battery Fugitive Emission Violations 2Q – 4Q 2020	Settlement Agreement and Order #190604 – Stipulated Penalties	Final - No adjudication or admission of any law or fact.	$382,950 assessed
3/1/21	Clairton Plant	Article XXI	Anhydrous Ammonia Railcar Release	Enforcement Order #210201	Final	$4,165 assessed
1/25/21	Clairton Plant	Article XXI/ Permit #0052-I011b	Self-reported C Battery Combustion Stack exceedance	Enforcement Order #210101	Final	$8,800 assessed
6/8/20	Edgar Thomson Plant	Article XXI	Alleged Visible Emissions Violations	Enforcement Order #200601	Final - No adjudication or admission of any law or fact.	NA

U. S. Steel Mon Valley Works
Incidents of Deviations – June 2025

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Status: Litigation Existing/Continuing Or Corrected/Date
6/2020 – 6/2025	Clairton Plant	Article XXI & Permit #0052 & Permit #0052-OP22 & Permit #0052-OP22a	Refer to semi-annual deviation reports/ annual certifications	NA
6/2020 – 6/2025	Fairless	Permit #09-00006	Refer to deviation reports; annual certifications	NA
6/2020 – 6/2025	Edgar Thomson	Article XXI & Permit #0051a & Permit #0051-OP23	Refer to semi-annual deviation reports; annual certifications	NA
6/2020 – 6/2025	Irvin	Article XXI & Permit #0050-OP16c & Permit #0050-OP24	Refer to deviation reports; annual certifications	NA

United States Steel Corporation
Allegheny County Health Department Permits

Clairton Plant

7035003-010-26320	Coke Battery No. 1
7035003-010-26318	Coke Battery No. 2
7035003-010-26317	Coke Battery No. 3
7035003-010-26312	Coke Battery No. 7
7035003-010-26313	Coke Battery No. 8
7035003-010-26319	Coke Battery No. 9
7035003-010-26309	Coke Battery No. 13
7035003-010-26307	Coke Battery No. 14
7035003-010-25306	Coke Battery No. 15
7035003-010-26304	Coke Battery No. 19
7035003-010-53800	Coke Battery No. 20
78-I-0083-P	Coke Battery B and B Quench Tower
7035003-010-25101	Quench Tower #1
7035003-010-25102	Quench Tower #3
7035003-010-25104	Quench Tower #5
7035003-010-25106	Quench Tower #7
91-I-0021-P	Coke By-Products Recovery Plant
7035003-010-00801	Boiler No. 1
7035003-010-00800	Boiler No. 2
7035003-010-99100	Boiler Nos. 13 and 14
7035003-010-01300	Boiler Nos. R1 and R2
7035003-010-00600	Boiler Nos. T1 and T2
7035003-010-25001	Coke Screening No. 1
7035003-010-25002	Coke Screening No. 2
0052-I003	Coke Screening No. 3
0052-I006	Fan Upgrade 1-3 PEC
0052-I007	Fan Upgrade 7-9 PEC
0052-I008	Fan Upgrade 13-15 PEC
0052-I005a	Fan Upgrade 19/20 PEC
0052-I002b	Ammonia Flare
0052-I004	Methanol/MEA Tanks
73-O-01138-P	Coke Battery 1
73-O-01136-P	Coke Battery 2
73-I-1135-P	Coke Battery 3
73-O-1130-P	Coke Battery 7
73-O-1131-P	Coke Battery 8
73-O-1137-P	Coke Battery 9
73-O-1127-P	Coke Battery 13
78-I-009	Coke Batteries 13-15 Rebuild
73-O-1126-P	Coke Battery 14
93-I-0010-P	Coke Battery 15
77-I-0019-P	Coke Battery 20
87-I-0031-P	PEC for 1-3
87-I-0032-P	PEC for 7-9
87-I-0037-P	PEC for 13-15
87-I-0033-P	PEC for 19/20
78-I-0083-P	Coke Battery B and Quench Tower
90-I-0031-P	Igniters for 1-3, 7-9, and 13-15
90-I-0032-P	Igniters for 19/20
90-I-0033-P	Igniters for B
73-O-1139-P	Quench Tower #1

73-O-1140-P	Quench Tower #3
73-O-1142-P	Quench Tower #5
73-O-1144-P	Quench Tower #7
73-O-1148-P	Coke Screening #1
73-O-1149-P	Coke Screening #2
GC-80-62	COG Desulfurization
73-I-3784-P	COG Desulfurization
7035003-010-8400	Sulfur Production (Claus Carbonate)
73-O-1153-P	Sulfur Production (Claus Carbonate)
7035003-010-25600	Gas Processing
73-O-1155-P	Gas Processing
91-I-0021-P	Benzene NESHAP By-Product Plant Emission Control
73-O-1161-P	Coal Chemical Recovery #1 Unit
7035003-010-25501	Coal Chemical Recovery #1 Unit
73-I-4035-P	Tanks
73-O-1162-P	Coal Chemical Recovery #2 Unit
7035003-010-25502	Coal Chemical Recovery #2 Unit
73-I-4036-C	Tanks
94-I-0096-C	Boiler #1
75-I-0019-C	Boiler #1
94-I-0019-C	Boiler #2
75-I-0020-C	Boiler #2
94-I-0091-C	Boilers R1 and R2
74-O-6090-C	Boilers R1 and R2
94-I-0093-C	Boilers T1 and T2
89-I-0003-C	Boilers T1 and T2
76-I-0067-C	Boilers T1 and T2
73-I-4034-P	No. 1 Tar Acid Tanks
73-I-4030-P	Tar Refining Tanks V-100 & V-101
73-I-4029-P	Tar Refining Tanks 3-A & 4-A
73-I-4028-P	Tar Refining Tanks 10, 11, & V-113
73-I-4027-P	Tar Refining Tanks 3 to 8 & T
73-I-4026-P	Road Tar Terminal V-200 to V-208 inclusive
0052-I011	C Battery
0052-I011b	Revised C Battery
0052-I013	Coke Screening #4
0052-I014a	Quench Towers 5A and 7A
0052-I015	Truck/ Railcar Loading and Process Tanks
0052-I016	Light Oil Loading Facility
0052-I017	1-Hour SO2 NAAQS
0052-I018	15 Battery Stack
0052-I020b	RACT II
0052-OP22a	Title V Operating Permit

Edgar Thomson Plant

7035003-002-93800	BOP
7035003-002-32300	BOP Slag Processing
92-I006-P	BOP Slag Processing
92-I0088-P	BOP Slag Processing
92-I066-P	BOP Slag Processing
7035003-002-90105	#1 Blast Furnace
7035003-002-31400	#1 Blast Furnace Hard Slag Pit
94-I-0026-P	#1 Blast Furnace Hard Slag Pit
4-1-0026-P	#1 Blast Furnace Hard Slag Pit
7035003-002-90107	#3 Blast Furnace

7035003-002-31401	#3 Blast Furnace Hard Slag Pit
94-I-0027-P	#3 Blast Furnace Hard Slag Pit
7035003-002-93900	Dual Slab Caster and Ladle Metallurgy Facility
90-I-003-P	Dual Slab Caster and Ladle Metallurgy Facility
95-I-006-P	RH Vacuum Degasser
94-I-006-P	RH Vacuum Degasser
7035003-004-99200	#2 Power House Riley Boilers #1, 2, & 3
7035003-002-99200	#2 Power House Riley Boilers #1, 2, & 3
0061559-000-73800	Waste Product Recycle & Briquetting Process
93-I-0039-P	Waste Product Recycle & Briquetting Process
0051-I004a	BOP Emission Control Upgrade
0051-I005	LMF Emission Control Upgrade
0051-I006	1-Hour SO2 NAAQS
0051-I008a	RACT II
0051-I009	Emergency Generators
0051-OP23	Title V Operating Permit

Irvin Plant

0050-I002a	Cold Reduction Mill
0050-I001b	64" Pickle Line
0050-I003	OCA Furnace #14
0050-I006	OCA Furnaces #15 and #16
0050-I007	Continuous Terne Line Molten Lead Pot Baghouse
0050-I008	1-Hour SO2 NAAQS
0050-I009	Irvin HSM
0050-OP24	Title V Operating Permit

United States Steel Corporation
Pennsylvania Department of Environmental Protection Permits

Fairless Plant

09-00006	Title V Operating Permit

Copies of Letters for Municipal Notifications

United States Steel Corporation
Mon Valley Works
P.O. Box 878, MS 100
Dravosburg, PA 15034

Via Electronic Mail:

May 8, 2025

Attn: County Commissioner Robert J. Harvie Jr.
Bucks County Administration Building
55 East Court Street
Doylestown, PA 18901
CommHarvie@buckscounty.org
webmaster@buckscounty.org

Subject: **County Notification of Air Permit Application**
U. S. Steel – Mon Valley Works – Fairless Plant
Facility No. TVOP 09-00006

Dear Commissioner Harvie,

Pursuant to Act 14, Section 1905-A (Cooperation with Municipalities), we are informing you of our intention to file an air permit application (operating permit modification), at the request of the Pennsylvania Department of Environmental Protection (PADEP), pursuant to 25 Pa. Code § 129.114(l), by June 30, 2025, for the Fairless Plant at:

United States Steel Corporation
Mon Valley Works – Fairless Plant
Fairless Hills, PA, Falls Township, Bucks County

The above mentioned Act 14, which became effective April 17, 1984, requests that applicants for Air Quality Permits under the Air Pollution Control Act must give written notification to each municipality or county in which the activities are located. The written notice is to be received by the local municipality or county at least 30 days before the Department of Environmental Protection issues or denies the permit. **Please confirm via email that you have received this notification.**

If you have any questions, please contact me at (412) 675-7382 or kkowalski@uss.com.

Sincerely,

Kaylene Kowalski
Environmental Dept.
Irvin and Fairless Plants
United States Steel Corporation

Tunno, Brett J

From: Comm. Harvie <commharvie@buckscounty.org>
Sent: Thursday, May 8, 2025 2:00 PM
To: Tunno, Brett J
Subject: [External]-Read: U. S. Steel - Fairless Plant - Notification of Intent to File Air Permit Application
Attachments: Read: U. S. Steel - Fairless Plant - Notification of Intent to File Air Permit Application

****

Please Be Advised

****

United States Steel Corporation
Mon Valley Works
P.O. Box 878, MS 100
Dravosburg, PA 15034

Via Electronic Mail

May 8, 2025

Attn: Falls Township Manager Matthew Takita
450 Lincoln Highway
Fairless Hills, PA 19030
m.takita@fallstwp.com
admin@fallstwp.com

Subject: **Municipal Notification of Air Permit Application**
U. S. Steel – Mon Valley Works – Fairless Plant
Facility No. TVOP 09-00006

Dear Mr. Takita,

Pursuant to Act 14, Section 1905-A (Cooperation with Municipalities), we are informing you of our intention to file an air permit application (operating permit modification), at the request of the Pennsylvania Department of Environmental Protection (PADEP), pursuant to 25 Pa. Code § 129.114(l), by June 30, 2025, for the Fairless Plant at:

United States Steel Corporation
Mon Valley Works – Fairless Plant
Fairless Hills, PA, Falls Township, Bucks County

The above mentioned Act 14, which became effective April 17, 1984, requests that applicants for Air Quality Permits under the Air Pollution Control Act must give written notification to each municipality in which the activities are located. The written notice is to be received by the local municipality or county at least 30 days before the Department of Environmental Protection issues or denies the permit. **Please confirm via email that you have received this notification.**

If you have any questions, please contact me at (412) 675-7382 or kkowalski@uss.com.

Sincerely,

Kaylene Kowalski
Environmental Dept.
Irvin and Fairless Plants
United States Steel Corporation

Tunno, Brett J

From: Rose Molle <r.molle@fallstwp.com>
To: Tunno, Brett J
Sent: Thursday, May 8, 2025 11:51 AM
Subject: Read: [External] U. S. Steel - Fairless Plant - Notification of Intent to File Air Permit Application

Your message

To: Rose Molle
Subject: [External] U. S. Steel - Fairless Plant - Notification of Intent to File Air Permit Application
Sent: Thursday, May 8, 2025 11:43:45 AM (UTC-05:00) Eastern Time (US & Canada)

was read on Thursday, May 8, 2025 11:51:14 AM (UTC-05:00) Eastern Time (US & Canada).

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR QUALITY FEES SCHEDULE

There are four different Fees Schedules.

1. Fees Schedule for New Plan Approval
2. Fees Schedule for Pending or Issued Plan Approval
3. Fees Schedule for State-Only Operating Permit
4. Fees Schedule for Title V Operating Permit

If the company is submitting a new plan approval application, the fees schedule for a "New Plan Approval" should be used. In this form, the company should check the appropriate boxes depending on the types of review requested and pay accordingly.

Similarly, if the company is submitting an Operating Permit application, the company should use the respective fees schedule for an Operating Permit, check all the appropriates boxes, and pay the fees required.

Please make the check payable to the "Commonwealth of Pennsylvania Clean Air Fund." Submit this fees schedule and the check with the application package to the appropriate regional office.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

QUALITY FEES FOR TITLE V OPERATING PERMIT

Company Information	
Federal Tax ID: 25-0996816	Firm Name: United States Steel Corporation
Permit # (If any): Operating Permit #09-00006	Facility Name: Mon Valley Works - Fairless Plant
Municipality: Falls Township	County: Bucks
Contact Person Name: Michael Dzurinko	Telephone Number: 412-233-1467
E-mail: mdzurinko@uss.com	

Title V Operating Permit

Line #	Check the appropriate box below	Type of Authorization	Fee 2021 - 2025	Total Fees
1	☐	New Application, Subchapter G	$5,000	
2	☐	Renewal	$4,000	
3	☐	Minor Modification	$1,500	
4	☒	Significant Modification	$4,000	$4,000
5	☐	Administrative Amendment / Change of Ownership	$1,500	
6	☐	Plantwide Applicability Limit (PAL) for NSR regulated pollutants or PAL for PSD regulated pollutants or both	$10,000	

Pay maximum amount of fee when one or more authorizations are requested. For example, when a renewal application and a change of ownership forms are submitted, please pay only the highest amount of fee ($4,000).

Copy of Permit Check

United States Steel Corporation
Pittsburgh, PA 15219

BMO HARRIS CENTRAL N.A. **1341078081**
ROSELLE, ILLINOIS

70-1558
719

DO NOT CASH UNLESS WARNING BAND AND CHECK BACKGROUND ARE BLUE. WATERMARK ON BACK, HOLD AT ANGLE TO VIEW.

05/16/2025

**********FOUR THOUSAND AND NO/100 DOLLARS**********

VOID AFTER 90 DAYS

PAY ONLY FOUR ZERO ZERO ZERO 00 CTS CTS

TO THE ORDER OF

PENNSYLVANIA COMMONWEALTH 0005
DEPT ENVIRONMENTAL PROTECTION
AIR QUALITY PROGRM-SE REGIONAL
2 EAST MAIN ST
NORRISTOWN, PA 19401-4915

AUTHORIZED SIGNATURE REQUIRED

⑈1341078081⑈ ⑆071915580⑆ 04⑉433⑉880⑉ 2⑈

United States Steel Corporation 05/16/2025 **1341078081**

For ERS Invoice Types: Contact Plant For Inquiries Please Visit: SteelTrack.uss.com BMOA

DIV. 74 PENNSYLVANIA COMMONWEALTH VENDOR CODE: 109100 - PAGE 1 OF 1

PO No.	Rel No.	Invoice Type	Invoice Date	Invoice No.	Discount	Net Remittance	Fac	Remit Comments
		STANDARD	05/08/2025	08-MAY-2025		4,000.00	817	IMMEDIATE CHECK

CHECK TOTAL: **4,000.00**

SQ-707-2 REV 2/23

Appendix A – USS NOx RACT III – Case by Case Analysis

United States Steel

February 28, 2025

Mr. James Rebarchak
Regional Air Quality Program Manager
Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 E. Main Street
Norristown, PA 19401-4915

Submitted via OnBase

RE: U. S. Steel Fairless Plant
Case by Case Analysis – 25 Pa. Code 129 RACT III

Mr. Rebarchak,

United States Steel Corporation (U. S. Steel) owns and operates a steel finishing facility located in Fairless Hills, Bucks County, Pennsylvania (Fairless Plant). Cold-rolled products are finished into galvanized sheet products at the site.

On January 30, 2025, U. S. Steel provided the Pennsylvania Department of Environmental Protection (PADEP) an initial notification in accordance with 25 Pa. Code 129.115(a). U. S. Steel committed to performing a case-by-case analysis in accordance with 25 Pa. Code 129.114 for Source ID 420 – Galvanizing Line Furnace. This document serves as that case-by-case analysis, which is required to be provided to PADEP by February 28, 2025.

Should you have any questions pertaining to this matter, please contact Kaylene Kowalski by phone at 412-675-7382 or by email at kkowalski@uss.com.

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Respectfully,

Kurt Barshick
Vice President
U. S. Steel – Mon Valley Works

NO_X REASONABLY AVAILABLE CONTROL TECHNOLOGY STUDY

U. S. Steel Corporation/ Fairless, Pennsylvania

Prepared By:

TRINITY CONSULTANTS
4500 Brooktree Road
Suite 310
Wexford, PA 15090

February 2025

Trinity Consultants

TABLE OF CONTENTS

LIST OF TABLES

1. BACKGROUND

United States Steel Corporation (U. S. Steel) owns and operates a steel finishing facility located in Fairless Hills, Bucks County, Pennsylvania (Fairless Plant). The Fairless Plant has historically been considered a minor source of nitrogen oxide (NO_x) emissions as it relates to Reasonably Available Control Technology (RACT) requirements. On July 30, 2024, the US Environmental Protection Agency (EPA) redesignated Bucks, Chester, Delaware, Montgomery and Philadelphia Counties as a serious nonattainment area for the 2015 Ozone NAAQS. This reclassification reduces the major source NO_x RACT threshold from 100 tons per year (tpy) to 50 tpy. The Title V permit for the Fairless Plant (TVOP 09-00006) contains a facility-wide less than 100 tpy NO_x restriction and, therefore, the Fairless Plant would be reclassified as a major source under NO_x RACT. As a major source for NO_x RACT, the Fairless Plant is subject to portions of 25 Pa. Code 129.111 through 129.115.

On January 30, 2025, U. S. Steel provided the Pennsylvania Department of Environmental Protection (PADEP) an initial notification in accordance with 25 Pa. Code 129.115(a).[1] The notification has been included as Appendix A for reference. The notification, which satisfied the initial notification requirement in the regulation as well as that communicated by PADEP via email[2], provided U. S. Steel's NO_x RACT requirement for each source of NO_x at the Fairless Plant. As outlined in Attachment A to the letter, U. S. Steel committed to performing a case-by-case analysis in accordance with 25 Pa. Code 129.114 for Source ID 420 – Galvanizing Line Furnace. This document serves as that case-by-case analysis, which is required to be provided to PADEP by February 28, 2025.

[1] Submitted via the electronic upload tool by Kaylene Kowalski (U. S. Steel) on January 30, 2025.

[2] Email from Southeast Regional Office to Kaylene Kowalski (U. S. Steel) on November 5, 2024

2. RACT DEFINITION AND METHODOLOGY

RACT, or Reasonably Available Control Technology, is required on existing major sources of NO_X (and VOC for major sources of VOC) in the ozone non-attainment area (NAA). At the federal level, RACT is not defined by statute or rule, rather it is defined in USEPA guidance 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."[3] Considering this definition, RACT involves identifying implementable control technologies with due consideration given to technological and economic feasibility. Since RACT considers the technological and economic impacts of controls, the analysis and determination may differ from source to source and location to location.

2.1 Top-Down Approach

In this RACT study, U. S. Steel is using USEPA's top-down approach to determining the feasibility of control technologies. The five steps in a top-down RACT evaluation can be summarized as follows:

- Step 1. Identify all possible control technologies
- Step 2. Eliminate technically infeasible options
- Step 3. Rank the technically feasible control technologies based upon emission reduction potential
- Step 4. Evaluate ranked controls based on energy, environmental, and/or economic considerations
- Step 5. Select RACT

The following sections contain a description of the five (5) basic steps of this "top-down" approach.

2.1.1 Step 1 – Identify All Control Options

In this step, available control technologies with the practical potential for application to the emission unit and regulated air pollutant in question are identified. The selected control technologies vary widely depending on the process technology and pollutant being controlled. The application of demonstrated control technologies in other similar source categories to the emission unit in question may also be considered in this step.

The following resources are typically consulted when identifying potential technologies for criteria pollutants:

- USEPA's RACT/BACT/LAER Clearinghouse (RBLC) database;
- NSPS, NESHAP, and RACT regulations for similar operations;
- Engineering experience with similar control applications; and
- Information provided by air pollution control equipment vendors with significant market share in the industry.

2.1.2 Step 2 – Eliminate Technically Infeasible Options

After control technologies are identified under Step 1, an analysis is conducted to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that prohibit the implementation of the control technology or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits, such as a New Source Performance Standard (NSPS) or National Emission Standard for Hazardous Air Pollutants (NESHAP). A

[3] 44 Fed. Reg. 53762 (9/17/1979)

control option is "technically feasible" if it has been "demonstrated" or if it is both "available" and "applicable."

2.1.3 Step 3 – Rank Remaining Control Options

All remaining technically feasible control options are ranked based on their overall control effectiveness for the pollutant under review. If there is only one remaining option or if all the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not required. Collateral impacts are usually not considered until step four of the five step top-down RACT analysis.

2.1.4 Step 4 – Evaluation of Most Effective Control Option

After identifying and ranking available and technically feasible control technologies, the economic, environmental, and energy impacts are evaluated to select the best control option. If collateral impacts do not disqualify the top-ranked option from consideration, it is selected as the basis for the RACT limit. Alternatively, in the judgment of the permitting agency, if economic, environmental, or energy considerations impact the top control option, the next most stringent option is evaluated. This process continues until a control technology is identified. This step validates the suitability of the top control option identified or provides a clear justification as to why the top option should not be selected as RACT.

2.1.5 Step 5 – Select RACT

In the final step, the RACT is determined for each emission unit under review based on evaluations from the previous step.

3. NO_X TOP-DOWN RACT STUDY

As noted in Section 1, a case-by-case RACT study is required for the galvanizing line furnace. The furnace has a total of 242 burners with a total firing capacity of 68.4 MMBtu/hr natural gas. This section provides the analysis for this source in accordance with the procedures outlined in Section 2.

3.1 Step 1 – Identify All Control Options

Step 1 in a top-down analysis is to identify all available control technologies. The evaluation of potential controls for NO_X emissions from furnaces includes both an investigation of end-of-pipe (post-combustion methods) and combustion modifications/optimization that reduce the formation of thermal NO_X. The basic complicating factor in efforts to reduce thermal NO_X from the steel industry is the fundamental need for high temperatures in order to work the materials (i.e., steel). Table 3-1 contains a list of the various technologies that have been identified as potentially applicable for the control of NO_X emissions.

Table 3-1. Potentially Available NO_X Control Technologies for Galvanizing Line Furnace

Potentially Applicable NO_X Control Technologies
Selective Non-Catalytic Reduction (SNCR)
Selective Catalytic Reduction (SCR)
Low NO_X or Ultra Low NO_X Burners (LNB or ULNB)
Good Combustion Practices

3.1.1 Review of Potentially Applicable NO_X Control Technologies

The following section provides a discussion of each potentially applicable technology identified above as it might be applied to the furnace at the Fairless Plant. The technical feasibility of each of the listed control options is discussed in Step 2.

3.1.2 Selective Non-Catalytic Reduction (SNCR)

SNCR uses ammonia (NH_3) or a urea solution [$CO(NH_2)_2$], injected into the gas stream, to chemically reduce NO_X to form N_2 and water. High temperatures, optimally between 1,600 to 2,400°F, promote the reaction via the following equation:

$$CO(NH_2)_2 + 2\ NO + \tfrac{1}{2}\ O_2 \rightarrow 2\ N_2 + CO_2 + 2\ H_2O$$
$$4\ NH_3 + 6NO \rightarrow 5\ N_2 + 6\ H_2O$$

At temperatures below the optimal range, unreacted ammonia can pass through the SNCR and be emitted from the stack (known as "ammonia slip"). At temperatures above the range, ammonia may be combusted, generating additional NO_X. In addition, an effective mixing of gases and entrainment of the reductant into the exhaust gases at the injection point is a critical factor in ensuring an efficient reaction. SNCR is being employed on various types of combustion sources in a wide range of sizes, including industrial boilers, electric utility steam generators, thermal incinerators, cement kilns, and industrial process furnaces in

various sectors.[4] SNCR is not suitable for sources where the residence time is too short (reducing conversion of reactants), temperatures or NO_X concentrations are too low (slowing reaction kinetics), the reagent would contaminate the product, or no suitable location exists for installing reagent injection ports. Expected removal efficiencies for SNCR are dependent on many factors, including the reagent type, injection rate, pre-control NO_X concentration as well as CO and O_2 concentrations, temperature, and residence time.[5]

3.1.3 Selective Catalytic Reduction (SCR)

Like SNCR, SCR is also a post-combustion NO_X control technology which removes NO_X from flue gas based on the chemical reaction of a NO_X reducing agent (typically ammonia); however, in the case of SCR this takes place using a metal-based catalyst. An ammonia or urea reagent is injected into the exhaust gas and the reaction of NO_X and oxygen occurs on the surface of a catalyst which lowers the activation energy required for NO_X decomposition into nitrogen gas and water vapor. Reactor design, operating temperature, sulfur content of the fuel, catalyst de-activation due to aging, ammonia slip emissions, and the ammonia injection system design are all important technical factors for effective SCR operation. Generally, SCR can achieve higher control efficiencies and be applied to a broader and lower range of exhaust temperatures relative to SNCR. However, this is accompanied by significantly higher capital and operating costs. Another primary disadvantage of an SCR system is that particles from the catalyst may become entrained in the exhaust stream and contribute to increased particulate matter emissions. In addition, ammonia slip reacts with the sulfur in the fuel creating ammonia bisulfates that become particulate matter.

The primary chemical reactions for an SCR unit can be expressed as follows:

$$4\ NH_3 + 4\ NO + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$
$$4\ NH_3 + 2\ NO_2 + 2\ O_2 \rightarrow 3\ N_2 + 6\ H_2O$$

The general temperature range for the majority of commercial SCR system catalysts is 480 to 800°F; operation outside the optimum temperature range can result in increased ammonia slip or increased NO_X emissions. The maximum removal efficiency is associated with temperatures between 700 and 750°F, with efficiency drastically reduced at temperatures below 600°F.[6]

3.1.4 Low NO_X Burners (LNBs)

The principle of all LNBs is the same: step-wise or staged combustion and localized exhaust gas recirculation at the flame is employed. LNBs are designed to control fuel and air mixing to create larger and more branched flames. Peak flame temperatures are reduced and the flame structure reduces oxygen supply to the hottest part of the flame, resulting in less NO_X formation. LNB retrofits on existing units must carefully consider furnace geometry, as the LNB flame diameters and lengths are typically larger and can impinge on furnace walls which may lead to reduced control efficiencies.

3.1.5 Good Combustion Practices/Proper Furnace Operation/Minimize Excess Air

The formation of NO_X is minimized by proper combustion unit design and operation. Generally, emissions are minimized when the operating temperatures are kept at the lower end of the desired range. The

[4] Air Pollution Control Cost Manual, Section 4.2, Chapter 1, Selective Non-Catalytic Reduction, NO_X Control, EPA Form 2220-1.(rev. 4-77), Page 1-1.

[5] Air Pollution Control Cost Manual, Section 4.2, Chapter 1, Selective Non-Catalytic Reduction, NO_X Control, EPA Form 2220-1.(rev. 4-77), Page 1-2.

[6] Air Pollution Control Cost Manual, Section 4.2, Chapter 2, Selective Catalytic Reduction, July 2019, Page 20.

controlled distribution of air at the air and fuel injection zones can also help minimize NO_X formation. Ideally, maintaining a low-oxygen condition near fuel injection points approaches an off-stoichiometric staged combustion process. A certain amount of air is required to provide sufficient oxygen to burn all of the fuel introduced to the furnace. However, excess air contributes to increased NO_X emissions through increasing the amount of air that must be heated (i.e., decreasing fuel efficiency and resulting in higher NO_X emissions) and providing more oxygen in the combustion zone which can in turn lead to greater amounts of thermal NO_X formation. By minimizing the amount of air used in the combustion process while maintaining proper furnace operation, the formation of NO_X can be reduced.

3.2 Step 2 – Eliminate Technically Infeasible Options

3.2.1 SNCR/SCR

As noted in prior sections, efficient SCR systems generally require exhaust temperatures between 480°F to 800°F for NO_X removal. Operation of SCR systems within this temperature range is critical to avoid damage to the catalyst bed. The flue gas exhaust temperatures from the galvanizing line furnace are at approximately 500°F, which is at, or near, the lower bound of the range of the operating temperature for SCR systems. As such, the flue gas temperature would require reheating through the firing of supplemental natural gas which would result in additional fuel cost and generate additional NO_X. While there is a risk of product contamination from contact with the reagent in this direct-fired furnace, SCR technology has been presumed to be technically feasible.

Efficient SNCR systems require exhaust temperatures between 1,600 to 2,400°F for optimal NO_X removal. As noted above, the flue gas temperatures from the galvanizing line furnace are significantly lower than the optimum temperature range for efficient SNCR systems. The flue gases would have to be reheated by using natural gas to raise the gas temperatures in the range of 1,600 to 2,400 °F for effective reaction of NO_X with ammonia. This would require significant fuel cost and generate additional NO_X from the combustion of natural gas. Further, the uncontrolled concentration of NO_X in the exhaust gas from the furnace is approximately 30 ppm, as shown in Appendix B, which is well below the effective SNCR threshold of > 200 ppm. For these reasons, SNCR is deemed technically infeasible for RACT purposes for the galvanizing line furnace.

3.2.2 LNBs

LNB is a potentially feasible control option for the galvanizing line furnace. As part of the RACT study, U. S. Steel evaluated the economic feasibility of replacing the existing burners in the affected furnace with LNBs capable of meeting the presumptive NO_X limit for similarly sized furnaces (i.e., 0.1 lb/MMBtu). The emissions reduction and associated cost-effectiveness are discussed in Step 4.

3.2.3 Good Combustion Practices/Proper Furnace Operation/Minimize Excess Air

Good combustion practices are a feasible option for the galvanizing line furnace. U. S. Steel employs certain practices such as annual adjustments/tune-ups and operating and maintaining the furnace in accordance with manufacturer recommendations.

3.3 Step 3 – Rank Remaining Control Options

The remaining technically feasible NO_X control technologies for the affected source are as follows:

Table 3-2. Remaining Control Options for Galvanizing Line Furnace

Galvanizing Line Furnace
SCR LNBs Good Combustion Practices

The cost effectiveness of the remaining technically feasible NO_X control technologies are discussed in Step 4 below.

3.4 Step 4 – Evaluation of Most Effective Control Option

The capital and operating costs as well as cost-effectiveness of the different control options should be calculated in a manner consistent with the most recent edition of the "United States Environmental Protection Agency Air Pollution Control Cost Manual".

3.4.1 SCR

U. S. Steel evaluated the economic feasibility of retrofitting the galvanizing line furnace with SCR to meet the proposed presumptive NO_X limit (i.e., 0.1 lb/MMBtu). U. S. Steel performed cost calculations (shown in Appendix C) for installing SCR on the furnace using EPA's Air Pollution Control Cost Manual (CCM), Section 4, Chapter 2 (SCR), NO_X Controls. Despite some technical concerns noted in Section 3.1.2, including lower starting point concentrations[7] as well as the exhaust temperature being on the extreme low end of the ideal temperature range for SCR, U. S. Steel assumed an 80 percent control efficiency for this application. The emissions reduction for the furnace is conservatively calculated based on the maximum potential emission rate (emission factor multiplied by maximum capacity).

Table 3-3 below summarizes the cost-effectiveness assessment of retrofitting SCR utilizing USEPA's SCR cost spreadsheet based on the 2019 CCM. The detailed cost calculations are shown in Appendix C C.

Table 3-3. Cost Effectiveness of SCR (Maximum Actuals Basis)

Source Description	Total Capital Investment	Total Annualized Cost	Cost Effectiveness ($/ton)
Galvanizing Line Furnace	$3,697,627	$1,024,347	$19,516

As shown in the above table, retrofit installation of SCR on the galvanizing line furnace is not economically feasible.

3.4.2 LNBs

Similar to the SCR cost effectiveness evaluation, U. S. Steel evaluated the economic feasibility of replacing the existing burners in the galvanizing line furnace with LNBs. The emissions reduction and associated cost-effectiveness assessments are calculated assuming the following:

[7] U.S. EPA, Technology Transfer Network, Clean Air Technology Center. "Air Pollution Control Technology Fact Sheet – Selective Catalytic Reduction." File number EPA-452/F-03-032. https://www3.epa.gov/ttncatc1/dir1/fscr.pdf (Accessed February 11, 2025).

- U. S. Steel utilized LNB vendor quotes for a similar galvanizing line furnace at its Pro-Tec facility in Ohio to perform this cost effectiveness evaluation. The vendor quote for each burner was used to estimate the total burner replacement cost for this furnace.
- The cost analysis utilizes the vendor guaranteed NO_X emission factor of 0.065 lb/MMBtu that was provided to the Pro-Tec facility. U. S. Steel notes that this guarantee was specific to the Pro-Tec facility and there is no assurance that the vendor would guarantee the same emission rate at Fairless. Nevertheless, U. S. Steel used this emission rate as a conservative estimate given that it is lower than the presumptive NO_X RACT limit for similarly sized furnaces (i.e., 0.1 lb/MMBtu).
- The emissions reduction for the furnace is conservatively calculated based on the maximum potential emission rate (emission factor multiplied by maximum capacity).

The emissions reduction and associated cost-effectiveness assessments are shown in Table 3-4 and Table 3-5, respectively. Detailed cost calculations are shown in Appendix C.

Table 3-4. Emission Reductions for the Galvanizing Line Furnace

Emission Unit	Annual Fuel Usage (MMBtu/yr)	Baseline Emission Factor (lb/MMBtu)	LNB Emission Factor (lb/MMBtu)	Emissions Reduction (tpy)
Galvanizing Line Furnace	599,184	0.219	0.065[a]	46.11

a. *As previously noted, a vendor guaranteed NO_X emission factor of 0.065 lb/MMBtu for a similar galvanizing line annealing furnace at U. S. Steel's Pro-Tec facility was used as a conservative approach. U. S. Steel notes that this guarantee was specific to the Pro-Tec facility and there is no assurance that the vendor would guarantee the same emission rate at Fairless.*

Table 3-5. Cost-Effectiveness of Installing LNBs for the Galvanizing Line Furnace

Emission Unit	Total Capital Investment	Total Indirect Annual Costs	NO_X removed (tpy)	Cost Effectiveness ($/ton)
Galvanizing Line Furnace	$22,933,897	$6,585,806	46.11	$142,837

As shown in Table 3-5, it is not economically feasible to replace the existing burners in the galvanizing line furnace with LNBs.

3.4.3 Good Combustion Practices/Proper Furnace Operation/Minimize Excess Air

U. S. Steel employs certain practices such as annual adjustments/tune-ups and operating and maintaining the furnace in accordance with manufacturer recommendations. Since these practices are already in place, there is no additional cost considerations. Therefore, good combustion practices are economically feasible.

3.5 Step 5 – Select RACT

As presented in the above sections, there are no emission reduction add-on control options that are both technically and economically feasible for the galvanizing line furnace. As such, the only remaining technically

and economically feasible control technology is good combustion practices. The Fairless Plant proposes to continue to employ good combustion management practices as RACT III for the source listed above. This will continue to be demonstrated through maintaining and operating the source in accordance with manufacturer specifications as well as adhering to the existing permit requirement to conduct an adjustment or tune-up on an annual basis.

APPENDIX A. JANUARY 2025 RACT III NOTIFICATION

United States Steel

January 30, 2025

Mr. James Rebarchak
Regional Air Quality Program Manager
Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 E. Main Street
Norristown, PA 19401-4915

Submitted via OnBase

RE: U. S. Steel Fairless Plant
Initial Notification – 25 Pa. Code 129 RACT III

Mr. Rebarchak,

United States Steel Corporation (U. S. Steel) owns and operates a steel finishing facility located in Fairless Hills, Bucks County, Pennsylvania (Fairless Plant). Cold-rolled products are finished into galvanized sheet products at the site. This letter satisfies the initial notification requirements contained in 25 Pa. Code 129.115a and as communicated by the Department via email[1].

The Fairless Plant has historically been considered a minor source of nitrogen oxide (NO_x) emissions as it relates to Reasonably Available Control Technology (RACT) requirements. On July 30, 2024, the US Environmental Protection Agency (EPA) redesignated Bucks, Chester, Delaware, Montgomery and Philadelphia Counties as a serious nonattainment area for the 2015 Ozone NAAQS. This reclassification reduces the major source NO_x RACT threshold from 100 tons per year (tpy) to 50 tpy. The Title V permit for the Fairless Plant (TVOP 09-00006) contains a facility-wide less than 100 tpy NO_x restriction and, therefore, the Fairless Plant would be reclassified as a major source under NO_x RACT. As a major source for NO_x RACT, the Fairless Plant is subject to portions of 25 Pa. Code 129.111 through 129.115:

1. Section 129.111 provides applicability information;
2. Section 129.112 outlines presumptive RACT requirements;
3. Section 129.114 states the requirement and method for case-by-case RACT proposals; and
4. Section 129.115 provides for notifications (including this initial notification due January 31, 2025), compliance demonstrations and recordkeeping and reporting requirements.

This letter is being submitted to meet the initial notification requirements of RACT III per 25 Pa. Code 129.115(a). The attachments to this letter are as follows:

- Attachment A contains the required information for the applicable equipment to satisfy 25 Pa. Code 129.115(a)(2) and 129.115(a)(5) through (7). Attachment A also contains facility information.
- Attachment B summarizes each RACT III citation referenced in Appendix A table of information.

As noted in Attachment A, U. S. Steel will be performing a case-by-case RACT proposal for Source ID 420 – Galvanizing Line Furnace. The case-by-case RACT submissions will be made to the Department by February 28, 2025.

---

[1] Email from Southeast Regional Office to Kaylene Kowalski (U. S. Steel) on November 5, 2024

Should you have any questions pertaining to this matter, please contact Kaylene Kowalski by phone at 412-675-7382 or by email at kkowalski@uss.com.

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Respectfully,

Kurt Barshick
Vice President
U. S. Steel – Mon Valley Works

cc: Kaylene Kowalski (USS)
Mike Dzurinko (USS)
Brett Tunno (USS)
Chris Hardin (USS)
Matthew DeLibero (USS)
Mike Benner (USS)

Attachments

ATTACHMENT A –RACT III NO_x Initial Notification Information

Source ID	Source Description	Equipment Make	Equipment Model	NO_x RACT Compliance Option	NO_x RACT Requirement	NO_x RACT Requirement Citation	NO_x RACT Compliance Demonstration	NO_x RACT Compliance Demonstration Citation
048	Gal3 Steam Boiler	Johnston Boiler Co.	PFTAR750-4G150S 31.2 MMBtu/hr Natural-gas fired	Presumptive	Biennial tune-up	129.112(b)(1)	Tune-ups and recordkeeping.	129.115(f), 129.115(i) and 129.115(k)
420	Galvanizing Line Furnace	General Electric Co.	Direct-fired furnace 68.4 MMBtu/hr Natural-gas fired	Case-By-Case	Case-By-Case	129.114	To be determined	To be determined
422	Galvanneal Furnace	Surface Combustion, Inc.	16.0 MMBtu/hr Natural-gas fired	Presumptive	Install, maintain, and operate in accordance with manufacturer's specifications and good operating practices	129.112(c)(4)	Operating practices and recordkeeping.	129.115(f) and 129.115(k)
Part of 426 (Misc. NG Usage)	Thirty-seven (37) Space Heaters	Dravo Corp.	100-I-SGA 1.25 MMBtu/hr, each	Exempt	Potential to emit for each heater (0.55 tpy) is less than 1 tpy NO_x. See attached calculations.	129.111(c)	NA - Exempt	N/A – Records per 129.115(h)
	Space Heater	Cambridge Engineering, Inc.	C2500 2.5 MMBtu/hr	Presumptive	Install, maintain, and operate in accordance with manufacturer's specifications and good operating practices	129.112(c)(4)	Operating practices and recordkeeping.	129.115(f) and 129.115(k)

Source ID	Source Description	Equipment Make	Equipment Model	NO_x RACT Compliance Option	NO_x RACT Requirement	NO_x RACT Requirement Citation	NO_x RACT Compliance Demonstration	NO_x RACT Compliance Demonstration Citation
	Chem Treat Dryer	Eclipse Combustion, Inc.	AH-O 120 1.2 MMBtu/hr	Exempt	Potential to emit (0.44 tpy) is less than 1 tpy NO_x. See attached calculations.	129.111(c)	NA - Exempt	N/A – Records per 129.115(g)
	Zinc Pot Dryer	Eclipse Combustion, Inc.	50 Minimatic 1.0 MMBtu/hr	Exempt	Potential to emit (0.53 tpy) is less than 1 tpy NO_x. See attached calculations.	129.111(c)	NA - Exempt	N/A – Records per 129.115(h)
100	Parts Washer	N/A	N/A	N/A – Not a NO_x Source				
N/A	Storage Tanks	N/A	N/A	N/A – Not a NO_x Source				

ATTACHMENT B – RACT III Citation Summary

RACT Citation	Citation Summary
129.111(c)	Sections 129.112—129.114 do not apply to the owner and operator of a NOx air contamination source that has the potential to emit less than 1 TPY of NOx located at a major NOx emitting facility subject to subsection (a) or (b) or a VOC air contamination source that has the potential to emit less than 1 TPY of VOC located at a major VOC emitting facility subject to subsection (a) or (b). The owner or operator shall identify and list these sources in the written notification required under § 129.115(a).
129.112(b)(1)	Combustion unit or process heater with a rated heat input equal to or greater than 20 million Btu/hour and less than 50 million Btu/hour shall conduct a biennial tune-up in accordance with the procedures in 40 CFR 63.11223 (relating to how do I demonstrate continuous compliance with the work practice and management practice standards?). (A) Each biennial tune-up shall occur not less than 3 months and not more than 24 months after the date of the previous tune-up. (B) The biennial tune-up must include, at a minimum, the following: (I) Inspection and cleaning or replacement of fuel-burning equipment, including the burners and components, as necessary, for proper operation as specified by the manufacturer. (II) Inspection of the flame pattern and adjustment of the burner, as necessary, to optimize the flame pattern to minimize total emissions of NO_x and, to the extent possible, emissions of CO. (III) Inspection and adjustment, as necessary, of the air-to-fuel ratio control system to ensure proper calibration and operation as specified by the manufacturer.
129.112(c)(4)	A boiler or other combustion source with a rated heat input less than 20 million Btu/hr located at a major NOx emitting facility or major VOC emitting facility and is subject to 129.111 shall install, maintain, and operate the source in accordance with the manufacturer's specification with good operating practices.
129.115(g)	Beginning with the compliance date specified in § 129.112(a), the owner or operator of an air contamination source claiming that the air contamination source is exempt from the applicable NO_x emission rate threshold specified in § 129.114(b) and the requirements of § 129.112 based on the air contamination source's potential to emit shall maintain records that demonstrate to the Department or appropriate approved local air pollution control agency that the air contamination source is not subject to the specified emission rate threshold.
129.115(i)	The owner or operator of a combustion unit or process heater subject to 129.112(b) shall record each adjustment conducted under the procedures in § 129.112(b). This record must contain, at a minimum: (1) The date of the tuning procedure. (2) The name of the service company and the technician performing the procedure. (3) The final operating rate or load. (4) The final NO_x and CO emission rates. (5) The final excess oxygen rate. (6) Other information required by the applicable operating permit.

U. S. Steel Corporation Mon Valley Works, Fairless Hills Plant

Source	Furnace Rating, mmbtu/hr	NOx emission factor, lbs/mmbtu[1]	PTE NOx, tons	
Space Heaters - Dravo Corp (each)	1.25	0.100	0.55	(per heater)
Space Heaters - Cambridge	2.5	0.100	1.10	
Zinc Pot Dryer [1]	1.0	0.100	0.44	
Chemtreat Dryer [1]	1.2	0.100	0.53	

[1] Emission factor from AP-42 Section 1.4, small boilers less than 100 MMBtu/hr

APPENDIX B. STACK TEST DATA EXCERPT

TABLE 1

SUMMARY OF EMISSION RESULTS
NITROGEN OXIDE EMISSIONS
U.S. STEEL CORPORATION
FAIRLESS PLANT
SEPTEMBER 4-5, 2014
GALVANIZING LINE EXHAUST

Parameter	Run 1
Gas Flow (cfm)-rated fan output	90000
Oxygen concentration, %	17.64
Natural Gas F-factor, dscf/mmBtu	8710
Natural Gas usage, mmcf/hr	0.0725
Nitrogen Oxides Emissions	
ppmv	29.90
lb/hr	19.276
lb/mmcf	265.88
lb/mmBtu (based on Method 19)	0.199

APPENDIX C. COST CALCULATIONS

Data Inputs - Fairless Plant Source ID 420

Enter the following data for your combustion unit:

Is the combustion unit a utility or industrial boiler? Industrial

What type of fuel does the unit burn? Natural Gas

Is the SCR for a new boiler or retrofit of an existing boiler? Retrofit

Please enter a retrofit factor between 0.8 and 1.5 based on the level of difficulty. Enter 1 for projects of average retrofit difficulty. 1

Complete all of the highlighted data fields:

What is the maximum heat input rate (QB)? 68.4 MMBtu/hour

What is the higher heating value (HHV) of the fuel? 1,033 Btu/scf

*HHV value of 1033 Btu/scf is a default value. See below for data source. Enter actual HHV for fuel burned, if known.

What is the estimated actual annual fuel consumption? 580,042,594 scf/Year

Enter the net plant heat input rate (NPHR) 8.2 MMBtu/MW

If the NPHR is not known, use the default NPHR value:

Fuel Type	Default NPHR
Coal	10 MMBtu/MW
Fuel Oil	11 MMBtu/MW
Natural Gas	8.2 MMBtu/MW

Plant Elevation 5 Feet above sea level

Not applicable to units burning fuel oil or natural gas

Type of coal burned: Not Applicable

Enter the sulfur content (%S) = percent by weight

Not applicable to units burning fuel oil or natural gas

Note: The table below is pre-populated with default values for HHV and %S. Please enter the actual values for these parameters in the table below. If the actual value for any parameter is not known, you may use the default values provided.

Coal Type	Fraction in Coal Blend	%S	HHV (Btu/lb)
Bituminous	0	1.84	11,841
Sub-Bituminous	0	0.31	8,971
Lignite	0	0.92	6,685

Please click the calculate button to calculate weighted average values based on the data in the table above.

For coal-fired boilers, you may use either Method 1 or Method 2 to calculate the catalyst replacement cost. The equations for both methods are shown on rows 85 and 86 on the ***Cost Estimate*** tab. Please select your preferred method:

- Method 1
- Method 2
- Not applicable

Enter the following design parameters for the proposed SCR:

Number of days the SCR operates (t_{SCR})	365 days
Number of days the boiler operates (t_{plant})	365 days
Inlet NO_x Emissions (NOx_{in}) to SCR	0.219 lb/MMBtu
Outlet NO_x Emissions (NOx_{out}) from SCR	0.044 lb/MMBtu
Stoichiometric Ratio Factor (SRF)	1.050

*The SRF value of 1.05 is a default value. User should enter actual value, if known.

Number of SCR reactor chambers (n_{scr})	1
Number of catalyst layers (R_{layer})	3
Number of empty catalyst layers (R_{empty})	1
Ammonia Slip (Slip) provided by vendor	2 ppm
Volume of the catalyst layers ($Vol_{catalyst}$) (Enter "UNK" if value is not known)	UNK Cubic feet
Flue gas flow rate ($Q_{flue gas}$) (Enter "UNK" if value is not known)	UNK acfm

Estimated operating life of the catalyst ($H_{catalyst}$)	24,000 hours
Estimated SCR equipment life	25 Years*

* For industrial boilers, the typical equipment life is between 20 and 25 years.

Gas temperature at the SCR inlet (T)	500 °F
Base case fuel gas volumetric flow rate factor (Q_{fuel})	484 ft^3/min-MMBtu/hour

Concentration of reagent as stored (C_{stored})	29 percent*
Density of reagent as stored (ρ_{stored})	56 lb/cubic feet*
Number of days reagent is stored ($t_{storage}$)	14 days

*The reagent concentration of 29% and density of 56 lbs/cft are default values for ammonia reagent. User should enter actual values for reagent, if different from the default values provided.

Densities of typical SCR reagents:

50% urea solution	71 lbs/ft^3
29.4% aqueous NH_3	56 lbs/ft^3

Select the reagent used: Ammonia

Enter the cost data for the proposed SCR:

Desired dollar-year	2024		
CEPCI for 2024	791 Enter the CEPCI value for 2024	541.7	2016 CEPCI
Annual Interest Rate (i)	7.5 Percent	(bank prime rate; Jan. 2025)	
Reagent ($Cost_{reag}$)	0.293 $/gallon for 29% ammonia*		
Electricity ($Cost_{elect}$)	0.0676 $/kWh		
Catalyst cost ($CC_{replace}$)	$/cubic foot (includes removal and disposal/regeneration of existing catalyst and installation of new catalyst) 227.00		
Operator Labor Rate	60.00 $/hour (including benefits)*		
Operator Hours/Day	4.00 hours/day*		

CEPCI = Chemical Engineering Plant Cost Index (Final 9/24 value)

* $0.293/gallon is a default value for 29% ammonia. User should enter actual value, if known.

* $0.0676/kWh is a default value for electricity cost. User should enter actual value, if known.

* $227/cf is a default value for the catalyst cost based on 2016 prices. User should enter actual value, if known.

* $60/hour is a default value for the operator labor rate. User should enter actual value, if known.

* 4 hours/day is a default value for the operator labor. User should enter actual value, if known.

Note: The use of CEPCI in this spreadsheet is not an endorsement of the index, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Maintenance and Administrative Charges Cost Factors:

Maintenance Cost Factor (MCF) =	0.005
Administrative Charges Factor (ACF) =	0.03

SCR Design Parameters

The following design parameters for the SCR were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Parameter	Equation	Calculated Value	Units	
Maximum Annual Heat Input Rate (Q_B) =	HHV x Max. Fuel Rate =	68	MMBtu/hour	
Maximum Annual fuel consumption (mfuel) =	(QB x 1.0E6 x 8760)/HHV =	580,042,594	scf/Year	
Actual Annual fuel consumption (Mactual) =		580,042,594	scf/Year	
Heat Rate Factor (HRF) =	NPHR/10 =	0.82		
Total System Capacity Factor (CF_{total}) =	(Mactual/Mfuel) x (tscr/tplant) =	1.000	fraction	
Total operating time for the SCR (t_{op}) =	CF_{total} x 8760 =	8760	hours	
NOx Removal Efficiency (EF) =	$(NOx_{in} - NOx_{out})/NOx_{in}$ =	80.0	percent	
NOx removed per hour =	NOx_{in} x EF x Q_B =	11.98	lb/hour	
Total NO_x removed per year =	$(NOx_{in}$ x EF x Q_B x $t_{op})/2000$ =	52.49	tons/year	
NO_x removal factor (NRF) =	EF/80 =	1.00		
Volumetric flue gas flow rate ($q_{flue\ gas}$) =	Q_{fuel} x QB x (460 + T)/(460 + 700)n_{scr} =	27,398	acfm	
Space velocity (V_{space}) =	$q_{flue\ gas}/Vol_{catalyst}$ =	52.00	/hour	
Residence Time	$1/V_{space}$	0.02	hour	
Coal Factor (CoalF) =	1 for oil and natural gas; 1 for bituminous; 1.05 for sub-bituminous; 1.07 for lignite (weighted average is used for coal blends)	1.00		
SO_2 Emission rate =	(%S/100)x(64/32)*1x10^6)/HHV =			Not applicable; factor applies only to coal-fired boilers
Elevation Factor (ELEVF) =	14.7 psia/P =			Not applicable; elevation factor does not apply to plants located at elevations below 500 feet.
Atmospheric pressure at sea level (P) =	2116 x [(59-(0.00356xh)+459.7)/518.6]$^{5.256}$ x (1/144)* =	14.7	psia	
Retrofit Factor (RF)	Retrofit to existing boiler	1.00		

* Equation is from the National Aeronautics and Space Administration (NASA), Earth Atmosphere Model. Available at https://spaceflightsystems.grc.nasa.gov/education/rocket/atmos.html.

Catalyst Data:

Parameter	Equation	Calculated Value	Units
Future worth factor (FWF) =	(interest rate)(1/((1+ interest rate)^Y -1) , where Y = $H_{catalyts}/(t_{SCR}$ x 24 hours) rounded to the nearest integer	0.3095	Fraction
Catalyst volume ($Vol_{catalyst}$) =	2.81 x Q_B x EF_{adj} x Slipadj x NOx_{adj} x S_{adj} x (T_{adj}/N_{scr})	526.85	Cubic feet
Cross sectional area of the catalyst ($A_{catalyst}$) =	$q_{flue\ gas}$ /(16ft/sec x 60 sec/min)	29	ft^2
Height of each catalyst layer (H_{layer}) =	($Vol_{catalyst}/(R_{layer}$ x $A_{catalyst})$) + 1 (rounded to next highest integer)	7	feet

SCR Reactor Data:

Parameter	Equation	Calculated Value	Units
Cross sectional area of the reactor (A_{SCR}) =	1.15 x $A_{catalyst}$	33	ft^2
Reactor length and width dimensions for a square reactor =	$(A_{SCR})^{0.5}$	5.7	feet
Reactor height =	(R_{layer} + R_{empty}) x (7ft + h_{layer}) + 9ft	66	feet

Reagent Data:

Type of reagent used: Ammonia

Molecular Weight of Reagent (MW) = 17.03 g/mole

Density = 56 lb/ft^3

Parameter	Equation	Calculated Value	Units
Reagent consumption rate ($m_{reagent}$) =	(NOx_{in} x Q_B x EF x SRF x MW_R)/MW_{NOx} =	5	lb/hour
Reagent Usage Rate (m_{sol}) =	$m_{reagent}$/Csol =	16	lb/hour
	(m_{sol} x 7.4805)/Reagent Density	2	gal/hour
Estimated tank volume for reagent storage =	(m_{sol} x 7.4805 x $t_{storage}$ x 24)/Reagent Density =	800	gallons (storage needed to store a 14 day reagent supply rounded to th

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	i $(1+ i)^n/(1+ i)^n$ - 1 = Where n = Equipment Life and i= Interest Rate	0.0897

Other parameters	Equation	Calculated Value	Units
Electricity Usage: Electricity Consumption (P) =	A x 1,000 x 0.0056 x (CoalF x HRF)$^{0.43}$ = where A = (0.1 x QB) for industrial boilers.	35.17	kW

Cost Estimate

Total Capital Investment (TCI)

TCI for Oil and Natural Gas Boilers

For Oil and Natural Gas-Fired Utility Boilers between 25MW and 500 MW:

$$TCI = 86{,}380 \times (200/B_{MW})^{0.35} \times B_{MW} \times ELEVF \times RF$$

For Oil and Natural Gas-Fired Utility Boilers >500 MW:

$$TCI = 62{,}680 \times B_{MW} \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers between 275 and 5,500 MMBTU/hour :

$$TCI = 7{,}850 \times (2{,}200/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers between 205 and 4,100 MMBTU/hour :

$$TCI = 10{,}530 \times (1{,}640/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers >5,500 MMBtu/hour:

$$TCI = 5{,}700 \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers >4,100 MMBtu/hour:

$$TCI = 7{,}640 \times Q_B \times ELEVF \times RF$$

Total Capital Investment (TCI) =	$3,697,627	in 2024 dollars

The TCI has been adjusted to include an additional cost of $500,000 for new duct burners and associated equipment needed to reheat the flue gas from the No. 2 Galvanizing Line Annealing Furnace. U. S. Steel estimated the additional capital cost based on cost estimates for a similar project at its Great Lakes, Michigan facility.

Annual Costs

Total Annual Cost (TAC)

TAC = Direct Annual Costs + Indirect Annual Costs

Direct Annual Costs (DAC) =		$689,820 in 2024 dollars
Indirect Annual Costs (IDAC) =		$334,527 in 2024 dollars
Total annual costs (TAC) = DAC + IDAC		$1,024,347 in 2024 dollars

Direct Annual Costs (DAC)

DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electricity Cost) + (Annual Catalyst Cost)

Annual Maintenance Cost =	0.005 x TCI =	$18,488 in 2024 dollars
Annual Reagent Cost =	$m_{sol} \times Cost_{reag} \times t_{op}$ =	$5,506 in 2024 dollars
Annual Electricity Cost =	$P \times Cost_{elect} \times t_{op}$ =	$20,827 in 2024 dollars
Annual Catalyst Replacement Cost =		$12,338 in 2024 dollars
Annual Natural Gas Cost for Reheat =	NG_{Cost}	$632,660 in 2024 dollars
	$n_{scr} \times Vol_{cat} \times (CC_{replace}/R_{layer}) \times FWF$	
Direct Annual Cost =		$689,820 in 2024 dollars

Indirect Annual Cost (IDAC)

IDAC = Administrative Charges + Capital Recovery Costs

Administrative Charges (AC) =	0.03 x (Operator Cost + 0.4 x Annual Maintenance Cost) =	$2,850 in 2024 dollars
Capital Recovery Costs (CR)=	CRF x TCI =	$331,677 in 2024 dollars
Indirect Annual Cost (IDAC) =	AC + CR =	$334,527 in 2024 dollars

Cost Effectiveness

Cost Effectiveness = Total Annual Cost/ NOx Removed/year

Total Annual Cost (TAC) =	$1,024,347 per year in 2024 dollars
NOx Removed =	52 tons/year
Cost Effectiveness =	$19,516 per ton of NOx removed in 2024 dollars

Low-NOx Burner Cost Effectiveness (PTE Basis)

Galvanizing Line Furnace (Source ID 420)

DIMENSIONAL ANALYSIS

Time Conversion	8,760	hours/year
Mass Conversion	2,000	lb/ton

ASSUMPTIONS

Cost Year	2025		
Economic Life	5	yrs	*US EPA OAQPS*
Annual Interest Rate	7.5	%	*https://www.federalreserve.gov/releases/h15/* (bank prime loan rate; January 2025)

BASIC INPUTS

Source 420 Burner Capacity	68.4	MMBtu/hr	*Total Capacity for Burners for Source ID 420 per Title V operating permit.*
Existing NO_X Emission Rate - Source 420	0.219	lb/MMBtu	*2014 Stack Test Result with 10% Additional Margin*
Vendor Guarantee NO_X Emissions	0.065	lb/MMBtu	*Vendor Guarantee for a similar galvanizing line annealing furnace at U. S. Steel's Pro-tec facility in Ohio.*
Potential NO_X Emissions - Before LNBs	65.58	tons/yr	*Burner Capacity for each Stack (MMBtu/hr) x NO_X Emission Factor for Each Stack (lb/MMBtu) x Max Operating Hours (hrs/yr) / 2,000 (lb/ton)*
Potential NO_X Emissions - After LNBs	19.47	tons/yr	*LNBs NO_X Guarantee (lb/MMBtu)] x Heat Input Rating (MMBtu/hr) x 8,760 (hrs/yr) / 2,000 (lb/ton)*
NO_X Removed	46.11	tons/yr	*Potential NO_X Emissions Before LNBs - Potential NO_X Emissions After Controls*
Capital recovery factor, CRF	0.2472		

TOTAL CAPITAL INVESTMENT

1. Replacement Burner Direct Equipment Cost

Burners	Quantity of Burners	*Replacement Burner Cost per Burner*	Total Burner Replacement Cost per Zone
Zones 1 - 2	68	*$ 38,500*	$ 2,618,000
Zone 3	34	*$ 38,500*	$ 1,309,000
Zones 4 - 8	140	*$ 38,500*	$ 5,390,000
Total Burners Replaced	**242**		**$ 9,317,000**

Replacement burner cost for each burner is based on a 2019 vendor quote for a similar galvanizing line annealing furnace at U. S. Steel's Pro-tec facility in Ohio. The vendor quote includes cost estimates for the replacement burners, associated tube, and controller modifications. The per burner rate has been escalated for inflationary factors.

2. Direct Installation Costs

Miscellaneous Materials	$	1,967,982
Demo	$	441,417
Natural Gas Piping Modifications	$	919,618
Burner Installation	$	3,972,749
Total	**$**	**7,301,766**

Facility estimated cost for miscellaneous materials, demo, piping modifications, and burner installation are based on a similar low-NOx burner replacement project at other U.S. Steel facilities. A per burner rate was applied and escalated for inflationary factors.

Low-NOx Burner Cost Effectiveness (PTE Basis)

Galvanizing Line Furnace (Source ID 420)

3. Indirect Installation Cost			
Engineering and Project Support	$	2,492,815	*15% of Direct Cost*
Contingency	$	3,822,316	*20% of (Direct Cost + Indirect Cost)*
Total	**$**	**6,315,131**	
Total Capital Investment, TCI	$	22,933,897	*=Direct Equipment Cost + Direct Installation Costs + Indirect Installation Costs*

TOTAL ANNUAL COSTS

Direct Annual Costs			
Annual Maintenance Costs	$	-	
Annual Operator Labor Cost	$	-	
Total direct annual cost, DAC	$	-	
Indirect Annual Costs			
Annual Administrative Cost	$	458,678	*2% of TCI*
Property Tax	$	229,339	*1% of TCI*
Insurance	$	229,339	*1% of TCI*
Capital recovery, CR	$	5,668,450	
Total indirect annual costs, IDAC	$	6,585,806	
Total annual cost, TAC	$	6,585,806	*= DAC + IDAC*

COST EFFECTIVENESS

Annual cost in terms of NO_x removed	$	142,836.80	$/ton	*=TAC / NOx Removed (tpy)*