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RACT 2 Case-by-Case Evaluation

Installation Permit No. 0059-I009

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Pennsylvania Department of Environmental Protection
Bureau of Air Quality

RACT SIP COMPLETENESS CHECKLIST

TO BE FILLED IN BY REGIONAL STAFF AND SUBMITTED TO CENTRAL OFFICE

Facility Name: ATI Flat Rolled Products Holdings, LLC

RACT Plan Approval/Permit Number: IP 0059-I009

Plan Approval/Permit Issuance Date: 4-16-2020

TECHNICAL MATERIALS

<u>Included</u>	<u>Not Included</u>	<u>Not Applicable</u>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Identification of all regulated (NO _x and VOC) pollutants affected by the RACT plan (Review memo and RACT Permit)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quantification of the changes in plan allowable emissions from the affected sources as a result of RACT implementation. (Review Memo)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Rationale as to why applicable CTG or ACT regulation is not RACT for the facility. (Review Memo)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Demonstration that the NAAQS, PSD increment, reasonable further progress demonstration, and visibility, as applicable, are protected if the plan is approved and implemented. (Review Memo)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	In the event of actual emission increase as a result of RACT SIP revision: Modeling information to support the proposed revision, including input data, output data, model used, ambient monitoring data used, meteorological data used, justification for use of offsite data (where used), modes of models used, assumptions, and other information relevant to the determination of adequacy of the modeling analysis. (Review Memo)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Include evidence, where necessary that emission limitations are based on continuous emission reduction technology. (Review Memo)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State in RACT PA/OP that expiration date shown in PA or OP is for state purposes. Either use the statement below or redact the expiration date on the permit. (Sample: The expiration date shown in this permit is for state purposes. For federal enforcement purposes the conditions of this operating permit which pertain to the implementation of RACT regulations shall remain in effect as part of the State Implementation Plan (SIP) until replaced pursuant to 40 CFR 51 and approved by the U.S. Environmental Protection Agency (EPA). The operating permit shall become enforceable by the U.S. EPA upon its approval of the above as a revision to the SIP.) (RACT Permit)
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Include evidence that the State has the necessary legal authority under State law to adopt and implement the RACT plan. (Reference of PA's Air Pollution Control Act (January 8, 1960, P.L. 2119, as amended and 25 PA Code Chapter 127 (NSR), and 25 PA Code Chapter 129 §§129.91 – 95 in RACT PA/OP). (Review memo or more likely operating permit)

(Back)

- | | | | |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | State that independent technical and economic justification for RACT determination <u>by the Department</u> was performed. As long as you reviewed the companies proposal you may agree with it but that must be stated. (Review memo) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Confidential Business Information excluded, highlighted or marked. Please also redact all checks from the application. (Review Memo, RACT Permit, RACT Plan by the company) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Adequate compliance demonstration, monitoring, recordkeeping, work practice standards, and reporting requirements. (Review memo and RACT Permit) |

ADMINISTRATIVE DOCUMENTS

<u>Attached</u>	<u>Not Attached</u>	<u>Not Applicable</u>
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- | | | | |
|-------------------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <u>Signed</u> copy of final RACT Plan Approval/Operating Permit. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Redacted copy of the RACT Plan Approval/Operating Permit. Reviewer should be able to read the redacted text. (We can do electronically if the PA/OP is uploaded in AIMS or available in pdf format). Make sure that the expiration date of the operating permit is redacted. SIPs do not expire. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Signed Technical Support Document or Review Memorandum. The review memo should contain a discussion about previous case by case RACT determinations so that requirements can be compared |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Public Notice evidence: Include a copy of the actual published notice of the public hearing as it appeared in the local newspaper(s). The newspaper page must be included to show the date of publication. The notice must specifically identify by title and number each RACT regulation adopted or amended. A signed affidavit showing the dates of publication and the newspaper clipping is best. Next best is a copy of the newspaper clippings from all days the article was published. An email showing that the newspaper article was purchased is acceptable unless the EPA receives comments during their comment period stating that there is no proof of publication. The newspaper notice must say that the case by case requirements will be submitted to the EPA as an amendment to the SIP |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A separate formal certification duly signed indicating that public hearings were held. If no public hearings were held the review memo should state that. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Public hearing minutes: This document must include certification that the hearing was held in accordance with the information in the public notice. It must also list the RACT regulations that were adopted, the date and place of the public hearing, and name and affiliation of each commenter. If there were no comments made during the notice period or at the hearing, please indicate that in the review memo. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Comment and Response Document: A compilation of EPA, company, and public comments and Department's responses to these comments. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Copy of RACT proposal, amendments, and other written correspondence between the Department and the facility. |



AIR QUALITY PROGRAM
301 39th Street, Bldg. #7
Pittsburgh, PA 15201-1811

Minor Source/Minor Modification
INSTALLATION PERMIT


Issued To: **ATI Flat Rolled**
 Products Holdings, LLC
 100 River Road
 Brackenridge, PA 15014-1597

ACHD Permit #: **0059-I009**

Date of Issuance: April 16, 2020

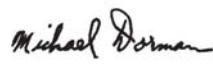
~~**Expiration Date:**~~ ~~**(See Section III.12)**~~

Issued By:


Digitally signed by JoAnn Truchan, PE
Date: 2020.04.16 13:39:53 -04'00'

JoAnn Truchan, P.E.
Section Chief, Engineering

Prepared By:


Digitally signed by Michael Dorman
Date: 2020.04.16 13:34:21 -04'00'

Michael Dorman
Air Quality Engineer

V. EMISSION UNIT LEVEL TERMS AND CONDITIONS

Pages 2 through 16
have been redacted.

A. Electric Arc Furnaces (F1 and F2)

1. Restrictions:

- ~~a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)~~
- b. The permittee shall at not conduct, or allow to be conducted, F1 or F2 process operations unless the furnace pollution control equipment is on line and properly maintained and operated according to the following conditions: (2102.04.b.5, 25 Pa. Code §129.99)
 - 1) F1 and F2 shall be equipped with a direct evacuation control (DEC) system with water cooled ductwork;
 - 2) The fugitive emissions capture equipment shall consist of segmented canopy hood systems exhausting to baghouses C002B and C006, cross-draft partitions, a scavenger duct and closed roofs. The scavenger duct systems shall be installed in the exhaust duct work between each canopy where it will be most effective, based on the canopy and duct configuration and design;
 - 3) The F1 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to C001 baghouse;
 - 4) The F2 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to the C002A baghouse
 - 5) F1 and F2 shall be equipped with canopy hoods for collection of process fugitive emissions. Such hoods shall be in operation at all times during process steel making operations and emissions shall be exhausted to the C002B (F2 canopy) baghouse and C006 (F1 canopy) baghouse, respectively;
 - 6) The differential pressure drop across each baghouse compartment shall not exceed 15 in. w.c.;
 - 7) The differential pressure drop across each compartment in the F1 and F2 DEC and canopy baghouses, shall be recorded once perweek, during furnace operations.
 - 8) Should the differential pressure across a baghouse exceed 15 in. w.c., the permittee shall promptly investigate the cause of the deviation. The permittee shall record and maintain records of the following information for each investigation:
 - a) The date and time the deviation was observed;
 - b) The magnitude of the deviation observed;
 - c) The date(s) the investigation was conducted;
 - d) The findings, recommendations and corrective actions for the investigation; and
 - e) The pressure drop reading after the deviation was corrected.
 - 9) The permittee shall take prompt action to correct any deviation and bring the control equipment back to normal operating parameters.
- c. The permittee shall maintain compliance with 40 CFR Part 63 Subpart YYYYYY. (2102.04.b.5, 25 Pa. Code §129.99)

~~2. Testing Requirements:~~

~~The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)~~

3. Monitoring Requirements:

- a. The permittee shall check and record the fan motor amperes and damper positions for the F1 and F2 emission control systems on a once-per-shift basis. (§2103.12.i, 40 CFR 60.274a(b), 25 Pa. Code §129.100)
- b. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouses for F1 and F2. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d) , 25 Pa. Code §129.100)
- c. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the F1 and F2 DEC and Canopy baghouses during operation of F1 and F2. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2103.12.a.2.D, 25 Pa. Code §129.100)
- d. The permittee shall inspect F1 and F2, the C001 and C002A DEC baghouses, and the C002B canopy and C006 canopy baghouses weekly for to insure proper operation and compliance with permit conditions. (§2103.12.i, 2102.04.b.5, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the F1 and F2 and associated control equipment: (2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685, 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Fan motor amp and damper position data;
 - 3) Monthly and 12-month production for each furnace; and
 - 4) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1, 25 Pa. Code §129.100)
- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a), 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information to the Department in its semiannual report. The reports shall contain all required information for the time period of the report: (§2103.12.k, 40 CFR §60.276a, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month summaries of data required to be recorded by Condition V.A.4.a above. Monthly fan motor amperes data shall consist of the monthly maximum and minimum values observed for each fan; and
 - 2) Non-compliance information required to be recorded by Condition V.A.4.b above.

- ~~b. Reporting instances of non-compliance in accordance with Condition V.A.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)~~

6. Work Practice Standards:

- a. EAFs F1 and F2 shall be: (§210.04.b.5, RACT Order No. 260, Condition 1.3, 25 Pa. Code §129.99)
- 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices to include but are not limited to; and
 - a) Controlling exhaust flows to reduce the input of outside air; and
 - b) Minimizing opening of the slag door.
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

B. Argon-Oxygen Decarburization Vessel (AOD)

1. Restrictions:

- ~~a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)~~
- b. The permittee shall not conduct, or allow to be conducted, AOD process operations unless the pollution control system is on-line, properly maintained and operated according to the following conditions: (2102.04.b.5, 40 CFR §60.272a(a), 40 CFR §63.10686(b)(1), 25 Pa. Code §129.99)
 - 1) Emissions from the AOD during process operations shall be exhausted to baghouse C006; and
 - 2) The differential pressure across the baghouse shall not exceed 15 inches w.c.

~~2. Testing Requirements:~~

~~The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)~~

3. Monitoring Requirements:

- a. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouse C006 for the AOD. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted, and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d), 25 Pa. Code §129.100)
- b. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the C006 Canopy baghouse during operation of the AOD. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2102.04.b.5, 25 Pa. Code §129.100)
- c. The permittee shall monitor production on a monthly and 12-month basis. (§2103.12.i, 2102.04.b.5, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the AOD and associated control equipment: (§2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685, 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Monthly and 12-month production for the AOD; and
 - 3) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1, 25 Pa. Code §129.100)

- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a), 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded for Condition V.B.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.B.4.b above.
- ~~b. Reporting instances of non-compliance in accordance, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)~~
- c. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)

6. Work Practice Standards:

- a. The AOD shall be: (§2102.04.b.5, 25 Pa. Code §129.99, RACT Order No. 260, Condition 1.3)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

C. No.2 A & P Line, H₂SO₄–HNO₃/HF Pickling (NO_x only)

1. Restrictions:

- ~~a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)~~
- b. The permittee shall at no time, conduct or allow to be conducted pickling operations in the No.2 A and P Pickling Tubs No.1, No.2 and No.3 unless all emissions from HNO₃/HF pickling are processed through the wet chemical packed tower scrubber D-019. The scrubber shall be properly maintained and operated according to the following conditions: (§210.04.b.5, Permit No. 0059-I002, Condition Nos. 26, 27 and 28, 25 Pa. Code §129.99)
- 1) The pH shall be between 8.0 and 12.5;
 - 2) The scrubbing solution shall be NaOH and NaHS in water;
 - 3) The minimum scrubbing liquid flow-rate shall be 450 gallons per minute;
 - 4) The maximum differential pressure drop across the scrubber shall be 3.0" w.c. The exhaust flow-rate through the scrubber shall be no less than 6,000 acfm at all times;
 - 5) The scrubber shall be equipped with instrumentation that shall at all times continuously monitor pH, scrubbing liquid flow-rate to within 1 gallon per minute of actual and differential pressure drop to within ½" w.c. of the actual pressure drop at all times.
- c. The throughput for No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed 148,920 tons of steel in any consecutive twelve-month period. (§210.04.b.5, 25 Pa. Code §129.99)
- d. Emissions from No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed the emissions limitations in Table V-C-1 below. (§210.04.b.5, 25 Pa. Code §129.99)

TABLE V-C-1: No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 & No.3 Emission Limitations

POLLUTANT	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Nitrogen Oxides	11.07	48.49

*A year is defined as any consecutive 12-month period.

~~2. Testing Requirements:~~

~~The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)~~

3. Monitoring Requirements:

- a. The permittee shall inspect the subject scrubber D019, weekly to ensure compliance with Condition V.C.1.b above. (§2103.12.i, 25 Pa. Code §129.100)

- b. The packed bed scrubbers shall be provided with monitoring instrumentation that shall at all times, continuously monitor the following parameters of the scrubbing liquid in the scrubber. The monitoring instrumentation shall be inspected for proper operation weekly. Calibration shall be conducted as required by manufacturer's instructions to ensure accurate measurements. (§2102.04.b.5, §2103.12.i, 25 Pa. Code §129.100)
 - 1) The pressure drop across the scrubber;
 - 2) The scrubbing liquid flow rate;
 - 3) The scrubbing liquid pH within 5%; and
 - 4) The scrubbing liquid ORP.
- c. The permittee shall perform daily visual inspection of emissions while the affected source is operating under normal conditions and weekly inspections of the scrubber for proper operation and to ensure that there is no evidence of chemical attack on its structural integrity. (§2102.04.b.5, §2103.12.i, 25 Pa. Code §129.100).
- d. The permittee shall monitor: (§2103.12.i, 25 Pa. Code §129.100)
 - 1) Steel throughput (monthly, and 12-month); and
 - 2) Operation, maintenance, inspection and calibration and/or replacement of process or pollution control equipment.

4. Record Keeping Requirements:

- a. The permittee shall keep and maintain the following data for the No.2 A and P Pickling Tubs No.1, No.2 and No.3 S092C and D: (§2102.04.b.5, §2103.12.j, Permit No. 0059-I002, Condition No. 29, 25 Pa. Code §129.100)
 - 1) The throughput in tons of steel (monthly and 12-month);
 - 2) The scrubbing liquid flow-rate (daily, monthly, and 12-month);
 - 3) Differential pressure drop to within ½" w.c. of the actual pressure drop (daily, monthly, average and 12-month);
 - 4) Chemical usage (daily, monthly, and 12-month);
 - 5) Oxidation Reduction Potential (daily, monthly, and 12-month);
 - 6) pH accurate to 5%, (daily, monthly, average and 12-month);
 - 7) Weekly records of the ORP and pH monitoring instrumentation inspection results; and
 - 8) Records of operation, maintenance, inspection, calibration and/or replacement of process or control equipment.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j, 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded by Condition V.C.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.C.4.b above.
- ~~b. Reporting instances of non-compliance in accordance with Condition V.C.5.a above does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)~~

6. Work Practice Standards:

- a. The No.2 A & P Line, H₂SO₄-HNO₃/HF Pickling shall be: (§210.04.b.5, 25 Pa. Code §129.99, RACT Order No. 260, Condition 1.3)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

D. Lewis Temper Mill (VOCs only)

1. Restrictions:

- ~~a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)~~
- b. The production of the Lewis temper mill shall not exceed 219,000 tons of steel in any consecutive twelve-month period. (§2102.04.b.5, 25 Pa. Code §129.99)
- c. The permittee shall not use more than 10,000 gallons of kerosene on the Lewis Temper Mill in any consecutive twelve-month period. (§2102.04.b.5, 25 Pa. Code §129.99)
- d. Maintain production and operating records in compliance with §1.9.A of Consent Decree No. 260 and §2105.06 of Article XXI. (§2105.06, Consent Decree No. 260, 25 Pa. Code §129.100)
- e. Fugitive emissions from the Lewis temper mill shall not exceed the emissions limitations in Table V-D-1 below. (§2102.04.b.5, 25 Pa. Code §129.99)

TABLE V-D-1: Lewis Temper Mill Emission Limitations

POLLUTANTS	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	14.00	61.32

* A year is defined as any consecutive 12-month period.

~~**2. Testing Requirements:**~~

~~The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)~~

3. Monitoring Requirements:

- a. The permittee shall monitor production on a monthly and a rolling 12-month basis. (2103.12.i, 25 Pa. Code §129.100)
- b. The permittee shall monitor kerosene on a monthly and a rolling 12-month basis. (2103.12.i, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for Lewis temper mill: (§2102.04.b.5, §2103.12.j., 25 Pa. Code §129.100, RACT Order No. 260, Condition 1.9)
 - 1) Production (monthly, and 12-month);
 - 2) Kerosene usage (monthly, and 12-month); and

- 3) Records of operation, maintenance, inspection and calibration and/or replacement of process equipment.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j, 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100,)
 - 1) Monthly and 12-month data required to be recorded by Condition V.D.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.D.4.b above.
- ~~b. Reporting instances of non-compliance in accordance with Condition V.D.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)~~

6. Work Practice Standards:

- a. The Lewis Temper Mill shall be: (§2102.04.b.5, 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

E. Miscellaneous Paints (VOCs only)

1. Restrictions:

- ~~a. The permittee shall continue to comply with all regulatory and Permit requirements. (2102.04.b.5)~~
- b. The permittee shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 5.2 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. (RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.99)
- c. Emissions from Miscellaneous Paints, based on an annual usage of 4,000 gallons per 12-month period, shall not exceed the emissions limitations in Table V-E-1 below (§2103.12.a.2.B, 25 Pa. Code §129.99)

TABLE V-E-1: Miscellaneous Paints Emission Limitations

POLLUTANT	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	10.4

*A year is defined as any consecutive 12-month period.

2. ~~Testing Requirements:~~

~~The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)~~

3. Monitoring Requirements:

- a. The permittee shall monitor the following data for miscellaneous paints: (§2102.04.b.5, §2103.12.i, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.100)
- 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

4. Record Keeping Requirements:

- a. The permittee shall record the following data for miscellaneous paints: (§2102.04.b.5, §2103.12.j, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.100)
- 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

- b. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Quantity of paint and coatings used at the facility in gallons (monthly, 12-month); and
 - 2) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

6. Work Practice Standards:

- a. The permittee shall apply paint and coatings in a manner that minimizes VOC emissions. (§2102.04.b.5, 25 Pa. Code §129.99)
- b. This shall be accomplished by: (§2102.04.b.5, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.63a)
 - 1) Storing all VOC-containing industrial cleaning solvents and paints, paint brushes, used shop towels and related waste materials in closed and sealed containers.;
 - 2) Ensuring that mixing and storage containers used for VOC-containing industrial cleaning solvents, paints and related waste materials are kept closed at all times except when depositing or removing these materials;
 - 3) Minimizing spills of VOC-containing industrial cleaning solvents, paints and related waste materials and cleaning up spills immediately; and
 - 4) Minimizing air circulation around painting operations to the extent possible.

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redacted.

ALLEGHENY COUNTY HEALTH DEPARTMENT AIR QUALITY PROGRAM

April 16, 2020

SUBJECT: Reasonable Available Control Technology (RACT II) Determination
ATI Flat Rolled Products Holdings, LLC
100 River Road
Brackenridge, PA 15014-1597
Allegheny County

Installation Permit No. 0059-I009

TO: JoAnn Truchan, P.E.
Section Chief, Engineering

FROM: Michael Dorman
Air Quality Engineer

I. Executive Summary

ATI Flat Rolled Products Holdings, LLC (ATI) is defined as a major source of NO_x and VOC emissions and was subjected to a Reasonable Available Control Technology II (RACT II) review by the Allegheny County Health Department (ACHD) required for the 1997 and 2008 Ozone National Ambient Air Quality Standard (NAAQS). The findings of the review established that technically and financially feasible RACT would result in the following emissions changes, summarized below.

Table 1-1: Technically and Financially Feasible Control Options Summary for NO_x

There are no technically feasible control options that are reasonably achievable for any processes at this facility.
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These findings are based on the following documents:

- RACT analysis performed by ERG/ACHD
- RACT analysis performed by ATI
- BACT analysis performed by ATI (see Application for Permit No. 0059-I008 dated 4-5-2006)
- Responses to questions from ATI dated 12-16-2019
- ATI Installation Permit No. 0059-I006 dated 11-08-2002

II. Regulatory Basis

ACHD requested all major sources of NO_x (potential emissions of 100 tons per year or greater) and all major sources of VOC (potential emissions of 50 tons per year or greater) to reevaluate NO_x and/or VOC RACT for incorporation into Allegheny County's portion of the PA SIP. ATI requested a case by case RACT II determination under 25 Pa Code 129.99 for five (5) of its emission units, the two (2) Electric Arc Furnace (F1 & F2), the Argon-Oxygen Decarburization Vessel (AOD), the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations, the Lewis Temper Mill, and the miscellaneous painting/coating operations. This document is the result of ACHD's determination of RACT for these emission sources at ATI based on the materials submitted by the subject source and other relevant information.

Source	Still Exists? (yes/no)	RACT Order 260 Condition No.	RACT I Requirement
Scrap Preheaters No. 1 and No. 2; No. 2 A&P line; preheat furnace; and annealing furnace No. 1 A&P line; preheat furnace and annealing furnace; Boilers No. 1 and No. 2; Loftus soaking pits No. 9 through No. 23; and Hot-band normalizing furnace	No Yes Yes Yes No	I.1.1 I.1.1.a I.1.1.b I.1.1.c I.1.2	ATI shall perform an annual adjustment or “tune-up” on the combustion process of the following equipment once every twelve (12) months. Such annual tune-up shall include: Inspections, adjustment, cleaning, or necessary replacement of fuel-burning equipment; Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NO _x ; and Inspections of the air-to-fuel ration control system. ATI shall maintain records of the annual tune-up.
BOF No. 71 and 72 Vessels; Electric Arc Furnace nos. 31 through 34; AOD vessel; Koppers BOF Ladle preheater no. 1; BOF vessel preheaters no. 1 and no. 2; Cadre BOF ladle preheaters no. 1 through no. 3; BOF mold preheaters No. 1 through No. 25; Olsen radiant tube annealing furnace no. 1; Slab warming furnaces no. 1 and no. 2; Bell annealing furnaces no. 1 though no. 5; No. 2 A&P line; Kolene heater; No. 3 B&P line; coil heater; Tandem mill radiant preheater; EAF vertical ladle preheaters no. 1 and no. 2, horizontal ladle preheater	No No No No No No No No No No No Yes No Yes	I.1.3	ATI shall maintain and operate the following equipment in accordance with good engineering and air pollution control practices.

and scrap preheaters no. 1 and no. 2; AOD mold preheaters 1 through no. 24 and vessel preheater no. 1; Tundish preheaters no. 1 and no. 2; Bloom horizontal ladle preheaters no. 1 and no. 2; American horizontal ladle preheaters no. 1 through no. 3; Department no. 2; plate torch cutters no. 1 and 2; Amsler-Morton soaking pits no. 35 through 42; Loftus soaking pits no. 43 through no. 46; No. 1 A&P line tubs; No. 2 A&P line tubs; and No. 3 B&P line tubs	Yes Yes Yes Yes Yes Yes No No Yes Yes No		
Combustion Units		I.1.4	ATI shall maintain fuel records for each combustion unit.
Salem & Rust Furnaces	No	I.1.5, 1.6, 1.7 & 1.8	These conditions referred to the Salem and Rust Furnace, which are no longer in operation.
BOF No. 71 and No. 72 vessels; EAFs No. 31 through 34; 56-inch Tandem Mill; Lewis Temper Mill; and Hot strip rolling mills	No No Yes Yes Yes	I.1.9	ATI shall record and maintain all appropriate records demonstrating compliance.
Painting/coating	Yes	I.1.10	ATI shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 7.0 pounds/gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. ATI shall maintain records of the quantity used, the density, water content and weight percentage of VOCs per gallon of paints/coatings used at the facility.
		I.1.11	ATI shall retain records for at least two (2) years and shall make the same available to the Department upon request.

Table 3-2: Facility Sources Subject to Case-by-Case RACT II

Source ID	Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	NO _x / VOC Presumptive Limit (RACT II)	Case-by Case RACT II Determination
P001	Electric Arc Furnace (EAF 1)	66 tons steel/hr	133.9	71.9	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
P001	Electric Arc Furnace (EAF 2)	66 tons steel/hr	133.9	71.9	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
P002	Argon-Oxygen Decarburization Vessel (AOD)	125 tons of steel	9.62	7.17	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operations	17 tons of steel slabs/hr	48.5	0	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	Lewis Temper Mill	112 tons of hot metal/heat	0	61.32	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	Miscellaneous Painting/Coating		0	10.40	NA	

Table 3-3: Facility Sources Subject to the Presumptive RACT II per PA Code 129.97

Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	Basis for Presumptive	Presumptive RACT Requirement (25 Pa Code Section 129.97)
Horizontal EAF Ladle Pre-heater	4.5 MMBtu/hr	2.15	0.12	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices
Vertical EAF Ladle Pre-heaters No.1 and No.2	10.5 MMBtu/hr (each)	10.1	0.55	25 Pa Code § 129.97(c)(2), § 129.97(c)(3)	Install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices
Ladle Pre-heater Nos. 4 through 7	15.0 MMBtu/hr (each)	7.0	0.7	25 Pa Code § 129.97(c)(2), § 129.97(c)(3)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
American Horizontal AOD Ladle Pre-heaters No.1, No. 2 and No. 3	10.0 MMBtu/hr (each)	11.48	0.63	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
AOD Vessel Pre-heater	6.0 MMBtu/hr	2.9	0.16	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Tundish Pre-heaters No.1 and No.2	2.5 MMBtu/hr (each)	2.42	0.015	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Plate Burners/Torch Cutters No.1 and No.2	3.0 MMBtu/hr (each)	2.9	0.16	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Active Hot Boxes (3)	10.0 MMBtu/hr (each)	6.9	0.49	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Car Bottom Furnaces (4)	21.2 MMBtu/hr (each)	24.5	1.4	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Loftus Soaking Pits Nos. 9 to 23 (15)	26.0 MMBtu/hr (each)	187.3	10.5	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Walking Beam Furnaces (2)	465.0 MMBtu/hr (each)	320.8	24.75	25 Pa Code § 129.97(g)(1)(i)	For a natural gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour, 0.10 lb NO _x /million Btu heat input.
Plasma Torch Cutting (NO _x only)		3.46	NA	25 Pa Code § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
No. 1 A & P Line Annealing Furnace	49.0 MMBtu/hr	38.8	1.3	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223

Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	Basis for Presumptive	Presumptive RACT Requirement (25 Pa Code Section 129.97)
No. 2 A & P Line Annealing Furnace	44.0 MMBtu/hr	34.7	1.18	25 Pa Code §129.97(b)(1), §129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
No.2 A & P Line, Kolene Heater	4.5 MMBtu/hr	2.15	0.12	25 Pa Code §129.97(c)(1), §129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
56" Tandem Mill Pre- heater	3.0 MMBtu/hr	1.45	0.79	25 Pa Code §129.97(c)(1), §129.97(c)(2))	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Boilers No. 1 and 2	34.0 MMBtu/hr (each)	32.7	1.8	25 Pa Code §129.97(b)(1), §129.97(c)(2))	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Space Heaters)	< 10 MMBtu/hr (largest unit)	91.15	4.99	25 Pa Code §129.97(c)(3)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
HRPF Emergency Generator No. 1	3,015 hp	3.19	3.19	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
HRPF Emergency Generator No. 2	2,682 hp	2.82	2.82	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Finishing WWTP Emergency Generator No. 3	268 hp	1.02	0.14	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.

Table 3-4: Facility Sources Exempt from RACT II per PA Code 129.96(c) { < 1 TPY NO_x and < 1 TPY VOC }

Source ID	Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)
	AOD Mold Pre-heaters No. 1 to No. 24	2.0 MMBtu/hr (each)	0.99	0.05
	Torch Cutters No.1, No.2 and No. 3	1.17 MMBtu/hr (each)	0.58	0.03
	No.1 A & P Line, Strip Dryer	1.5 MMBtu/hr	0.75	0.04
	No.2 A & P Line, Strip Dryer	1.5 MMBtu/hr	0.74	0.04
	HRPF Fire Pumps	376 hp	0.4	0.4
	Parts Cleaner			

Table 3-5: Emission Sources Shut Down Since RACT I

Source ID	Description
	Basic Oxygen Furnace (BOF) Nos. 71 and 72 Vessels
	Electric Arc Furnaces (EAFs) Nos. 31, 32, 33 and 34
	Koppers BOF Ladle preheater No. 1
	BOF Vessel Preheaters Nos. 1 and 2
	Cadre BOF Ladle Preheaters Nos. 1, 2 and 3
	BOF Mold Preheaters Nos. 1 through 25
	Olsen Radiant Tube Annealing Furnace No. 1
	Slab Warming Furnaces Nos. 1 and 2
	Scrap Preheaters Nos. 1 and 2
	Argon-Oxygen Decarburization (AOD) Mold Preheaters Nos. 1 through 23
	Bloom Horizontal Preheaters Nos. 1 and 2

IV. RACT Determination

Electric Arc Furnaces (EAFs) F1 and F2:

NO_x

ACHD has determined that case-by-case (cbc) RACT II for EAFs F1 and F2 is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. NO_x emissions at Electric Arc Furnaces can be reduced to some degree through operational practices such as controlling the exhaust flows to reduce the input of outside air and minimizing the opening of the slag door.

There are no Technically Feasible Control Options for the EAFs at ATI. The basis for this conclusion is given below:

This process includes two (2) electric arc furnaces (EAF1 and EAF2) with maximum transfer rate of 112 tons hot metal per heat per furnace, using scrap steel and lime as inputs. The two EAF 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. The EAFs do not use oxy-fuel firing in the sidewall burners.

The use of electricity for steel melting in EAFs 1 and 2 transfers the generation of combustion NO_x from the iron and steel mill to a utility generating plant. However, these processes result in thermal NO_x formation.

The EAFs are controlled by a water-cooled direct evacuation (DEC) System with baghouses D005/D006 (1A and 1B) and D008/D009 (2A and 2B), and Canopy Baghouses D004 and D007, with a manufacturer's estimated control efficiency of 99.5% each. The units are also controlled by cooling towers No. 1 and No. 2, with a capacity of 20,000 gallons per minute for both towers combined. EAF1 and EAF2 exhaust to stacks P006 and P009 (Canopy Baghouse Exhaust) and P007/P008 and P010/P011 (DEC Baghouse Exhaust).

The electric arc furnaces are currently permitted under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.d of IP#0059-I006 states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve-month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6] Condition V.A.1.e of IP #0059-I006 states that "emissions from the 1A, 1B, 2A and 2B DEC baghouses, and D004 canopy and D007 canopy baghouses, due to EAFs #1 & #2 shall not exceed the following": 35.06 lbs/heat or 41.96 tons NO_x per year. [§2102.04.b.6]. The EAFs must also meet the requirements of 40 CFR part 60, subpart AAa for particulate matter.

Step 1 – Identify Control Options

ACHD reviewed ATI's RACT submittal for the Electric Arc Furnaces and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills² and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify any controls for EAFs. The ACT states, "There is no information to suggest that EAFs have NO_x emission controls or that suitable controls are available". The BART Engineering Analysis does not identify any controls for EAFs that do not use oxygen or natural gas to preheat the charge. Finally, the USEPA RACT-BACT-LAER Clearinghouse (RBLC)⁴ indicates that EAFs without preheat or oxy-fuel burners have no add-on control technology for NO_x emissions. Therefore, technology transfer of NO_x control used on other sources are the only control technologies that were evaluated as part of this RACT analysis. EAFs 1 and 2 do not involve conventional combustion of a fuel and do not use burners, therefore, common combustion NO_x control

strategies such as overfire air, burners out of service, low NO_x burners, and reburning were not considered. The identified controls are discussed below:

The following control technologies were identified as potential control measures:

1. *Selective Catalytic Reduction (SCR)*
2. *Selective Non-Catalytic Reduction (SNCR)*

ATI also identified the follow control measures in their RACT submittal:

3. Flue Gas Recirculation (FGR)

No additional control measures were identified for EAFs. These control measures have been organized into 3 groups: additions to combustion air or fuel and post combustion controls.

Additions to Combustion Air or Fuel

Furnace operation can be optimized to reduce NO_x emissions by injecting flue gases or other materials into the combustion zone. This controls the formation of NO_x by controlling the stoichiometric ratio of the chemicals that react to form NO_x. The addition of flue gas dilutes the combustion zone and reduces the combustion temperature, which in turn reduces the formation of thermal NO_x.

(a) Flue Gas Recirculation

As the name suggests, flue gas recirculation (FGR) involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into a combustion zone in order to lower flame temperature and reduce NO_x formation. FGR can be classified into two types; external or induced. External FGR utilizes an external fan to recirculate the flue gases, and external piping routes the exhaust gases from the stack to a burner. Induced FGR utilizes the combustion air fan within the unit to recirculate the flue gases.

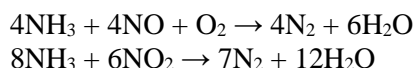
FGR is generally feasible for fuel-fired combustion units where there is no minimum operational temperature/oxygen requirement for the emission unit. NO_x reductions vary considerably depending on the type of fuel. When operated without additional controls, the normal NO_x control efficiency range for FGR used in a furnace is 30-50%.

Post Combustion Control

Post combustion control includes the addition of technologies that reduce NO_x emissions (as opposed to preventing NO_x generation). Generally, these technologies include the addition of a catalyst or reactant into the exhaust stream which chemically reduces the NO_x, allowing for removal from the gas stream.

(b) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium-based catalysts), 470–510 °F for platinum catalysts, and 600–1,000°F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR requires a stable gas flow rate, temperature range, and NO_x concentration. Factors affecting SCR performance include space velocity (volume per hour of flue gas divided by the volume of the catalyst bed), ammonia/ NO_x molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time but will also cause an increase in catalyst bed pressure drop. Reaction temperature is also critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

SCR has been extensively and quite successfully used in a very cost-effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry.

(c) Selective Non-Catalytic Reduction

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1,600–2,100°F.

The normal NO_x control efficiency range for SNCR is 40-70%. To date there are no known installations of SNCR at iron and steel plants.

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x at EAFs 1 and 2. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Flue Gas Recirculation

FGR generally applies to the fuel-fired units and involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. The ACT does not include FGR as an option for EAFs. FGR is not considered technically feasible for EAFs 1 and 2 because these units do not use burners or involve conventional combustion of a fuel.

(b) Selective Catalytic Reduction

SCR controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. In order for an SCR system to effectively reduce NO_x emissions, the exhaust gas stream must have relatively stable gas flow rates, NO_x concentration, and temperature profile. Due to the violent nature of the process that results from the melting of scrap and when process gases are used to stir the hot metal, the EAF exhaust stream gas is highly variable with regard to flow rate, temperature, and NO_x emissions. The temperature of the exhaust

gas (which ranges from ambient melt shop to 2,500°F) often exceeds the operating range of the catalyst. In addition, the NO_x concentration will vary from zero to ~15 to 20 ppm. This makes it infeasible to install the catalyst either prior to or after the baghouse and assure that the temperature will always be within the proper operating range. Additionally, metals and other particulates present in the exhaust stream would "blind" or erode the catalyst very quickly. SCR units have not been used on EAFs in similar facilities in the United States. Therefore, SCR is not considered technically feasible for EAFs 1 and 2.

(c) Selective Non-Catalytic Reduction

SNCR is similar to SCR, but it does not use a catalyst. As with SCR, exhaust heat variations, flow rates, gas composition, and oxygen content are expected to present issues in the operation of an SNCR on an EAF/melt shop. SNCR requires a more stable gas condition than SCR. Maintaining the near-stable gas conditions necessary for SNCR is infeasible given the highly variable nature of the gas stream. The temperature conditions in the EAF process that are required for SNCR are well upstream of the baghouse and would subject the SCR injection heads to high mechanical wear and poor dispersal of fluids. In addition, the great variations in the gas NO_x concentration would make it infeasible to maintain the proper stoichiometric ratio of reducing reagent, which could result in reduced efficiency or unreacted ammonia being emitted directly to the atmosphere ("ammonia slip"). SNCR has not been used on EAFs in the United States. Therefore, SNCR is not considered technically feasible for EAFs 1 and 2.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The two (2) EAFs have a potential to emit 41.96 tpy NO_x each (or 83.92 tpy NO_x for both units) based on limits from Installation Permit #0059-I006 (issued November 8, 2002). No technically feasible NO_x control options were identified for EAFs 1 and 2 that would result in emissions reductions from these units.

Step 4 – Select RACT

No additional controls were identified as technically feasible for EAF 1 or EAF 2. Therefore, RACT for these units is no additional control beyond what is currently required. NO_x emissions from the electric arc furnaces are currently limited under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.e of IP #0059-I006 states that NO_x emissions shall not exceed 35.06 lbs/heat or 41.96 tons per year. Additionally, per the requirements §2105.03, EAF 1 and EAF 2 must be maintained and operated in accordance with good engineering and air pollution control practices. Good engineering practices include controlling exhaust flows to reduce the influx of outside air and minimizing the time the slag door is open as described by Chan, E. et al in Nitrogen Oxides (NO_x) Formation and Control in an Electric Arc Furnace (EAF): Analysis with Measurements and Computational Fluid Dynamics (CFD) Modeling, ISIJ International, Vol. 44 (2004), No. 2, pp. 429-438.

VOCs

ACHD has determined that cbc RACT II for EAFs F1 and F2 is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for VOC emissions from Electric Arc Furnaces were:

1. *Regenerative Thermal Oxidation;*
2. *Recuperative Thermal Oxidation;*
3. *Afterburner;*
4. *Absorption;*
5. *Carbon Adsorption;*
6. *Inertial Separation;*

7. *Condensation; and*
8. *Scrap Management.*

These controls are discussed in detail below:

(a) Thermal Oxidation

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

Regenerative thermal oxidation

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.

(c) Carbon Adsorption

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

(d) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%.

(e) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the latter, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC.

(f) Restricted Use of Scrap Containing Organics or Scrap Management Plan

VOC emissions from electric arc furnaces are present from volatile organic compounds (VOCs) and dirt particles in the melted scrap. Currently, steelmaking facilities that are area sources of HAP and subject to 40 CFR Part 63, Subpart YYYYYY (YYYYYY) must either restrict the use of certain metallic scrap or implement a scrap management plan to reduce chlorinated plastics, lead, and free organic liquids in the scrap that is charged to the furnace. In

addition to reducing HAP emissions, it is anticipated that either of these measures would reduce VOC emissions from these sources.

Generally, facilities that restrict metallic scrap to reduce organic emissions would not charge to the furnaces any scrap from motor vehicle bodies, engine blocks, oil filters, oily turnings, machine shop borings, transformers or capacitors containing polychlorinated biphenyls, lead-containing components (if producing non-leaded steel), chlorinated plastics, or free organic liquids.

For facilities requiring more flexibility, a scrap management plan may be used. A scrap management plan involves provisions for scrap selection and inspection that minimize the amount of organic contaminants in the scrap. Generally, a scrap management plan would include (1) specifications that scrap materials must be depleted (to the extent practicable) of undrained used oil filters, chlorinated plastics, and free organic liquids at the time of charging to the furnace; (2) removal (to the extent practicable) of lead-containing components (such as batteries, battery cables, and wheel weights) from the scrap, except for scrap used to produce leaded steel; and (3) procedures such as visual inspection or periodic audits of scrap providers, as well as and procedures for taking corrective actions with vendors whose shipments are not within specifications.

Restricted use of scrap and a pollution prevention plan reduce the amount of VOC emissions by reducing the amount of VOC generating materials that may be comingled with the scrap.

ATI is a producer of stainless steel and is subject to YYYYYY. As a stainless steel producer, the facility cannot use the same type of scrap generally used by non-specialty steel producers. Specifically, ATI does not use auto scrap. Therefore, VOC sources such as oil filters, engine blocks and other sources of free organic liquids are not present in ATI's scrap mix. Additionally, ATI has a pollution prevention plan specified in 40 CFR §63.10685. The requirement of a pollution prevention plan and the scrap mix necessary to make stainless steel inherently minimizes sources of VOCs in ATI's scrap.

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation and absorption were identified as technically feasible VOC control options for EAFs 1 and 2. However, a number of the control options identified are not technically feasible for controlling VOC at EAFs 1 and 2. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Thermal Oxidation

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidation has been used in limited application for EAFs in the United States, usually in conjunction with a Direct Evacuating Control (DEC) system. Therefore, thermal oxidation, including regenerative thermal oxidation, recuperative thermal oxidation, and afterburners, are considered technically feasible add-on VOC controls, and costs are provided for each of these options in Step 3 below. These units can achieve a relatively high organic vapor removal efficiency (95%)

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption technology has been applied for reductions of NO_x, CO and VOC from an assortment of similar melt shop applications, including furnaces. Therefore, absorption is considered a technically feasible add-on VOC control for EAFs 1 and 2. Costs are provided for this option in Step 3 below.

(c) Carbon Adsorption

Carbon adsorbers generally require the exhaust gas temperature to be within a range of 100-200°F, which is significantly lower than the exhaust temperature of the EAFs. Additionally, the exhaust streams from the respective EAFs contain a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the EAFs 1 and 2.

(d) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Inertial separation is applicable to the removal of liquid droplets only, and therefore would not be effective for removal of VOC from the exhaust stream. Therefore, inertial separation is not considered technically feasible for the EAFs 1 and 2.

(e) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for EAFs 1 and 2. Based on stack testing from October 2011, the concentration of VOC in the exhaust stream from EAFs 1 and 2 is less than 20 ppm. In general, a condenser requires an inlet concentration stream of at least 5,000 ppm VOC to be effective.⁸³ As such, the use of a condenser would not result in a measurable reduction of VOC. Therefore, the use of a condenser is considered not technically feasible for EAFs 1 and 2.

(f) Restricted Use of Scrap Containing Organics or Scrap Management Plan

Restricting the use of certain metallic scrap or implementation of a scrap management plan reduces the amount of volatile organic materials that may be charged in an EAF, therefore lowering VOC emissions. Such provisions are required for similar specialty steel manufacturers, including area sources of HAP subject to 40 CFR 63, Subpart YYYYYY. ATI is an area source of HAP and is currently required to meet the requirements of subpart YYYYYY. The facility current complies with the requirements for restricted metallic scrap for chlorinated plastics, lead, and free organic liquids in accordance with 40 CFR 63.10685(a)(2) and participates and purchases motor vehicle scrap only from scrap providers who participate in a program for removal of mercury switches in accordance with 40 CFR 63.10685(b)(2). The facility also only charges materials from motor vehicles in the EAFs that are materials recovered for specialty alloy content in accordance with 40 CFR 63.10685(b)(3). Therefore, although these VOC reduction techniques are technically feasible, the source is already performing these activities, and no additional emissions reductions for EAFs 1 and 2 are expected.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The two (2) EAFs have a potential to emit 46.92 tpy VOC each (or 93.84 tpy VOC for both units) based on limits from Installation Permit #0059-I006 (issued November 8, 2002). The technically feasible control options for EAFs 1 and 2, with their estimated control efficiency and VOC emissions reductions, are as follows:

Table 4-1: EAFs 1 and 2 – VOC Control Options

Units	Potential to Emit VOC (tpy)	Control Type	Estimated VOC Control Efficiency (%)	Total Estimated VOC Emission Reductions (tpy)
EAF 1	46.92	Regenerative TO	96 ^a	45.04

EAF 2	46.92	Recuperative TO	96 ^a	45.04
		Afterburner	96 ^a	45.04
		Absorption	93 ^b	43.64
		Regenerative TO	96 ^a	45.04
		Recuperative TO	96 ^a	45.04
		Afterburner	96 ^a	45.04
		Absorption	93 ^b	43.64

^a Based on data from "Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022)."

^b Based on average from "Control Technologies for Hazardous Air Pollutants (EPA 625/6-91/014)" (June 1991).

Economic Analysis

Using information provided by ATI and collected by ACHD a thorough economic analysis of the technically feasible control options for EAFs 1 and 2 was conducted - see Appendix F for more information. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided for emission control devices in the table below. Note that although the amount of VOC minimized through the implementation of the pollution prevention plan in YYYY is uncertain, there are not additional costs to implement this plan. Therefore, this control measure is technically and economically feasible.

Table 4-2: Electric Arc Furnaces – Economic Analysis of VOC Technically Feasible Control Options

Units	Option	Total Capital Investment (\$/furnace)	Total Annualized Cost (\$/furnace/yr)	Potential VOC Removal from Control (ton/furnace/yr)	Cost Effectiveness (\$/ton VOC removed/furnace)
EAF 1	Regenerative TO	\$12,133,346	\$6,934,459	45.04	\$153,951
	Recuperative TO	\$2,752,898	\$13,785,132	45.04	\$306,042
	Afterburner	\$1,128,741	\$32,603,780	45.04	\$723,834
	Absorption	\$1,917,898	\$22,361,044	43.64	\$512,450
EAF 2	Regenerative TO	\$17,991,108	\$10,557,206	45.04	\$234,380
	Recuperative TO	\$3,150,088	\$21,013,699	45.04	\$466,523
	Afterburner	\$1,282,078	\$50,009,565	45.04	\$1,110,258
	Absorption	\$3,017,964	\$37,747,653	43.64	\$796,314

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. Additionally, the use of an absorber is not cost effective given the quantities of solvent required. RACT for these units is no additional control beyond what is currently required, including the requirements of 40 CFR Part 63, Subpart YYYY that the facility is currently following in 40 CFR 63.10685(a)(2), (b)(2), and b(3) (the pollution prevention plan). The pollution prevention plan limits the amount of VOC sources in the scrap by requiring the minimization "of chlorinated plastics, lead, and free organic liquids

that is charged to the furnace.” As a stainless steel producer, the facility cannot use the same type of scrap generally used by non-specialty steel producers. Specifically, ATI does not use auto scrap. Therefore, VOC sources such as oil filters, engine blocks and other sources of free organic liquids are not present in ATI’s scrap mix. The scrap mix necessary for ATI’s operations to make stainless steel inherently minimizes sources of VOC. However, the pollution prevention plan in YYYYYY is technically and economically feasible and is part of the RACT determination for the EAFs.

As noted above, the addition of an add on emission control system for the EAFs is economically infeasible. The most cost-effective solution is Regenerative Thermal Oxidation which demonstrated VOC removal costs of \$153,951.00 per ton in 2015 dollars.

Argon – Oxygen Decarburization (AOD):

NO_x

ACHD has determined that cbc RACT II for the AOD is to operate the sources in accordance with the manufacturer’s specifications and with good operating practices. Control options reviewed for NO_x emissions from the AOD, by ERG, were:

1. *Selective Catalytic Reduction (SCR);*
2. *Selective Non-Catalytic Reduction (SNCR); and*
3. *Flue Gas Recirculation.*

Analysis of these control options indicated that none were technically feasible. No further economic analysis was done. The detailed analysis follows:

This process consists of one (1) argon-oxygen decarburization vessel (AOD) with maximum design rate of 100 tons of steel per hour and a capacity of 125 tons, using steel, lime, fluxes, argon, oxygen, and nitrogen as inputs. In the AOD process, steel from the EAF is transferred into an AOD vessel and gaseous mixtures containing argon and oxygen are blown into the vessel to reduce the carbon content of the steel.

Potential NO_x emissions from the AOD vessel are estimated at 56.9 tpy based on an emission rate of 0.13 lb/ton steel (based on stack testing performed February 1996) and a maximum potential throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve-month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6] This effectively limits the throughput to the AOD process to 536,267 tons of steel and 34.9 tons NO_x per any consecutive twelve month period.

The AOD is controlled by a Wheelabrator Frye 264 Series 8S baghouse for the control of particulate matter, with a manufacturer’s estimated control efficiency of 99.5%, exhausting to stack P009. Per the requirements of RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed AATI’s ACT submittal for the AOD vessel and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA’s Alternative Control Techniques (ACT) Document for Iron and Steel Mills⁹ and the study “Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis”¹⁰ to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel and the BART Engineering analysis does not identify any controls for argon-oxygen decarburization processes. The USEPA RACT-BACT-LAER Clearinghouse (RBLCL)11 also does not indicate any add-on control technology for NO_x emissions for AOD vessels or stirring operations. Therefore, technology transfer of NO_x control used on other sources are the only control technologies that were evaluated as part of this RACT analysis. The AOD stirring operation does not directly involve conventional combustion of a fuel and does not use burners, therefore, common combustion NO_x control strategies such as overfire air, burners out of service, low NO_x burners, and reburning were not considered. The identified controls are discussed below:

The following control technologies were identified as potential control measures:

1. Selective Catalytic Reduction (SCR)
2. Selective Non-Catalytic Reduction (SNCR)

ATI also identified the follow control measures in their RACT submittal:

3. Flue Gas Recirculation (FGR)

No additional control measures were identified for the AOD vessel.

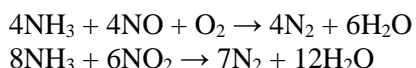
(a) **Flue Gas Recirculation**

As the name suggests, flue gas recirculation (FGR) involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into a combustion zone in order to lower flame temperature and reduce NO_x formation. FGR can be classified into two types; external or induced. External FGR utilizes an external fan to recirculate the flue gases, and external piping routes the exhaust gases from the stack to a burner. Induced FGR utilizes the combustion air fan within the unit to recirculate the flue gases.

FGR is generally feasible for fuel-fired combustion units where there is no minimum operational temperature/oxygen requirement for the emission unit. NO_x reductions vary considerably depending on the type of fuel. When used in iron and steel furnaces, the normal NO_x control efficiency range for FGR is 30-50%.

(b) **Selective Catalytic Reduction**

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1,000°F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR requires a stable gas flow rate, temperature range, and NO_x concentration. Factors affecting SCR performance include space velocity (volume per hour of flue gas divided by the volume of the catalyst bed), ammonia/ NO_x

molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time, but will also cause an increase in catalyst bed pressure drop. Reaction temperature is also critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

SCR has been extensively and quite successfully used in a very cost-effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry.

(c) Selective Non-Catalytic Reduction

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1,600-2,100°F.

The normal NO_x control efficiency range for SNCR is 40-70%.¹⁴ To date there are no known installations of SNCR at iron and steel plants.

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x from the AOD vessel. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Flue Gas Recirculation

FGR generally applies to the fuel-fired units and involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. The ACT does not include FGR as an option for argon-oxygen decarburization processes. FGR is not considered technically feasible for the AOD vessel because this unit does not have a burner or involve conventional combustion of a fuel.

(b) Selective Catalytic Reduction

In order for an SCR system to effectively reduce NO_x emissions, the exhaust gas stream must have relatively stable gas flow rates, NO_x concentration, and temperature profile. The AOD exhaust stream is highly variable with regard to flow rate, temperature, and NO_x emissions because of the violent nature of the process which results when process gases are blown into the hot metal. The temperature of the exhaust gas (which ranges from ambient melt shop to 2,500°F) often exceeds the operating range of a catalyst. This makes it infeasible to install the catalyst either prior to or after the baghouse and assure that the temperature will always be within the proper operating range. SCR units have not been used on AODs in similar facilities in the United States. Therefore, SCR is not considered technically feasible for the AOD vessel.

(c) Selective Non-Catalytic Reduction

SNCR is similar to SCR, but it does not use a catalyst. As with SCR, exhaust heat variations, flow rates, gas composition, and oxygen content are expected to present issues in the operation of an SNCR in an AOD/melt shop. SNCR requires a more stable gas condition than SCR. Maintaining the near-stable gas conditions necessary for

SNCR is infeasible given the highly variable nature of the gas stream. In addition, the great variations in the gas NO_x concentration would make it infeasible to maintain the proper stoichiometric ratio of reducing reagent, which could result in reduced efficiency or an undesirable amount of ammonia slip. SNCR has not been used on AODs in the United States. Therefore, SNCR is not considered technically feasible for the AOD vessel.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The AOD vessel has a potential to emit 56.9 tpy based on an emission rate of 0.13 lb/ton steel and a maximum throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel." [§2102.04.b.6] This effectively limits the throughput to the AOD process to 536,267 tons of steel and 34.9 tons NO_x per any consecutive twelve month period.

No technically feasible NO_x control options were identified for the AOD vessel that would result in emissions reductions from these units.

Step 4 – Select RACT

No additional controls were identified as technically feasible for the AOD vessel. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

VOCs

ACHD has determined that cbc RACT II for the AOD is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for VOC emissions from the AOD were:

1. *Regenerative Thermal Oxidation;*
2. *Recuperative Thermal Oxidation;*
3. *Afterburner;*
4. *Absorption;*
5. *Carbon Adsorption;*
6. *Inertial Separation;*
7. *Condensation*

The technical analysis identified four (4) feasible control options:

1. *Regenerative Thermal Oxidation;*
2. *Recuperative Thermal Oxidation;*
3. *Afterburner; and*
4. *Absorption*

The economic analysis of the remaining control options reviewed by ERG indicate that they are all economically infeasible. The most cost-effective solution was Regenerative Thermal Oxidation which demonstrated VOC removal costs of \$585,498.00 per ton in 2015 dollars. The detailed analysis follows:

This process consists of one (1) argon-oxygen decarburization vessel (AOD) with maximum design rate of 100 tons of steel per hour and a capacity of 125 tons, using steel, lime, fluxes, argon, oxygen, and nitrogen as inputs. In the AOD process, steel from the EAF is transferred into an AOD vessel and gaseous mixtures containing argon and oxygen are blown into the vessel to reduce the carbon content of the steel.

Potential VOC emissions from the AOD vessel are estimated at 26.3 tpy based on an emission rate of 0.06 lb/ton steel (based on stack testing performed in February 1996) and a maximum throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve-month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6]. This effectively limits the throughput to AOD to 536,267 tons of steel and 16.1 tons VOC per any consecutive twelve-month period.

The AOD is controlled by a Wheelabrator Frye 264 Series 8S baghouse ("AOD/Canopy Baghouse" D007) with a manufacturer's estimated control efficiency of 99.5%, and exhausts to stack P009. Per the requirements of RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed ATI's RACT submittal for the argon-oxygen decarburization vessel and consulted several references to ensure that all possible control options were identified. ACHD reviewed the RBLC, EPA's CTG for Volatile Organic Emissions from Stationary Sources, EPA's "Control Technologies for Hazardous Air Pollutants", and investigated additional resources to determine if VOC controls for AOD vessels have been demonstrated. The CTG documents do not identify any specific controls for AODs at iron and steel facilities. However, ATI also reviewed the following controls:

1. *Regenerative Thermal Oxidation*
2. *Recuperative Thermal Oxidation*
3. *Afterburner*
4. *Absorption*
5. *Carbon Adsorption*
6. *Inertial Separation*
7. *Condensation*

ACHD additionally reviewed common VOC control techniques for similar stationary sources. This included the review of the following controls:

8. *Restriction Use of Scrap Containing Organics or Scrap Management Plan*

These controls are discussed in detail below.

(a) Thermal Oxidation

Thermal oxidizers are refractory lined enclosures with one or more burners in which the waste gas stream is routed through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidizers typically operate at 1,200 to 2,100° Fahrenheit with residence times typically ranging from 0.5 to 2 seconds. An efficient thermal oxidizer design must provide adequate residence time for complete combustion, sufficiently high temperatures for VOC destruction, and adequate velocities to ensure proper mixing without quenching combustion. The type of burners and their arrangement affect combustion rates and residence time; the more thorough the contact between the flame and VOC, the shorter the time required for complete combustion. Natural gas is required to ignite the flue gas mixtures and maintain combustion temperatures. Typically, a heat

exchanger upstream of the oxidizer uses the heat content of the oxidizer flue gas to preheat the incoming VOC-laden stream to improve the efficiency of the oxidizer.

Regenerative thermal oxidation

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.

(c) Carbon Adsorption

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

Removal efficiencies of 95 to 99 percent can be achieved using carbon adsorption. The effectiveness of carbon adsorption is largely dependent on available carbon sites.

(d) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%.

(e) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the latter, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC.

(f) Restricted Use of Scrap Containing Organics or Scrap Management Plan

VOC emissions from melting operations, including AOD vessels, are present from volatile organic compounds (VOCs) and dirt particles in the melted scrap. Currently, steelmaking facilities that are area sources of HAP and subject to 40 CFR part 63, subpart YYYYY must either restrict the use of certain metallic scrap or implement a scrap management plan to reduce chlorinated plastics, lead, and free organic liquids in the scrap that is charged to the furnace. In addition to reducing HAP emissions, it is anticipated that either of these measures would reduce VOC emissions from these sources.

Generally, facilities that restrict metallic scrap to reduce organic emissions would not charge any scrap from motor vehicle bodies, engine blocks, oil filters, oily turnings, machine shop borings, transformers or capacitors containing polychlorinated biphenyls, lead-containing components (if producing non-leaded steel), chlorinated plastics, or free organic liquids.

For facilities requiring more flexibility, a scrap management plan may be used. A scrap management plan involves provisions for scrap selection and inspection that minimize the amount of organic contaminants in the scrap. Generally, a scrap management plan would include (1) specifications that scrap materials must be depleted (to the extent practicable) of undrained used oil filters, chlorinated plastics, and free organic liquids at the time of charging to the furnace; (2) removal (to the extent practicable) of lead-containing components (such as batteries, battery cables, and wheel weights) from the scrap, except for scrap used to produce leaded steel; and (3) procedures such as visual inspection or periodic audits of scrap providers, as well as and procedures for taking corrective actions with vendors whose shipments are not within specifications.

Restricted use of scrap and scrap management plans do not result in specific VOC emissions reductions from an AOD vessel, but instead reduce the flow of materials to the AOD that would generate VOC emissions.

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation and absorption were identified as technically feasible VOC control options for the AOD. However, a number of the control options identified are not technically feasible for controlling VOC at the AOD. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Thermal Oxidation

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Although thermal oxidation has not currently been demonstrated in use with a argon-oxygen decarburization vessel, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only five facilities using six argon-oxygen decarburization vessels or stirring stations. ATI provided information in their RACT submittal indicating that regenerative thermal oxidation, recuperative thermal oxidation, and afterburners were considered as options for VOC control for this unit; therefore, ACHD has considered each of these options as technically feasible, and costs are provided for each option in Step 3 below.

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Although absorption has not been demonstrated in use with an argon-oxygen decarburization vessel, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only five facilities using argon-oxygen decarburization vessels. ATI provided information in their RACT submittal indicating that absorption was considered as an option for VOC control for this unit; therefore, ACHD has considered absorption as technically feasible, and costs are provided in Step 3 below.

(c) Carbon Adsorption

Carbon adsorbers generally require the exhaust gas temperature to be within a range of 100-200°F, which is significantly lower than the exhaust temperature of the AOD vessel. Additionally, the exhaust stream from the AOD vessel contains a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the AOD vessel.

(d) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Inertial separation is applicable to the removal of liquid droplets only, and therefore would not be effective for removal of VOC from the exhaust stream. Therefore, inertial separation is not considered technically feasible for the AOD vessel.

(e) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for the AOD vessel. Based on stack testing from October 2011, the concentration of VOC in the exhaust stream from the AOD baghouse is less than 20 ppm. In general, a condenser requires an inlet concentration stream of at least 5,000 ppm VOC to be effective. As such, the use of a condenser would not result in a measurable reduction of VOC. Therefore, the use of a condenser is considered not technically feasible for the AOD vessel.

(f) Restricted Use of Scrap Containing Organics or Scrap Management Plan

Restricting the use of certain metallic scrap or implementation of a scrap management plan reduces the amount of volatile organic materials that may enter an AOD, therefore lowering VOC emissions. Such provisions are required for similar specialty steel manufacturers, including area sources of HAP subject to 40 CFR 63, Subpart YYYYYY. ATI is an area source of HAP, and is currently required to meet the requirements of subpart YYYYYY. The facility current complies with the requirements for restricted metallic scrap for chlorinated plastics, lead, and free organic liquids in accordance with 40 CFR 63.10685(a)(2) and participates and purchases motor vehicle scrap only from scrap providers who participate in a program for removal of mercury switches in accordance with 40 CFR 63.10685(b)(2). The facility also only charges materials from motor vehicles in the EAFs that are materials recovered for specialty alloy content in accordance with 40 CFR 63.10685(b)(3). Therefore, although these VOC reduction techniques are technically feasible, the source is already performing these activities, and no additional emissions reductions for the AOD are expected.

Table 4-3: AOD – VOC Technically Feasible Control Options

Control Type	Estimated VOC Control Efficiency (%)	Estimated VOC Emission Reductions (tpy)
Regenerative TO	96	15.5
Recuperative TO	96	15.5
Afterburner	96	15.5
Absorption	93	15.0

Economic Analysis

Using information provided by ATI and collected by ACHD a thorough economic analysis of the technically feasible control options for the AOD was conducted. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the “EPA Air Pollution Control Cost Manual, Sixth Edition” (document # EPA 452-02-001). Direct capital costs are based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 4-4: AOD – Economic Analysis of VOC Technically Feasible Control Options

Option	Total Capital Investment (\$/furnace)	Total Annualized Cost (\$/yr/furnace)	Potential VOC Removal from Add-on Control (ton/yr/furnace)	Cost Effectiveness (\$/ton VOC removed/furnace)
Regenerative TO	\$14,869,978	\$9,049,451	15.5	\$583,835
Recuperative TO	\$1,860,288	\$17,942,355	15.5	\$1,157,571
Afterburner	\$749,948	\$42,797,151	15.5	\$2,761,107
Absorption	\$1,020,898	\$30,177,726	14.9	\$2,025,350

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. Additionally, the use of an absorber is not cost effective given the quantities of solvent required. Therefore RACT for these units is no additional control beyond what is currently required, including the requirements of 40 CFR 63, subpart YYYYYY that the facility is currently following in 40 CFR 63.10685(a)(2), (b)(2), and b(3) (regarding mercury switches). Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices. It should be noted that the AOD is a secondary refining device. As such, it only processes hot metal from the EAFs. No scrap is added to the AOD. Therefore, any VOC reduction through the pollution prevention plan for scrap was realized with the EAFs.

No. 2 A & P Line, H₂SO₄ – HNO₃/HF Pickling:

NO_x

Note: This analysis applies only to No. 2 Pickling line because No. 1 Pickling line no longer uses HNO₃/HF and No.3 Pickling line is no longer operating.

ACHD has determined that cbc RACT II for the No. 2 A & P Line, H₂SO₄ – HNO₃/HF Pickling is to operate the source in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for NO_x emissions from the No. 2 A & P Line, H₂SO₄ – HNO₃/HF Pickling (NO_x only) were:

1. *SCR;*
2. *Absorption (Wet Scrubber);*
3. *SNCR;*
4. *Absorption + Chemical Reaction;*
5. *Oxidation +Absorption + Chemical Reaction; and*
6. *Hydrogen Peroxide Injection.*

Those considered technically feasible were:

1. *SCR;*
2. *Absorption (Wet Scrubber);*
3. *Oxidation +Absorption + Chemical Reaction; and*
4. *Hydrogen Peroxide Injection.*

Condition 34 of Installation Permit No. 0059-0002 limits combined emissions from the No. 2 Pickling Line Acid Tubs to 11.5 lbs per hour or 48.5 tons per year.

ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills, and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis", EPA's "Control Technologies for Hazardous Air Pollutants", and investigated other sources to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify any controls for acid pickling processes. The USEPA RACT-BACT-LAER Clearinghouse (RBLCL) indicated the following control technologies for similar acid pickling operations:

1. *SCR*
2. *Absorption (Wet Scrubber)*

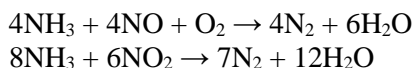
ATI also identified the follow control measures in their RACT submittal:

3. SNCR
4. Absorption + Chemical Reaction (currently used)
5. Oxidation + Absorption + Chemical Reaction
6. Hydrogen Peroxide Injection

No additional control measures were identified for the acid pickling lines. These control measures are all considered post combustion controls.

(a) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium-based catalysts), 470–510 °F for platinum catalysts, and 600–1,000 °F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR has been extensively and quite successfully used in a very cost-effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry. SCR has been used to control acid regeneration lines at steel plants. As indicated above, the optimum temperature for SCR depends on the catalyst. Thus, the exit gas temperatures from some of the processes at iron and steel plants may either be too high or too low, requiring either reheat (if too low) or dilution/quenching (if too high) in order to effectively use SCR.

(b) Selective Non-Catalytic Reduction

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1,600-2,100°F).

The normal NO_x control efficiency range for SNCR is 40-70%. To date there are no known installations of SNCR at iron and steel plants.

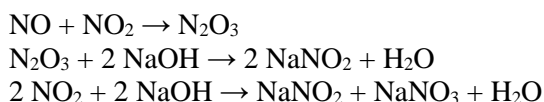
(c) Absorption (Wet Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Physical absorption occurs when the absorbed compound simply dissolves in the solvent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

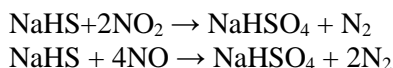
The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). For inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.

Absorption can also be chemical. When a reaction occurs between the absorbed compound and the solvent, it is termed chemical absorption or reactive absorption. This type of absorption depends upon the stoichiometry of the reaction and the concentration of its reactants. For removal of NO₂, the reduction process is designed to reduce NO₂ to molecular nitrogen and water. The reduction process is carried out in a packed column which is fed from a recirculation tank having chemical concentrations held to specific levels based on pH and reduction potential requirements. Sodium hydroxide (NaOH) and sodium hydrosulfide (NaHS) in an aqueous solution are typically used for scrubbing at stainless steel facilities.

The reactions for NaOH scrubbing are shown as follows:



The NaHS reactions proceed as follows:



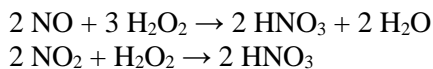
The NO_x removal efficiency of the process is highly dependent on the ratio of NO₂ to total NO_x. ATI previously used physical absorption to control NO_x emissions from the acid pickling lines. The scrubber was upgraded to include chemical absorption in 1998; a stack test performed on the scrubber in 1998 showed 28% control efficiency for NO_x from chemical absorption.

(d) Oxidation + Chemical Absorption (TriNOx® Multi-Chem System)

Oxidation and absorption with chemical reaction is very similar to the process described for absorption with chemical reaction, with the addition of an oxidation column. The oxidation column is designed to first convert NO in the exhaust stream to NO₂, followed by reduction of NO₂ using chemical absorption. This system is commercially known as the TriNOx® Multi-Chem System. The oxidation column does not incorporate a recirculation tank since it accepts a direct feed from its chemical storage tank. The removal efficiency of this process is very high (80-90%) and can result in NO_x outlet emissions of less than 25 ppm.

(e) Hydrogen Peroxide Injection

Hydrogen peroxide (H₂O₂) injection is a means of reducing NO_x emissions from mixed acid (nitric and hydrofluoric) solutions used in pickling. During the pickling process, the nitric acid is converted to nitrous acid which is insoluble in the mixed acid solution and decomposes into mixed NO_x. Injecting H₂O₂ into the acid bath oxidizes the dissolved NO_x back to nitric acid before it escapes solution. The chemical reaction is as follows:



The rate of peroxide injection is controlled by the oxidation-reduction potential of the acid bath. This technology is capable of high NO_x reductions (95% percent).

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x from the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation. ACHD identified SCR, chemical absorption, oxidation plus chemical absorption (TriNO_x®), and hydrogen peroxide injection as technologically feasible control options. This section presents the rationale explaining why each control option is, or is not, technically feasible for this unit.

(a) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. SCR has been used to control acid pickling and acid regeneration lines at similar steel plants. As indicated above, the optimum temperature for SCR depends on the catalyst. The exit gas temperatures from the acid pickling tanks are too low to apply SCR without reheat, thus an auxiliary burner would be required. With these considerations, SCR is considered technically feasible for control of NO_x from the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation.

(b) Selective Non-Catalytic Reduction

SNCR is similar to SCR, but SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1,600-2,100°F). The use of SNCR has not been demonstrated on acid pickling lines in the stainless-steel industry, nor has it been demonstrated on acid regeneration lines at similar facilities. Additionally, the exit gas temperatures from the acid pickling tanks are too low to apply SNCR without reheat. Given the high temperature applications of SNCR, the amount of excess heat required would likely be costly to generate. Therefore, SNCR is considered not technologically feasible for control of NO_x from the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation.

(c) Absorption (Wet Scrubber)

The No. 1 B&P Line, No. 2 A&P Line, and No. 3 A&P Line operations were previously controlled using absorption (without chemical reaction). Stack testing from July 1994 revealed the NO_x control from absorption was 14.8%; the scrubber was subsequently upgraded in 1998. The No. 2 A&P Line operation has been controlled using chemical absorption since 1998. The exhaust from the acid pickling lines are routed to a Ceilcote HAW-300 wet chemical packed bed scrubber utilizing sodium hydroxide (NaOH) and sodium hydrosulfide (NaHS) in water. The scrubber was accepted as Best Available Control Technology (BACT) for the control of HF and HNO₃ acid emissions and NO_x emissions under IP#0059-0002 (issued January 20, 1998), with anticipated reduction efficiencies of 99+% for acid emissions control and 45% for NO_x emissions control. Subsequent testing of the scrubber performed in 1998 showed 28% control efficiency for NO_x. Because the source is currently using this technology, absorption with chemical reaction is considered technology feasible for these units; therefore, no additional emissions reductions would be anticipated.

(d) Oxidation + Chemical Absorption (TriNO_x® Multi-Chem System)

Oxidation and absorption with chemical reaction (TriNO_x®) is very similar to the process described for absorption with chemical reaction but includes the addition of an oxidation column. This technology has been used in similar other acid fume control applications to reduce NO_x emissions and is anticipated to be feasible for stainless steel acid pickling using a "deep tank" design. Therefore, TriNO_x® technology is considered technologically feasible for these units.

(

e) Hydrogen Peroxide Injection

Hydrogen peroxide (H₂O₂) injection is a means of reducing NO_x emissions from mixed acid (nitric and hydrofluoric) solutions used in pickling and has been demonstrated in stainless steel pickling applications. Although it is anticipated to be costly due to H₂O₂ consumption, H₂O₂ injection is considered technologically feasible for control of NO_x from the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The potential to emit NO_x from the No. 2 Pickling Line Acid Tubs is 11.5 lbs per hour or 48.5 tons per year. Therefore, the total potential to emit NO_x from the No. 3 Department Scrubber is currently 48.5 tons per year

The technically feasible control options for each unit, with their estimated control efficiency are as follows:

Table 4-5: Acid Pickling Lines – NO_x Control Options

Units	Potential to Emit NO _x (tpy)	Control Type	Estimated NO _x Control Efficiency (%)	Total Estimated NO _x Emission Reductions (tpy)
No. 2 A & P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation	48.5	SCR	80 ^a	38.8
		Oxygen + Chemical Absorption	85 ^b	41.225
		H ₂ O ₂ Injection	95 ^c	46.075

a Based on average NO_x control efficiency from "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005).

b Based on estimate from TriNO_x® vendor.

c Based on estimate from "How to Control NO_x: Hydrogen peroxide can eliminate NO_x in some treatment situations." Nicholas J. Rossi.

Pollution Engineering, April 1995, pp. 50-52.

Economic Analysis

Using information provided by ATI and collected by ACHD a thorough economic analysis of the technically feasible control options for the acid pickling lines was conducted. The analysis estimates the total costs associated with the NO_x control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NO_x (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below. Absorption alone is technically and economically feasible and is presently being used.

Table 4-6: Acid Pickling Line – Economic Analysis of NO_x Technically Feasible Control Options

Units	Option	Total Capital Investment	Total Annualized Cost (\$/yr) ^a	Potential NO _x Removal from Control (tpy)	Cost Effectiveness(\$/ton NO _x removed)
	SCR	\$1,732,226	\$1,159,624	38.8	\$29,887 ^b

No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation	Oxygen + Chemical Absorption	\$9,417,436	\$3,397,449	41.225	82,412 ^b
	H ₂ O ₂ Injection	\$540,890	\$2,191,398	46.075	\$47,562 ^b

^a Costs based on construction cost estimates from SE Technologies, RACT Proposal, rev. 1996, updated to 2014 dollars.

^b Rounded to the nearest whole dollar.

Step 4 – Select RACT

Currently, the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Line is the only operating pickling facility generating NO_x. Per the ERG report, No. 2 Line generates 48.5 tons per year of NO_x. The Cost calculation, above, results from dividing the Total Annualized Cost by the tons per year of NO_x removed by each control method. Based on the cost of reducing NO_x emissions in dollars per ton, none of the proposed emissions systems are economically feasible. Note that Condition V.C.d of IP 0059-I009 limits NO_x emissions to 48.49 tons per year and this is considered RACT for this emission source.

Lewis Temper Mill:

VOCs

ACHD has determined that cbc RACT II for the Lewis Temper Mill is to operate the sources in accordance with the manufacturer’s specifications and with good operating practices based on the following analyses:

The source includes one milling operation, the Lewis Temper Mill (P008), which emits VOC. In the rolling process, the steel is pinched between two rollers to form strips of steel coils. To lubricate the steel as it moves through the rollers, mixtures of oil and water are sprayed on the steel surface. The unit has a maximum design capacity of 25 tons of steel per hour, with annual production of 219,000 tons steel per year. The unit is uncontrolled.

The Lewis Temper Mill has a potential to emit VOC of 61.32 tons per year. Emissions are based on an application of 0.56 lbs VOC/ton of steel (as provided in the Title V permit application submitted July 8, 2013) and the maximum capacity of 25 tons steel/hr. Per the requirements of RACT Order No. 260, issued December 19, 1996, ATI must maintain production and operating records for the Lewis Temper Mill to demonstrate compliance with 2105.06 of Article XXI and the agreed order.

Step 1 – Identify Control Options

ACHD reviewed ATI's RACT submittal for the Lewis Temper Mill and consulted several references to ensure that all possible control options were identified. ACHD reviewed the RBLC, EPA’s CTG for Volatile Organic Emissions from Stationary Sources, EPA’s “Control Technologies for Hazardous Air Pollutants”, and investigated additional resources to determine if VOC controls for similar mills have been demonstrated. The CTG documents do not identify any specific controls for rolling mills at iron and steel facilities. However, ATI also reviewed the following controls:

1. *Regenerative Thermal Oxidation*
2. *Recuperative Thermal Oxidation*
3. *Afterburner*
4. *Absorption*
5. *Carbon Adsorption*
6. *Inertial Separation*
7. *Condensation*

ACHD additionally reviewed common VOC control techniques for similar sources. This included the review of the following controls:

8. *Oil substitution*: ATI uses kerosene on the Lewis Temper Mill. Kerosene has a vapor pressure (vp) of 0.102. Kerosene's low vapor pressure mitigates the evolution of VOCs from the Lewis Temper Mill.

These controls are discussed in detail below.

(a) **Thermal Oxidation**

Thermal oxidizers are refractory lined enclosures with one or more burners in which the waste gas stream is routed through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidizers typically operate at 1,200 to 2,100° Fahrenheit with residence times typically ranging from 0.5 to 2 seconds. An efficient thermal oxidizer design must provide adequate residence time for complete combustion, sufficiently high temperatures for VOC destruction, and adequate velocities to ensure proper mixing without quenching combustion. The type of burners and their arrangement affect combustion rates and residence time; the more thorough the contact between the flame and VOC, the shorter the time required for complete combustion. Natural gas is required to ignite the flue gas mixtures and maintain combustion temperatures. Typically, a heat exchanger upstream of the oxidizer uses the heat content of the oxidizer flue gas to preheat the incoming VOC-laden stream to improve the efficiency of the oxidizer.

Regenerative thermal oxidation

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.

(b) **Absorption (Scrubber)**

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic

compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.⁹⁴

(c) Carbon Adsorption

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

(d) Catalytic Oxidation

Catalytic oxidizers are similar to thermal oxidizers - the units are enclosed structures that use heat to oxidize the combustible materials. However, in a catalytic oxidizer, a catalyst is used to lower the operating temperature needed to oxidize the VOCs by lowering the activation energy for oxidation. When a preheated gas stream is passed through a catalytic oxidizer, the catalyst bed initiates and promotes the oxidation of the VOC without being permanently altered itself. Note that steps must be taken to ensure complete combustion. The types of catalysts used include platinum, platinum alloys, copper chromate, copper oxide, chromium, manganese, and nickel. These catalysts are deposited in thin layers on an inert substrate, usually a honeycomb shaped ceramic. The effectiveness of catalytic oxidizers is largely dependent on the presence of active catalyst, and may be affected when the inlet gas stream contains a high number of particulate contaminants. The efficiency of a catalytic oxidizer for controlling organic emissions generally ranges from 90-95%.

(e) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%.

(f) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved

mainly through the later, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation, absorption, and inertial separation were identified as technically feasible VOC control options for the AOD. However, a number of the control options identified are not technically feasible for controlling VOC at the AOD. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Thermal Oxidation

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Although thermal oxidation has not currently been demonstrated in use with a rolling mill, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only four facilities using similar cold rolling mills. ATI provided information in their RACT submittal indicating that regenerative thermal oxidization, recuperative thermal oxidation, and afterburners were considered as options for VOC control for this unit; therefore, ACHD has considered each of these options as technically feasible, and costs are provided for each option in Step 3 below.

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Major factors affecting the performance of absorbers on a rolling mill including inlet VOC concentration and volume of lubricant remaining in the wash oil; both of these factors affect the rate of mass transfer of VOC. Typically, removal efficiencies from absorption technology range from 90-95%. Use of absorption has been demonstrated in similar rolling mills in the iron and steel industry, therefore, absorption is considered a technically feasible control option for the Lewis Temper Mill; costs are provided in Step 3 below.

(c) Carbon Adsorption

The exhaust stream from the Lewis Temper Mill contains a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the Lewis Temper Mill.

(d) Catalytic Oxidation

The effectiveness of catalytic oxidizers is largely dependent on the presence of active catalyst. The exhaust streams from the Lewis Temper Mill contains a number of organic and inorganic contaminants. If catalytic oxidation were applied, particulates in the outlet gas would rapidly result in fouling of the catalyst bed and limit the efficiency of the system. Therefore, catalyst oxidation is considered not technically feasible for controlling VOC emissions from the Lewis Temper Mill.

(e) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Although inertial separation has not currently been demonstrated in use with a rolling mill, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only four facilities using similar cold rolling mills. ATI provided information in their RACT submittal indicating that inertial separation was considered as an option for VOC control for this unit; therefore, ACHD has considered inertial separation as technically feasible, and costs are provided in Step 3 below.

(f) Condensers

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for the Lewis Temper Mill. In general, a condenser requires an inlet concentration stream of at least 5,000 ppm VOC to be effective. As such, the use of a condenser would not result in a measurable reduction of VOC in the Lewis Temper Mill. Therefore, the use of a condenser is considered not technically feasible for the AOD vessel.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The potential to emit VOC from the Lewis Temper Mill is estimated at VOC of 61.32 tons per year. Emissions are based on an application of 0.56 lbs VOC/ton of steel (as provided in the Title V permit application submitted July 8, 2013) and the maximum capacity of 25 tons steel/hr.

The technically feasible control options with their estimated control efficiency are as follows:

Table 4-7: Lewis Temper Mill – VOC Technically Feasible Control Options

Control Type	Estimated VOC Control Efficiency	Estimated VOC Emission Reductions (tpy)
Regenerative TO	96 ^a	58.87
Recuperative TO	96 ^a	58.87
Afterburner	96 ^a	58.87
Absorption	93 ^b	57.02
Inertial Separation	80 ^c	49.05

^a Based on data from "Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources" (EPA-450/R-78-022).

^b Based on average from "Control Technologies for Hazardous Air Pollutants" (EPA 625/6-91/014) (June 1991).

^c Based on average from "Air Pollution Control Technology Fact Sheet: Cyclones" (EPA-452/F-03-005)

Economic Analysis

Using information provided by ATI and collected by ACHD a thorough economic analysis of the technically feasible control options for the Lewis Temper Mill was conducted. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 4-8: Lewis Temper Mill – Economic Analysis of VOC Technically Feasible Control Options

Option	Total Capital Investment (\$)	Total Annualized Cost (\$/year)	Potential VOC Removal from Add-on Control (tpy)	Cost Effectiveness (\$/ton VOC Removed)
Regenerative TO	\$6,167,423	\$1,034,223	58.87	\$17,569
Recuperative TO	\$4,901,551	\$844,602	58.87	\$14,348
Afterburner	\$3,838,744	\$685,399	58.87	\$11,643
Absorption	\$12,949,327	\$2,050,116	57.02	\$35,950
Inertial Separation	\$6,230,583	\$1,043,684	49.05	\$24,315

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. The use of an absorber is not cost effective given the quantities of solvent required. Additionally, the use of inertial separation is not cost effective given the high capital cost of the equipment and installation. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the Lewis Temper Mill must be maintained and operated in accordance with good engineering and air pollution control practices. Additionally, ATI must maintain production and operating records for the Lewis Temper Mill to demonstrate compliance with 2105.06 of Article XXI and the agreed order.

The ERG document discussed the possibility that ATI would substitute the oil used in the Lewis Temper Mill for one of less volatility. The revised permit application indicates that kerosene is used as a lubricant on the Mill. Kerosene is acceptable for use on the Mill because its low vapor pressure mitigates the evolution of VOCs. The production limits, kerosene usage limits, and monitoring and recording keeping requirements in Conditions V.D.1.b, c, d and V.D.3 are RACT for this emission source.

Miscellaneous Paints:

VOCs

The source includes miscellaneous painting/coating operations for maintenance and safety painting purposes. Hand rails, machine safety guards, parking lot and safe walkway markings, etc., are routinely painted. Paint usage is tracked and estimated VOC emissions are reported annually.

Emissions of VOC from the painting operations are estimated at 10.4 tons per year, based on a maximum paint usage of 4,000 gallons per year and a maximum annual average VOC content of 5.2 lbs/gallon. The paints' usage and VOC content are based on information supplied by ATI in an e-mail dated 12-16-2019.

Per the requirements of RACT Order No. 260, issued December 19, 1996, ATI must perform miscellaneous painting/coating activities using paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. ATI is required to maintain records of the quantity used, density, water content, and weight percent of VOCs per gallon of the paints/coatings used at the facility.

Step 1 – Identify Control Options

ACHD reviewed ATI's miscellaneous painting operations and consulted several references to ensure that all possible control options were identified for the determination of RACT submittal. ACHD reviewed EPA's CTG

document for Volatile Organic Emissions from Stationary Sources and investigated additional resources to determine if any other VOC controls for miscellaneous painting operations have been demonstrated since the CTG document was published, including the National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources (40 CFR part 63, subpart HHHHHH). The identified controls are discussed below.

The CTG document does not identify control measures for the type of maintenance painting operations conducted. Due to the fugitive nature of the painting operations, it is not feasible to capture the emissions and vent them to an add-on control device. Additionally, 40 CFR part 63, subpart HHHHHH excludes the type of maintenance activities that are performed by ATI. Therefore, ACHD's review of the literature focuses on material reductions and good work practices. Condition V.E.1.b limits the VOC content of the paint used at ATI to 5.2 pounds per gallon. This is technically feasible for ATI and is considered, in conjunction with work practices, RACT.

(a) Use of Low-Volatility Paints and Coatings

Use of low-volatility paintings and coatings is not considered a VOC control technique, but more of a pollution prevention or source reduction technique. When considering the paintings and coatings used for maintenance, a painting or coating with a lower VOC content will result in fewer VOC emissions.

(b) Work Practices

Good work practices for painting/coating materials generally include practices that ensure that exposure of the painting/coating to the atmosphere is minimized and evaporation is reduced. The following are considered good housekeeping practices for painting/coating materials:

1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers.
2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials.
3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately.
4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers.

Step 2 – Eliminate Technically Infeasible Control Options

This section presents the rationale explaining why each control option is, or is not, technically feasible.

(b) Work Practices

Good work practices for painting/coating materials generally include practices that ensure that exposure of the coating to the atmosphere is minimized and evaporation is reduced. ATI is currently using these practices. Therefore, there are no additional work practices would that reduce emissions from the miscellaneous painting and coating operations.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

Although use of low-volatility paints is considered technically feasible for the miscellaneous painting operations, the facility is currently using paints/coatings with a maximum VOC content equal to or less than 5.20 lbs per gallon.

Additionally, the source is already using good work practices for these operations. Therefore, minimal emission reductions are expected and no additional activities are contemplated.

Economic Analysis

Because the source is currently using low-volatility paintings and coatings and using good work practices, no additional costs are anticipated. Specifically, ATI has a permit limit of 5.2 pounds per gallon of VOCs for its paints/coatings. (Condition V.E.1.b)

Step 4 – Select RACT

The miscellaneous painting operation is already subject to the requirements of RACT Order No. 260, issued December 19, 1996, which are equivalent to §2105.06 of Article XXI. Per these requirements, ATI must perform miscellaneous painting/coating activities using paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. However, in IP 0059-I009 the VOC content is lowered to 5.2 pounds per gallon. ATI is also required to maintain records of the quantity used, density, water content, and weight percent of VOCs per gallon of the paints/coatings used at the facility. Therefore, it is determined that RACT for miscellaneous painting is lowering the maximum allowable VOC content of the paints/coatings to 5.2 pounds per gallon, implementing the Work Practice Standards in Condition V.E.6 of the permit, limiting VOC emissions to 10.4 tons per year, and continued compliance with Article XXI.

RACT also includes the use of good work practices, including the following good housekeeping practices for painting/coating materials:

1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers.
2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials.
3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately.
4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers.

ACHD has determined that cbc RACT II for miscellaneous painting is lowering the maximum allowable VOC content of the paints/coatings to 5.2 pounds per gallon, implementing the Work Practice Standards in Condition V.E.6 of the permit, and limiting VOC emissions to 10.4 tons per year. There are no feasible controls when painting buildings, railings and other such objects.

Section 2105.82 of Article XXI does not apply because that section regulates parts cleaners. An example of the activity performed here is painting a railing on a walkway after its repair. This is an on-site maintenance function, as opposed to the removal of a part to a shop for cleaning in a parts cleaner before repair as would be done with a pump or a gear box.

Section 2105.83 of Article XXI does not apply either because it applies to parts cleaning and surface coating as part of producing a finished product as can be found in a production line. It does not apply to general maintenance as described above.

The reduction of 17.6 tpy of VOCs was accomplished by lowering the annual paint usage from 10,000 gallons per year to 4,000 gallons per year and lowering the maximum VOC content of the paint to 5.2 pounds per gallon.

Table 6-1: RACT II Permit Conditions

Source ID	Description	Permit Condition 0059-I009	RACT II Regulations
		Condition V.A.4.c Condition V.A.5.a Condition V.A.6.a	25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99; RO 260
P002	Argon-Oxygen Decarburization Vessel (AOD)	Condition V.B.1.b Condition V.B.3.a Condition V.B.3.b Condition V.B.3.c Condition V.B.4.a Condition V.B.4.b Condition V.B.4.c Condition V.B.5.a Condition V.B.5.c Condition V.B.6.a	25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99; RO 260
P002	No. 2 A&P Line H2SO4 – HNO3/HF Pickling Operations	Condition V.C.1.b Condition V.C.1.c Condition V.C.1.d Condition V.C.1.e Condition V.C.3.a Condition V.C.3.b Condition V.C.3.c Condition V.C.3.d Condition V.C.4.a Condition V.C.4.b Condition V.C.4.c Condition V.C.5.a Condition V.C.6.a	25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99; RO 260
P002	Lewis Temper Mill	Condition V.D.1.b Condition V.D.1.c Condition V.D.1.d Condition V.D.1.e Condition V.D.3.a Condition V.D.3.b Condition V.D.4.a Condition V.D.4.b Condition V.D.4.c Condition V.D.5.a Condition V.D.6.a	25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100; RO 260 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
	Miscellaneous Paints	Condition V.E.1.b Condition V.E.1.c Condition V.E.3.a Condition V.E.4.a Condition V.E.4.b Condition V.E.5.a Condition V.E.6.a	25 PA Code §129.99; RO 260 25 PA Code §129.99 25 PA Code §129.100; RO 260 25 PA Code §129.100; RO 260 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99; RO 260

ALLEGHENY COUNTY HEALTH DEPARTMENT
Air Quality Program

**SUMMARY OF PUBLIC COMMENTS AND DEPARTMENT RESPONSES
ON THE PROPOSED ISSUANCE OF ALLEGHENY LUDLUM CORPORATION
INSTALLATION PERMIT NO. 0059-I009**

*[Notice of the opportunity for public comment appeared in the legal section of the
Pittsburgh Post-Gazette on January 9, 2020. The public comment
period ended on February 11, 2020.]*

Comments by EPA

1. **Comment: RACT I vs. RACT II and anti-backsliding requirement:** EPA has previously SIP approved RACT I (RACT Order 260, dated December 19, 1996) for ATI (formerly, Allegheny Ludlum) in 2001 (40 CFR 52.2020 (c)(159)(i)(B)). Several of the emission units have RACT requirements that must be evaluated under the RACT II analysis. For example, some units are required to conduct annual tune ups and perform other activities to minimize NO_x emissions. These sources are the No. 2 A&P line, preheat furnace and annealing furnace, the No. 1 A&P line, preheat furnace and annealing furnace, Boilers No. 1 and No. 2, and the Loftus soaking pits No. 9 through 23. The draft IP does not list these emission sources as RACT subject units nor does the permit contain these existing requirements. All of the emission units subject to RACT I, unless clearly identified as shutdown, must have a RACT II evaluation performed, which could, for example, conclude that one or more units are subject to the presumptive RACT requirements at 25 Pa. Code §129.97. Unless ACHD has successfully evaluated the existing RACT requirements and determined that the new RACT II requirements are at least as stringent, these existing requirements must remain in the permit. As required under the Clean Air Act §110(l), ACHD must provide an evaluation and comparison of the RACT II vs. RACT I requirements to ensure that there is no backsliding. The comparison of the RACT I vs. RACT II requirements under §110(l) is a comparison of the entire package of emission limitations, emission requirements, work practices, monitoring, testing and recordkeeping.

Response: Installation Permit IP 0059-I009 (IP9) does not include No. 2 A&P line, preheat furnace and annealing furnace, the No. 1 A&P line, preheat furnace and annealing furnace, Boilers No. 1 and No. 2, and the Loftus soaking pits No. 9 through 23. IP9 includes only those sources identified as case-by-case RACT. Therefore, it does not address the sources identified above. Those sources continue to be subject to the requirements of RACT Order 260.

2. **Comment: Work Practice Standards as RACT II:** The ACHD review memo describes specific examples of work practice standards for the electric arc furnaces such as “controlling exhaust flows to reduce the input of outside air and minimizing the opening of the slag door”. This is part of ACHD’s RACT determination for the electric arc furnaces and needs to be included in the draft permit.

A more detailed consideration of work practice standards as RACT is needed for the VOC operations at ATI. The work practice standards for the minimization of VOC emissions from the

miscellaneous paint operation for RACT can likewise be more specific in offering the types of commonly used good work practices, such as the storing of used rags and brushes within enclosed and sealed containers and the minimization of VOC emission during painting operations by covering/sealing all paints/materials not immediately being used, and minimizing air circulation in the cleaning unit. A potentially applicable requirement at Article XXI §2105.82 (25 Pa. Code §129.63a) pertaining to industrial cleaning solvents contains some good practices to minimize VOC emissions. Even if this regulation is determined not to be applicable to ATI's activities, ACHD should consider the specific good practices in that regulation as part of its RACT evaluation.

Response: The Work Practice Standards for NO_x have been revised to include specific examples for electric arc furnaces (EAFs). See Condition V.A.6.a.2.

The Work Practice Standards for VOCs regarding Miscellaneous Paints have been revised to include specific examples for minimizing VOC emissions during painting. See Condition V.E.6.b.

3. **Comment: RACT II evaluation of technical and economic feasibility:** The rationale for the RACT evaluation of the Electric Arc Furnaces (F1 and F2), the Argon – Oxygen Decarburization (AOD), the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling, and the Lewis Temper Mill needs to include how and why the named emission control technologies were determined to be technically infeasible. It may be necessary to more fully describe each emission unit's operations relative to how emissions are generated and controlled as part of this evaluation. For example, if ACHD has determined that SCR and SNCR have technical constraints for application to F1 and F2, please describe and explain those technical constraints as applied to F1 and F2. For the AOD and the No. 2 A&P pickling line, when no control technologies were deemed technically feasible, please describe how and why these controls were deemed infeasible. For the Lewis Temper Mill, the control technologies were deemed economically infeasible (and hence, presumably, technically feasible). Please describe in more detail what the economic evaluation consisted of such as the amount of VOC reduction expected with each of the feasible control options, and the method by which costs were evaluated (including, for example, assumptions of interest rate and equipment life).

Response: Additional information has been added to the technical support document (TSD) to explain the evaluated control options.

4. **Comment: Applicable RACT requirements for Miscellaneous Paints:** Other than painting buildings, what does this activity at ATI include? Please expand the description of the activities covered. ACHD must assess whether there are any existing RACT requirements that apply to the activities in this source grouping. For example, if there is painting of metals objects, the regulation at Article XXI §2105.83 (25 Pa. Code §129.52) may apply. For example, §2105.83 (25 Pa. Code §129.52d) pertains to the surface coating of miscellaneous metal parts. These are existing state- and federally-enforceable RACT requirements. Clean up operations may be subject to §2105.82 (25 Pa. Code §129.63a). The case by case RACT provisions of §129.99 are only applicable to those units for which there is not an existing RACT requirement.

Response: In their comments below (Comment #31 below), ATI described the painting activities as: "...for maintenance purposes and safety-related painting activities (safety railings, designated safe walkways, etc.); we do not engage in production-related painting activities or painting "processes." ATI's painting and clean up activities do not meet the applicability definitions in §2105.15 or §2105.83 of Article XXI, therefore, a case by case RACT determination(25 Pa. Code

§129.99) is necessary. Additional Work Practice Standards have been added to Condition V.E.6 to reduce emissions of fugitive VOCs.

5. **Comment: VOC and NO_x RACT Permit Provisions:** Section VI of the ACHD review memo summarizes the ATI RACT II permit conditions. There are many provisions identified as part of ACHD's case by case RACT II determination that were not specifically discussed in the review memo. All provisions being proposed for RACT must be discussed and evaluated for their contribution toward minimizing or reducing VOC or NO_x emissions at each RACT subject unit. This should be part of the RACT technical and feasibility analysis. If there are RACT I provisions being retained because they are required under Clean Air Act §110(l), the RACT Order 260 should be appropriately cited.

Response: Section VI of the RACT review memo (technical support document or TSD) lists six (6) sources as subject to case-by-case RACT. This is an Installation Permit because this source does not have a Title V Operating Permit. The Conditions cited are not specific additions to an existing permit but proposed conditions in a new permit. See the additional language in Section IV of the TSD. Where appropriate citations to RACT Order 260 have been included in the TSD.

Comments by Clean Air Council

6. **Comment:** The Department should provide better substantiation in support of its RACT II determination for Electric Arc Furnaces (EAF) F1 and F2.

NO_x:

The commenter suggested that NO_x emissions could be reduced by “working smarter”. The example given stated that “emissions could be reduced by decreasing the number of batch processes through upgrades of electrical equipment. Specifically, the commenter noted that by upgrading their electrical equipment by purchasing higher power transformers for the EAFs, ATI could reduce tap-to-tap time and thereby, reduce the number of heats. The result would be fewer emissions.

VOCs:

The commenter notes that “the Department reproduces the conclusions of the technical support document in 2015 (ERG document), without reproducing the reasoning or calculations.” The commenter further suggests that the entire technical and economic analyses for all possible emission controls should be included in the technical support document (TSD).

The commenter asks for a clarification for the following language in the TSD: “scrap management, required by 40 CFR Part 63 Subpart YYYYYY, reduces sources of VOCs in the scrap but does not control the emissions of VOCs from the EAFs.” The CAC contends that scrap management will control VOCs.

Response:

NO_x: The commenter assumes that purchasing a new transformer for the EAFs to control NO_x by reducing the annual number of heats assumes that a reduction in such heats will take place. The comments noted that production would increase also. Increased production would cause increased emissions. Additionally, ATI reports that the cost of replacing the existing

transformers is at least \$1,900,000 each. This price does not include installation. A higher-powered transformer is expected to be more expensive. Therefore, the high cost of purchasing a new transformer to reduce emissions makes the project economically infeasible.

VOCs: The Department agrees with the commenter and the pollution prevention plan in YYYYYY is part of the RACT determination for the EAFs and the AOD. ATI is required to implement a scrap pollution prevention plan under 40 CFR Part 63 Subpart WWWW. A purpose of this plan is to “ minimize the amount of chlorinated plastics, lead, and free organic liquids that is charged to the furnace.” Implementing and following the plan is RACT for the EAFs.

7. **Comment:** The Department should provide better substantiation in support of its RACT II determination for Argon-Oxygen Decarburization (AOD).

NO_x:

Commenter asserts that the ERG analyses do not provide evidence to support the conclusion that there are no technically feasible control options for the AOD.

VOCs:

Commenter suggests that the economic infeasibility analysis is incomplete because it does not include calculations.

Response:

NO_x: Information has been added to the TSD that expands upon the reasoning for the Department’s conclusions regarding control of NO_x from the AOD.

VOCs: The calculations in which the annualized cost was divided by the annual tons of VOCs removed is the pertinent calculation. Said calculation is included in the revised TSD.

8. **Comment:** The Department should provide better substantiation in support of its RACT II determination for the No. 2 Pickling Line.

NO_x only:

The commenter questions the reliability of the cost estimates supplied in the ERG analysis.

Response:

NO_x only: Information has been added to the TSD that expands upon the reasoning for the Department’s conclusions regarding control of NO_x from the No. 2 Pickling Line.

9. **Comment:** The Department should provide better substantiation in support of its RACT II determination for the Lewis Temper Mill.

VOCs only:

The commenter deems this analysis insufficient because it does not include calculations.

Response:

VOCs only: Information has been added to the TSD that expands upon the reasoning for the Department's conclusions regarding control of VOCs from the Lewis Temper Mill.

10. **Comment:** The Department should provide better substantiation in support of its RACT II determination for Miscellaneous Paints.

VOCs only:

Commenter states that there are "best management practices" that will reduce VOCs during painting and uses the example of painting on a mobile offshore drilling unit located at least 100 miles from the Louisiana shoreline and 125 miles from the Florida shoreline. Commenter does not identify any emission control devices for this application.

Response:

VOCs only: Language identifying and listing "best management practices" has been added to IP 0059-I009. Additionally, the TSD has been expanded to address the specific type of painting contemplated by Condition V.E.

Cited RACT/BACT/LAER Clearinghouse – Anadarko Petroleum Corporation, Painting Operations. The language the commenter cited in their comment came from this site. The site stated that no controls were feasible. Permitted in Region IV. OCS air regs apply. Permit issued 9-16-2014. Painting conditions in permit refer only to spray guns.

11. **Comment:** The Department should require specific work practice standards in the Terms and Conditions of the Draft Permit, and not rely on boilerplate language. Commenter wants more specific language in the "work practice standards" Condition of the permit. Furthermore, the commenter suggests that "the Department should require the facility to adopt the precise emissions reduction practices that the Department identified as technically and economically feasible in the review memorandum." Those practices explicitly identified as feasible in the review memorandum should also explicitly be part of the draft permit.

Response: The Department has modified "work practice standards" in the draft permit. Specific emission reduction practices have been included in the "work practice standards" and elsewhere as appropriate.

Comments by ATI

12. **Comment:** The commenter noted that the permit contains a typographical error in that the permit number should be 0059-I001 rather than 0060-I001.

Response: The Department concurs. The correction has been made.

13. **Comment:** The Facility Description section of the permit stated that the Brackenridge Facility is a major source of SO_x. The commenter asserts that the Brackenridge Facility is **not** a major source of SO_x.

Response: The Department concurs that the Brackenridge is not currently a major source of SO_x.

The language in the “Facility Description” section of the draft permit has been revised to reflect this.

14. **Comment:** The commenter noted that Condition III.12 states that the Installation Permit shall expire in 18 months if construction has not commenced or has been started then suspended for 18 months. The commenter asserts that ATI does not anticipate any construction associated with this permit. Therefore, the Condition is not applicable and should be deleted.

Response: The Department acknowledges “that ATI does not anticipate commencing construction related to this Installation Permit within 18 months.” However, the Department sees no need to remove the Condition. There is no guarantee that the Condition will not be applicable during the life of the Installation Permit. If the Condition is unnecessary, its presence does no harm.

15. **Comment:** The commenter states that Condition V.A.1.b.4 contains a typographic error in that it mis-identifies the baghouse to which the F2 DEC system exhausts. The Condition states that the F2 DEC exhausts into C002A baghouses. The F2 DEC exhausts into C002A baghouse (singular).

Response: The Department concurs. The correction has been made.

16. **Comment:** The commenter noted a difference in the requirements for recording differential pressure (DP) at the furnace baghouses. The proposed requirements are once per day while the existing requirements are once per week. The commenter requested that the DP recording requirements be returned to once per week.

Response: The Department reviewed IP6 and confirmed that the DP recording requirements were once per week. Draft IP9 has been revised to correspond to IP6.

17. **Comment:** The commenter asserts that Condition V.A.4.a contains duplicative language and suggests that the language of this Condition be revised to eliminate said duplication.

Response: The Department concurs. The Condition has been edited to eliminate duplication.

18. **Comment:** The Commenter states that there is a typographical error in Condition V.B.1.b.2 because it refers to “baghouses” but should refer to only one (1) baghouse.

Response: The Department concurs. The typographical error has been corrected.

19. **Comment:** The commenter noted concerns about several issues in Condition V.C.1.b and suggested changes in the permit language. Among the stated concerns are typographical errors; incorrect permit numbers; inaccurate parameter ranges; and references to additional parameters not routinely monitored, not routinely monitored since installation and do not need to be monitored to demonstrate proper installation.

Response: The typographical error regarding the reference to Permit IP 0059-I002 (IP2) has been corrected.

The Department agrees that a pH range of 8.0 to 12.5 is reasonable and the change was made to the draft permit.

The minimum scrubbing liquid flow-rate of 450 gallons per minute was recorded in the Title V permit application submitted by the commenter. Since no basis was offered for its modification by the commenter, it will remain unchanged.

The pressure drop across the scrubber is stated as 2.25 inches of water in the Title V permit application submitted by the commenter. Unless and until the commenter supplies technical information why it should be changed, the pressure drop requirement shall remain unchanged at 3.0 inches of water.

The commenter suggested removing the requirement for an exhaust flow through the scrubber. The draft permit calls for an exhaust flow rate of 60,000 acfm which is the rate in the Title V permit application. Appendix A for IP2 indicates the exhaust flow rate is 6,000 acfm. The draft permit was corrected to 6,000 acfm.

The commenter suggested the removal of certain language in Condition V.C.1.b.5. This language appears in the draft Title V permit and will remain unchanged with the exception of changing the “I” in “Instrumentation” to lower case.

20. **Comment:** The commenter contends that the requirements of Condition V.C.1.c are not relevant to this permit because said Condition discusses H₂SO₄ pickling which is not a source of NO_x. As such, the commenter believes that the entire Condition should be deleted.

Response: The Department concurs that H₂SO₄ pickling is not a source of NO_x and has deleted the Condition.

21. **Comment:** The commenter suggested revised language to more accurately identify the processes in Conditions V.C.1.d, V.C.1.e and Table V-C-1.

Response: The Department concurs and has made the suggested changes.

22. **Comment:** The Commenter asserts that scrubber D17, referred to in Condition V.C.3.a, is an H₂SO₄ scrubber and not a source of NO_x. Therefore, Condition V.C.3 should be revised to eliminate reference to scrubber D17 and Condition V.C.1.c (addressed in Comment #20 above). The commenter states that inspection of the pickling tubs is not required either.

Response: The Department has made an appropriate clarification to the Condition.

23. **Comment:** The Commenter asserts Condition V.C.3.b contains typographical errors and refers to non-applicable monitoring requirements.

Response: The language for this Condition comes primarily from IP2. Monitoring fan amps is not included in IP2 and will be deleted. ORP monitoring is included in IP2 and will be added. The rest of the draft permit language will remain unchanged.

24. **Comment:** Regarding Condition V.C.3.c: The commenter states daily visual inspections for fugitive emissions are not necessary because the equipment is located inside a building. Weekly structural inspections were proposed by the commenter.

Response: Notwithstanding that the scrubber is located within the building, the scrubber stack exits outside the building above the roof line. For that reason, daily visual inspections for emissions will remain part of the permit monitoring requirements. The word “fugitive” has been

removed from IP9.

The Department agrees with the commenter that weekly structural integrity inspections are sufficient to verify the proper working of the scrubber. The draft permit was modified to reflect this change.

25. **Comment:** The Commenter asserts Condition V.C.4.a contains typographical errors, contains overly burdensome recordkeeping requirements and suggests language changes in the draft permit. The recommended changes are listed below:

- a. The permittee shall keep and maintain the following data for the No.2 A and P Pickling Tubs No.1, No.2 and No.3 ~~S092C and D~~: (§2102.04.b.5, §2103.12.j, Permit No. 0059-I002, Condition No. 29; 25 Pa. Code §129.100)
 - 1) The throughput in tons of steel (~~daily, monthly, and 12-month~~);
 - 2) The scrubbing liquid ~~solution~~ flow-rate (weekly ~~daily, monthly, and 12-month~~);
 - 3) Differential pressure ~~drop to within 1/2" w.c. of the actual pressure drop~~ (weekly ~~daily, monthly, average and 12-month~~);
 - 4) ~~Chemical Usage (daily, monthly, and 12-month)~~;
 - 5) Oxidation Reduction Potential (weekly ~~daily, monthly, and 12-month~~);
 - 6) pH ~~accurate to 5%, (weekly daily, monthly, average and 12-month)~~;
 - 7) ~~The results of the inspections required by Condition V.C.3.a above; and~~
 - 8) Records of operation, maintenance, inspection, calibration and/or replacement of process or control equipment.

Response: IP2 requires daily records of scrubbing liquid pH and oxidation reduction potential (ORP); daily records of scrubbing liquid flowrate, pressure drop across the scrubber and chemical usage of NaOH and NaHS; and weekly records of ORP and pH monitoring instrumentation inspection reports. Condition V.C.4.a of IP9 will continue to incorporate these requirements. The Department agrees that monthly and 12-month throughput of tons of steel is an acceptable parameter. The Department will revise Condition V.C.4.a.7 to include recording the ORP and pH monitoring instrumentation inspection results on a weekly basis in conformance with IP2 Condition 29.D. Additionally, the Department changed the word “solution” to “liquid” to conform with IP2.

26. **Comment:** The Commenter suggests that the language in Condition V.C.4.c requiring: “All records to be retained...” is too expansive and suggests that the word “All” be removed from this Condition.

Response: The Department does not agree with the commenter’s contention and will leave Condition V.C.4.c unchanged.

27. **Comment:** The Commenter considers Condition V.C.5.a over burdensome as described in the following quoted comment:

“Condition V.C.5.a refers to semi-annual reporting. As indicated above, recordkeeping for this source is a manual task and there is no further environmental benefit to be gained by entering the monitored values into a computerized spreadsheet in order to calculate monthly and 12-month data. In addition, there is no benefit to reporting records of operation and maintenance to the Department semiannually (as recorded in Condition

V.C.4.a.8). We also believe that semi-annual reporting of "operation and maintenance" was not the intent of this condition. As required in Condition V.C.4.c., records will be retained for at least five (5) years and shall be made available to the Department upon request for review and/or copying. Therefore, to be consistent with other conditions in this permit, to clarify the intent, and to not make the recordkeeping and reporting tasks overly burdensome with no additional environmental benefit, ATI requests that production information and parametric monitoring deviation events be included in the semi-annual report and requests that Condition V.C.5.a be revised as follows:

The permittee shall report the following information semiannually to the Department in accordance with General Condition Ill.15 above. The reports shall contain all required information for the time period of the report:

Monthly and 12-month data required to be recorded by Condition V.C.4.a.1 above; and

~~*Non-compliance information required to be recorded by Condition V.W.4.b above. Deviations from parametric monitoring ranges in Condition V.C.1.a above.*~~

Response: IP2 requires: (Condition 29)

1. Daily records of scrubbing liquid pH and ORP;
2. Daily records of scrubbing liquid flowrate, pressure drop across the scrubber and chemical usage of NaOH and NaHS; and
3. Weekly records of the ORP and pH monitoring instrumentation inspection results.

Additionally, IP2 requires the reporting of all instances of non-compliance and the corrective action taken to restore the equipment to compliance. Therefore, the language: "Deviations from parametric monitoring ranges in Condition V.C.1.a above." will not be incorporated into IP2 but will remain as originally stated.

28. **Comment:** Page 25 - Conditions V.D.1.c refer to limitations on the Lewis Temper Mill. Please note that fugitive VOC emissions are generated from maintenance activities associated with this Mill and are not based on a production rate. Emissions estimates of the fugitive emissions were previously submitted to the Department. Potential fugitive VOC emissions are estimated to be 3.5 lb/hr and 15.3 tons/year. Please note that monitoring kerosene usage is not currently required; this would be a new permit requirement. Kerosene has a very low evaporation rate and the majority of the used kerosene would be on disposed rags. Due to the significant decrease in the Lewis Temper Mill potential VOC emissions and because kerosene usage is related to a maintenance activity, ATI requests that the requirement to monitor kerosene usage be removed. Conditions V.D.1.c. and V.D.1 e. need to be revised as follows:

~~*c. The permittee shall not use more than 10,000 gallons of kerosene on the Lewis Temper Mill in any consecutive twelve month period;*~~

~~*e d. Fugitive emissions from the Lewis Temper Mill shall not exceed the emissions limitations in Table V-D-1 below.*~~

TABLE V-D-1: Lewis Temper Mill Emission Limitations

<i>POLLUTANTS</i>	<i>HOURLY EMISSION LIMIT (lb/hr)</i>	<i>ANNUAL EMISSION LIMIT (tons/year)</i>
<i>Volatile Organic Compounds</i>	14.00 3.5	61.32 15.3

Response: The emissions from the Lewis Temper Mill for IP9 are based on information supplied by ATI in their Title V Operating Permit application. The calculation is based on a factor of 0.56 pounds of VOCs per ton of steel throughput. The steel throughput is 25 tons per hour. Other Conditions in the permit limit the amount of kerosene to 10,000 gallons and production to 219,000 tons per consecutive 12-month period. The production number is based on 25 tons per hour and 8,760 hours of operation in a year. The Commenter stated that the fugitive emissions were due to maintenance activities and not based on a production rate. This is a change from information previously supplied by ATI in their Title V Operating Permit application. No basis was given for this change or the source of the revised (lower) emission factors (lb/hr and tons/year) other than “maintenance activities”. Information such as: How many gallons of kerosene are used per 12-month period during these maintenance activities? and What is the amount of VOCs emitted per gallon of kerosene? are missing from the comment. Therefore, there is no ability to verify the revised emission factors.

The Department appreciates ATI’s efforts to reduce VOCs. However, the Department cannot accept such a change without a basis and considers the attribution to “maintenance activities” insufficient. Therefore, the Department will not change any Conditions based on this comment

29. **Comment:** The Commenter suggested the removal of Conditions V.D.3.b and V.D.4.a.2, relating to the Monitoring and Recordkeeping of kerosene use, based on the suggested revision to Comment #28 above.

Response: The Department declined to make any revisions based on Comment #28. Therefore, the suggested revisions to Comment #29 will not be incorporated into IP9

30. **Comment:** Page 26 - Condition V.D.6.a. refers to work practice standards for the No. 2 A&P Line; this is a typographical error. This condition should refer to the Lewis Temper Mill, and needs to be revised as follows:

a. The Lewis Temper Mill No. 2A & P Line, ~~H₂O~~, ~~HNO₃~~, ~~HF~~ Pickling shall be:

Response: The Department appreciates the Commenters discovery of this typographical error. It has been corrected.

31. **Comment:** The Commenter states that Condition V.E.1.b. refers to RACT Order No. 260 Condition 1.10 and contains typographic errors. Condition V.E.1.b. needs to be corrected as follows to match the requirements of RACT Order No. 260. Also, Condition V.E.1.b refers to Article XXI §2105.10 which applies to surface coating processes. Paint usage at the Brackenridge facility is for maintenance purposes and safety-related painting activities (safety railings, designated safe walkways, etc.); the facility does not engage in production-related painting activities or painting "processes." References to Article XXI §2105.10 and 25 PA Code §129.99 are not applicable and need to be removed. Condition V.E.1.b. needs to be revised as follows:

The permittee shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than ~~5.2~~ 7.0 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis.

(RACT Order No. 260, Condition 1.10, ~~§2105.10.a.3, 25 Pa. Code §129.99~~)

Response: The Department agrees that §2105.10.a.3 does not apply to this Condition (Surface Coating Processes) because the activities contemplated under Section V.E do not meet the definition of Surface Coating Processes in §2101.20 of Article XXI.

Notwithstanding RACT Order 260, ATI agreed in an e-mail dated 12-16-2019 to a limit of 5.2 pounds per gallon of VOCs less water and exempt solvents and a maximum annual paint usage of 4,000 gallons per year. This is the basis for the 5.2 pounds per gallon VOCs and will remain unchanged.

The Commenter offered no reason why the reference to 25 Pa Code §129.99 should be removed, just the unsupported statement that it does not apply. With no supporting justification, the Department sees no reason to remove the reference. It will remain in Condition V.E.1.b.

32. **Comment:** Page 27 - Conditions V.E.3.a., V.E.4.a., and V.E.5.a. refer to monitoring, recordkeeping and reporting requirements for miscellaneous paint usage. It appears these requirements are based on Article XXI §2105.10, which applies to surface coating process categories. Paint usage at the Brackenridge Facility is for maintenance purposes and safety-related painting activities, and the facility does not engage in production-related painting activities. Currently, usage data for painting activities are compiled annually from "end of the year" purchasing records, and actual VOC emissions are based on VOC content. The proposed monthly monitoring and recordkeeping requirements for maintenance and safety-related painting activities are overly burdensome, would be extremely difficult to comply with, and there would be no additional environmental benefit beyond the current *annual* monitoring and recordkeeping procedures. In addition, ATI already reports paint usage and VOC information to the Department annually in the emissions inventory and source report. The additional requirement to report maintenance and safety-related painting activities semi-annually would be overly burdensome and there would be no additional environmental benefit beyond the current *annual* reporting practice. In addition, the proposed Title V permit (November 14, 2017) did not require semi-annual reporting of paint usage. As required by Condition V.E.4.b., paint usage records will be available on-site for ACHD review. Conditions V.E.3., V.E.4., and V.E.5. be revised as follows:

3. *Monitoring Requirements:*

- a. *The permittee shall monitor the following data for miscellaneous paints ~~§115~~:*
- 1) *Quantity of paints/coatings used at the facility (~~monthly, 12-month~~);*
 - 2) *VOC of paints/coatings used at the facility (12-month) ~~Density of paints/coatings used at the facility (monthly, 12 month)~~;*
 - 3) *~~Water content of paints/coatings used at the facility (monthly, 12 month); and~~*
 - 4) *~~Weight percent of VOCs per gallon of paints/coatings used at the facility (monthly, 12 month).~~*

4. *Record Keeping Requirements:*

a. The permittee shall record the following data for miscellaneous paints ~~S115~~;

- 1) ~~Quantity of paints/coatings used at the facility (monthly, 12-month);~~
- 2) ~~VOC of paints/coatings used at the facility (12-month). Density of paints/coatings used at the facility (monthly, 12 month);~~
- 3) ~~Water content of the paints/coatings used at the facility; (monthly, 12 month); and~~
- 4) ~~Weight percent of VOCs per gallon of paints/coatings used at the facility (monthly, 12 month).~~

b. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying.

5. Reporting Requirements:

c. ~~None except as provided elsewhere. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa Code §129.100~~

- 1) ~~Quantity of paint and coatings used at the facility in gallons (monthly, 12 month)~~
- 2) ~~Weight percent of VOCs per gallon of paintings/coatings used at the facility (monthly, 12 month).~~

Response: The Recordkeeping requirements are from "Plan Approval Order and Agreement Nn. 260 Upon Consent" (260 Order) Condition 1.10 not §2105.10 of Article XXI and will remain in the draft permit.

The language "S115" is a reference number from the Title V application. The Department agrees that it does not need to be part of IP9 and will be removed from Conditions V.E.3 and V.E.4.

Because there are limits to the amount of paint and coatings used annually and to the VOC content of the paint and coatings, the Department believes that the permittee should report these parameters to demonstrate compliance. Therefore, the Reporting requirements will remain in IP9.

33. **Comment:** Page 28 - Condition V.E.6.a. is a work practice standard and proposes that paints and coatings are applied in a manner than *minimizes VOC emissions*. Paint usage at the Brackenridge Facility is for maintenance purposes and safety-related painting activities; the facility does not engage in production-related painting activities or painting "processes." Because painting is a maintenance activity and is performed in open air or inside buildings throughout the entire facility using hand-held spray paint cans or brushes, this is a "fugitive" source; no control device can be used. Condition V.E.6.a. is an ambiguous statement and needs to be revised as follows:

- a. *None as provided elsewhere. ~~The permittee shall apply paint and coatings in a manner to minimize VOC emissions.~~*

Response: The Department agrees that Condition V.E.6.a is too general. Therefore, Condition V.E.6.b was added listing specific work practices to reduce VOCs during painting.

LIST OF COMMENTERS

	Name	Affiliation
1	Cynthia H. Stahl, PhD.	EPA
2	Joseph Otis Minott, Esq.	Clean Air Council
3	Christopher D. Ahlers, Esq.	Clean Air Council
4	Deborah L. Calderazzo	ATI Flat Rolled Products Holdings, LLC

Michael Dorman
Air Quality Engineer
April 16, 2020



AIR QUALITY PROGRAM
301 39th Street, Bldg. #7
Pittsburgh, PA 15201-1811

Minor Source/Minor Modification
INSTALLATION PERMIT

Issued To: **ATI Flat Rolled**
 Products Holdings, LLC
 100 River Road
 Brackenridge, PA 15014-1597

ACHD Permit#: **0060-I009**

Date of Issuance: -----

Expiration Date: (See Section III.12)

Issued By: _____
 JoAnn Truchan, P.E.
 Section Chief, Engineering

Prepared By: _____
 Michael Dorman
 Air Quality Engineer

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AMENDMENTS:

<i>DATE</i>	<i>SECTION(S)</i>
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I. CONTACT INFORMATION

Facility Location: **ATI Flat Rolled Products Holdings, LLC**
100 River Road
Brackenridge, PA 15014-1597

Permittee/Owner: **ATI Flat Rolled Products Holdings, LLC**
100 River Road
Brackenridge, PA 15014-1597

Permittee/Operator:
(if not Owner)

Responsible Official: **Deborah Calderazzo**
Title: Director, Environmental Affairs
Company: ATI Flat Rolled Products Holdings, LLC
Address: 100 River Road
Brackenridge, PA 15014-1597

Telephone Number: 724-226-5947
Fax Number: 724-226-5292

Facility Contact: **Deborah Calderazzo**
Title: Director, Environmental Affairs
Telephone Number: 724-226-5947
Fax Number: 724-226-5292
E-mail Address: **Deborah.Calderazzo@ATIMetals.com**

AGENCY ADDRESSES:

ACHD Contact: **Section Chief, Engineering**
Allegheny County Health Department
Air Quality Program
301 39th Street, Building #7
Pittsburgh, PA 15201-1811

EPA Contact: **Enforcement Programs Section (3AP12)**
USEPA Region III
1650 Arch Street
Philadelphia, PA 19103-2029

II. FACILITY DESCRIPTION

FACILITY DESCRIPTION

The ATI Flat Rolled Products Holdings, LLC (ATI) Brackenridge Plant, located at 100 River Road, Brackenridge, Allegheny County, PA, is a producer of specialty products from scrap and other additives.

The facility is a minor source of lead (Pb), HAPs, sulfuric acid (H_2SO_4) and nitric acid (HNO_3). It is a major source of particulate matter (PM), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($\text{PM}_{2.5}$), oxides of sulfur dioxide (SO_x), oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs) and carbon dioxide (CO_2) as defined in section 2101.20 of Article XXI.

INSTALLATION DESCRIPTION

This permit is an installation addressing the requirements for case-by-case RACT for this facility.

The emission units regulated by this permit are summarized in Table I-1:

Table I-1: RACT: Table of Requirements

Source	RACT II Requirement	Basis
V.A: EAF F1 F2	RACT consists of continued compliance with all applicable regulatory and permit requirements.	No feasible control technology available for NO_x or VOCs Meets BACT
V.B: Argon-Oxygen Decarburization Vessel (AOD)	RACT consists of continued compliance with all applicable regulatory and permit requirements.	No feasible control technology available for NO_x or VOCs
V.C: No.2 A & P Line, H_2SO_4 – HNO_3 /HF Pickling (NO_x only)	RACT consists of continued compliance with all applicable regulatory and permit requirements.	Source meets BACT
V.D: Lewis Temper Mill (VOCs only)	RACT consists of continued compliance with all applicable regulatory and permit requirements and Consent Decree No. 260.	§2105.06 of Article XXI and Consent Decree No. 260
V.E: Miscellaneous Paints (VOCs only)	<ol style="list-style-type: none">1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers.2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials.3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately.4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers.	Revised ATI analysis of paint usage. No feasible control technology available for VOCs

DECLARATION OF POLICY

Pollution prevention is recognized as the preferred strategy (over pollution control) for reducing risk to air resources. Accordingly, pollution prevention measures should be integrated into air pollution control programs wherever possible, and the adoption by sources of cost-effective compliance strategies, incorporating pollution prevention, is encouraged. The Department will give expedited consideration to any permit modification request based on pollution prevention principles.

The permittee is subject to the terms and conditions set forth below. These terms and conditions constitute provisions of Allegheny County Health Department Rules and Regulations, Article XXI Air Pollution Control. The subject equipment has been conditionally approved for operation. The equipment shall be operated in conformity with the plans, specifications, conditions, and instructions which are part of your application, and may be periodically inspected for compliance by the Department. In the event that the terms and conditions of this permit or the applicable provisions of Article XXI conflict with the application for this permit, these terms and conditions and the applicable provisions of Article XXI shall prevail. Additionally, nothing in this permit relieves the permittee from the obligation to comply with all applicable Federal, State and Local laws and regulations.

III. GENERAL CONDITIONS**1. Prohibition of Air Pollution (§2101.11)**

It shall be a violation of this permit to fail to comply with, or to cause or assist in the violation of, any requirement of this permit, or any order or permit issued pursuant to authority granted by Article XXI. The permittee shall not willfully, negligently, or through the failure to provide and operate necessary control equipment or to take necessary precautions, operate any source of air contaminants in such manner that emissions from such source:

- a. Exceed the amounts permitted by this permit or by any order or permit issued pursuant to Article XXI;
- b. Cause an exceedance of the ambient air quality standards established by Article XXI §2101.10; or
- c. May reasonably be anticipated to endanger the public health, safety, or welfare.

2. Nuisances (§2101.13)

Any violation of any requirement of this Permit shall constitute a nuisance.

3. Definitions (§2101.20)

- a. Except as specifically provided in this permit, terms used retain the meaning accorded them under the applicable provisions and requirements of Article XXI or the applicable federal or state regulation. Whenever used in this permit, or in any action taken pursuant to this permit, the words and phrases shall have the meanings stated, unless the context clearly indicates otherwise.
- b. Unless specified otherwise in this permit or in the applicable regulation, the term “year” shall mean any twelve (12) consecutive months.

4. Certification (§2102.01)

Any report or compliance certification submitted under this permit shall contain written certification by a responsible official as to truth, accuracy, and completeness. This certification and any other certification required under this permit shall be signed by a responsible official of the source, and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

5. Operation and Maintenance (§2105.03)

All air pollution control equipment required by this permit or Article XXI, and all equivalent compliance techniques that have been approved by the Department, shall be properly installed, maintained, and operated consistent with good air pollution control practice.

6. Conditions (§2102.03.c)

It shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02, for any person to fail to comply with any terms or conditions set forth in this permit.

7. Transfers (§2102.03.e)

This permit shall not be transferable from one person to another, except in accordance with Article XXI §2102.03.e and in cases of change-in-ownership which are documented to the satisfaction of the Department, and shall be valid only for the specific sources and equipment for which this permit was issued. The transfer of permits in the case of change-in-ownership may be made consistent with the administrative permit amendment procedure of Article XXI §2103.14.b.

8. Effect (§2102.03.g)

Issuance of this permit shall not in any manner relieve any person of the duty to fully comply with the requirements of Article XXI or any other provision of law, nor shall it in any manner preclude or affect the right of the Department to initiate any enforcement action whatsoever for violations of Article XXI or this Permit, whether occurring before or after the issuance of such permit. Further, the issuance of this permit shall not be a defense to any nuisance action, nor shall such permit be construed as a certificate of compliance with the requirements of Article XXI or this Permit.

9. General Requirements (§2102.04.a)

It shall be a violation of this Permit giving rise to the remedies set forth in Article XXI §2109 for any person to install, modify, replace, reconstruct, or reactivate any source or air pollution control equipment to which this Permit applies unless either:

- a. The Department has first issued an Installation Permit for such source or equipment; or
- b. Such action is solely a reactivation of a source with a current Operating Permit, which is approved under §2103.13 of Article XXI.

10. Conditions (§2102.04.e)

Further, the initiation of installation, modification, replacement, reconstruction, or reactivation under this

Installation Permit and any reactivation plan shall be deemed acceptance by the source of all terms and conditions specified by the Department in this permit and plan.

11. Revocation (§2102.04.f)

- a. The Department may, at any time, revoke this Installation Permit if it finds that:
 - 1) Any statement made in the permit application is not true, or that material information has not been disclosed in the application;
 - 2) The source is not being installed, modified, replaced, reconstructed, or reactivated in the manner indicated by this permit or applicable reactivation plan;
 - 3) Air contaminants will not be controlled to the degree indicated by this permit;
 - 4) Any term or condition of this permit has not been complied with;
 - 5) The Department has been denied lawful access to the premises or records, charts, instruments and the like as authorized by this Permit; or
- b. Prior to the date on which construction of the proposed source has commenced the Department may, revoke this Installation Permit if a significantly better air pollution control technology has become available for such source, a more stringent regulation applicable to such source has been adopted, or any other change has occurred which requires a more stringent degree of control of air contaminants.

12. Term (§2102.04.g)

This Installation Permit shall expire in 18 months if construction has not commenced within such period or shall expire 18 months after such construction has been suspended, if construction is not resumed within such period. In any event, this Installation Permit shall expire upon completion of construction, except that this Installation Permit shall authorize temporary operation to facilitate shakedown of sources and air cleaning devices, to permit operations pending issuance of a related subsequent Operating Permit, or to permit the evaluation of the air contamination aspects of the source. Such temporary operation period shall be valid for a limited time, not to exceed 180 days, but may be extended for additional limited periods, each not to exceed 120 days, except that no temporary operation shall be authorized or extended which may circumvent the requirements of this Permit.

13. Annual Installation Permit Administrative Fee (§2102.10.c & e)

No later than 30 days after the date of issuance of this Installation Permit and on or before the last day of the month in which this permit was issued in each year thereafter, during the term of this permit until a subsequent corresponding Operating Permit or amended Operating Permit is properly applied for, the owner or operator of such source shall pay to the Department, in addition to all other applicable emission and administration fees, an Annual Installation Permit Administration Fee in an amount of \$750.

14. Severability Requirement (§2103.12.l)

The provisions of this permit are severable, and if any provision of this permit is determined to be invalid or unenforceable, such a determination will not affect the remaining provisions of this permit.

15. Reporting Requirements (§2103.12.k)

- a. The permittee shall submit reports of any required monitoring at least every six (6) months. All

instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by the Responsible Official.

- b. Prompt reporting of deviations from permit requirements is required, including those attributable to upset conditions as defined in this permit and Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.
- c. All reports submitted to the Department shall comply with the certification requirements of General Condition III.4 above.
- d. Semiannual reports required by this permit shall be submitted to the Department as follows:
 - 1) One semiannual report is due by July 31st of each year for the time period beginning January 1st and ending June 30th of the current year.
 - 2) One semiannual report is due by February 1st of each year for the time period beginning July 1st and ending December 31st of the previous year.
 - 3) The first semiannual report shall be due July 31, 2020 for the time period beginning on the issuance date of this permit through June 30, 2020.
- e. Reports may be emailed to the Department at aqreports@alleghenycounty.us in lieu of mailing a hard copy.

16. Minor Installation Permit Modifications (§2102.10.d)

Modifications to this Installation Permit may be applied for but only upon submission of an application with a fee in the amount of \$300 and where:

- a. No reassessment of any control technology determination is required; and
- b. No reassessment of any ambient air quality impact is required.

17. Violations (§2104.06)

The violation of any emission standard established by this Permit shall be a violation of this Permit giving rise to the remedies provided by Article §2109.02.

18. Other Requirements Not Affected (§2105.02)

Compliance with the requirements of this permit shall not in any manner relieve any person from the duty to fully comply with any other applicable federal, state, or county statute, rule, regulation, or the like, including, but not limited to, any applicable NSPSs, NESHAPs, MACTs, or Generally Achievable Control Technology standards now or hereafter established by the EPA, and any applicable requirement of BACT or LAER as provided by Article XXI, any condition contained in this Installation Permit and/or any additional or more stringent requirements contained in an order issued to such person pursuant to Part I of Article XXI.

19. Other Rights and Remedies Preserved (§2109.02.b)

Nothing in this permit shall be construed as impairing any right or remedy now existing or hereafter created in equity, common law or statutory law with respect to air pollution, nor shall any court be deprived of such jurisdiction for the reason that such air pollution constitutes a violation of this permit

20. Penalties, Fines, and Interest (§2109.07.a)

A source that fails to pay any fee required under this Permit or article XXI when due shall pay a civil penalty of 50% of the fee amount, plus interest on the fee amount computed in accordance with of Article XXI §2109.06.a.4 from the date the fee was required to be paid. In addition, the source may have its permit revoked.

21. Appeals (§2109.10)

In accordance with State Law and County regulations and ordinances, any person aggrieved by an order or other final action of the Department issued pursuant to Article XXI shall have the right to appeal the action to the Director in accordance with the applicable County regulations and ordinances.

IV. SITE LEVEL TERMS AND CONDITIONS

1. Reporting of Upset Conditions (§2103.12.k.2)

The permittee shall promptly report all deviations from permit requirements, including those attributable to upset conditions as defined in Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.

2. Visible Emissions (§2104.01.a)

Except as provided for by Article XXI §2108.01.d pertaining to a cold start, no person shall operate, or allow to be operated, any source in such manner that the opacity of visible emissions from a flue or process fugitive emissions from such source, excluding uncombined water:

- a. Equal or exceed an opacity of 20% for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period; or,
- b. Equal or exceed an opacity of 60% at any time.

3. Odor Emissions (§2104.04) (County-only enforceable)

No person shall operate, or allow to be operated, any source in such manner that emissions of malodorous matter from such source are perceptible beyond the property line.

4. Materials Handling (§2104.05)

The permittee shall not conduct, or allow to be conducted, any materials handling operation in such manner that emissions from such operation are visible at or beyond the property line.

5. Operation and Maintenance (§2105.03)

All air pollution control equipment required by this permit or any order under Article XXI, and all equivalent compliance techniques approved by the Department, shall be properly installed, maintained, and operated consistently with good air pollution control practice.

6. Open Burning (§2105.50)

No person shall conduct, or allow to be conducted, the open burning of any material, except where the Department has issued an Open Burning Permit to such person in accordance with Article XXI §2105.50 or where the open burning is conducted solely for the purpose of non-commercial preparation of food for human consumption, recreation, light, ornament, or provision of warmth for outside workers, and in a manner which contributes a negligible amount of air contaminants.

7. Shutdown of Control Equipment (§2108.01.b)

- a. In the event any air pollution control equipment is shut down for reasons other than a breakdown, the person responsible for such equipment shall report, in writing, to the Department the intent to shut down such equipment at least 24 hours prior to the planned shutdown. Notwithstanding the submission of such report, the equipment shall not be shut down until the approval of the Department is obtained; provided, however, that no such report shall be required if the source(s) served by such air pollution control equipment is also shut down at all times that such equipment

is shut down.

- b. The Department shall act on all requested shutdowns as promptly as possible. If the Department does not take action on such requests within ten (10) calendar days of receipt of the notice, the request shall be deemed denied, and upon request, the owner or operator of the affected source shall have a right to appeal in accordance with the provisions of Article XI.
- c. The prior report required by Site Level Condition IV.7.a above shall include:
 - 1) Identification of the specific equipment to be shut down, its location and permit number (if permitted), together with an identification of the source(s) affected;
 - 2) The reasons for the shutdown;
 - 3) The expected length of time that the equipment will be out of service;
 - 4) Identification of the nature and quantity of emissions likely to occur during the shutdown;
 - 5) Measures, including extra labor and equipment, which will be taken to minimize the length of the shutdown, the amount of air contaminants emitted, or the ambient effects of the emissions;
 - 6) Measures which will be taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impracticable to shut down or curtail the affected source(s) during the shutdown; and
 - 7) Such other information as may be required by the Department.

8. Breakdowns (§2108.01.c)

- a. In the event that any air pollution control equipment, process equipment, or other source of air contaminants breaks down in such manner as to have a substantial likelihood of causing the emission of air contaminants in violation of this permit, or of causing the emission into the open air of potentially toxic or hazardous materials, the person responsible for such equipment or source shall immediately, but in no event later than sixty (60) minutes after the commencement of the breakdown, notify the Department of such breakdown and shall, as expeditiously as possible but in no event later than seven (7) days after the original notification, provide written notice to the Department.
- b. To the maximum extent possible, all oral and written notices required shall include all pertinent facts, including:
 - 1) Identification of the specific equipment which has broken down, its location and permit number (if permitted), together with an identification of all related devices, equipment, and other sources which will be affected.
 - 2) The nature and probable cause of the breakdown.
 - 3) The expected length of time that the equipment will be inoperable or that the emissions will continue.
 - 4) Identification of the specific material(s) which are being, or are likely to be emitted, together with a statement concerning its toxic qualities, including its qualities as an irritant, and its potential for causing illness, disability, or mortality.
 - 5) The estimated quantity of each material being or likely to be emitted.
 - 6) Measures, including extra labor and equipment, taken or to be taken to minimize the length of the breakdown, the amount of air contaminants emitted, or the ambient effects of the emissions, together with an implementation schedule.
 - 7) Measures being taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impractical to shut down the source(s), or any part thereof, during the breakdown.

- c. Notices required shall be updated, in writing, as needed to advise the Department of changes in the information contained therein. In addition, any changes concerning potentially toxic or hazardous emissions shall be reported immediately. All additional information requested by the Department shall be submitted as expeditiously as practicable.
- d. Unless otherwise directed by the Department, the Department shall be notified whenever the condition causing the breakdown is corrected or the equipment or other source is placed back in operation by no later than 9:00 AM on the next County business day. Within seven (7) days thereafter, written notice shall be submitted pursuant to Paragraphs a and b above.
- e. Breakdown reporting shall not apply to breakdowns of air pollution control equipment which occur during the initial startup of said equipment, provided that emissions resulting from the breakdown are of the same nature and quantity as the emissions occurring prior to startup of the air pollution control equipment.
- f. In no case shall the reporting of a breakdown prevent prosecution for any violation of this permit or Article XXI.

9. Cold Start (§2108.01.d)

In the event of a cold start on any fuel-burning or combustion equipment, except stationary internal combustion engines and combustion turbines used by utilities to meet peak load demands, the person responsible for such equipment shall report in writing to the Department the intent to perform such cold start at least 24 hours prior to the planned cold start. Such report shall identify the equipment and fuel(s) involved and shall include the expected time and duration of the startup. Upon written application from the person responsible for fuel-burning or combustion equipment which is routinely used to meet peak load demands and which is shown by experience not to be excessively emissive during a cold start, the Department may waive these requirements and may instead require periodic reports listing all cold starts which occurred during the report period. The Department shall make such waiver in writing, specifying such terms and conditions as are appropriate to achieve the purposes of Article XXI. Such waiver may be terminated by the Department at any time by written notice to the applicant.

10. Monitoring of Malodorous Matter Beyond Facility Boundaries (§2104.04)

The permittee shall take all reasonable action as may be necessary to prevent malodorous matter from becoming perceptible beyond facility boundaries. Further, the permittee shall perform such observations as may be deemed necessary along facility boundaries to insure that malodorous matter beyond the facility boundary in accordance with Article XXI §2107.13 is not perceptible and record all findings and corrective action measures taken.

11. Emissions Inventory Statements (§2108.01.e & g)

- a. Emissions inventory statements in accordance with §2108.01.e shall be submitted to the Department by March 15 of each year for the preceding calendar year. The Department may require more frequent submittals if the Department determines that more frequent submissions are required by the EPA or that analysis of the data on a more frequent basis is necessary to implement the requirements of Article XXI or the Clean Air Act.
- b. The failure to submit any report or update within the time specified, the knowing submission of

false information, or the willful failure to submit a complete report shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

12. Orders (§2108.01.f)

In addition to meeting the requirements Site Level Conditions IV.7 through IV.11, inclusive, the person responsible for any source shall, upon order by the Department, report to the Department such information as the Department may require in order to assess the actual and potential contribution of the source to air quality. The order shall specify a reasonable time in which to make such a report.

13. Violations (§2108.01.g)

The failure to submit any report or update thereof required by Site Level Conditions IV.7 through IV.12 above, inclusive, within the time specified, the knowing submission of false information, or the willful failure to submit a complete report shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

14. Emissions Testing (§2108.02)

- a. **Orders:** No later than 60 days after achieving full production or 120 days after startup, whichever is earlier, the permittee shall conduct, or cause to be conducted, such emissions tests as are specified by the Department to demonstrate compliance with the applicable requirements of this permit and shall submit the results of such tests to the Department in writing. Upon written application setting forth all information necessary to evaluate the application, the Department may, for good cause shown, extend the time for conducting such tests beyond 120 days after startup but shall not extend the time beyond 60 days after achieving full production. Emissions testing shall comply with all applicable requirements of Article XXI, §2108.02.e.
- b. **Tests by the Department:** Notwithstanding any tests conducted pursuant to this permit, the Department or another entity designated by the Department may conduct emissions testing on any source or air pollution control equipment. At the request of the Department, the permittee shall provide adequate sampling ports, safe sampling platforms and adequate utilities for the performance of such tests.
- c. **Testing Requirements:** No later than 45 days prior to conducting any tests required by this permit, the person responsible for the affected source shall submit for the Department's approval a written test protocol explaining the intended testing plan, including any deviations from standard testing procedures, the proposed operating conditions of the source during the test, calibration data for specific test equipment and a demonstration that the tests will be conducted under the direct supervision of persons qualified by training and experience satisfactory to the Department to conduct such tests. In addition, at least 30 days prior to conducting such tests, the person responsible shall notify the Department in writing of the time(s) and date(s) on which the tests will be conducted and shall allow Department personnel to observe such tests, record data, provide pre-weighed filters, analyze samples in a County laboratory and to take samples for independent analysis. Test results shall be comprehensively and accurately reported in the units of measurement specified by the applicable emission limitations of this permit.
- d. Test methods and procedures shall conform to the applicable reference method set forth in this permit or Article XXI Part G, or where those methods are not applicable, to an alternative sampling and testing procedure approved by the Department consistent with Article XXI §2108.02.e.2.

- e. **Violations:** The failure to perform tests as required by this permit or an order of the Department, the failure to submit test results within the time specified, the knowing submission of false information, the willful failure to submit complete results, or the refusal to allow the Department, upon presentation of a search warrant, to conduct tests, shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

15. Abrasive Blasting (§2105.51)

- a. Except where such blasting is a part of a process requiring an operating permit, no person shall conduct or allow to be conducted, abrasive blasting or power tool cleaning of any surface, structure, or part thereof, which has a total area greater than 1,000 square feet unless such abrasive blasting complies with all applicable requirements of Article XXI §2105.51.
- b. In addition to complying with all applicable provisions of §2105.51, no person shall conduct, or allow to be conducted, abrasive blasting of any surface unless such abrasive blasting also complies with all other applicable requirements of Article XXI unless such requirements are specifically addressed by §2105.51.

16. Asbestos Abatement (§2105.62, §2105.63)

In the event of removal, encasement, or encapsulation of Asbestos-Containing Material (ACM) at a facility or in the event of the demolition of any facility, the permittee shall comply with all applicable provisions of Article XXI §2105.62 and §2105.63.

17. Volatile Organic Compound Storage Tanks (§2105.12.a)

No person shall place or store, or allow to be placed or stored, a volatile organic compound having a vapor pressure of 1.5 psia or greater under actual storage conditions in any aboveground stationary storage tank having a capacity equal to or greater than 2,000 gallons but less than or equal to 40,000 gallons, unless there is in operation on such tank pressure relief valves which are set to release at the higher of 0.7 psig of pressure or 0.3 psig of vacuum or at the highest possible pressure and vacuum in accordance with State or local fire codes, National Fire Prevention Association guidelines, or other national consensus standard approved in writing by the Department. Petroleum liquid storage vessels that are used to store produced crude oil and condensate prior to lease custody transfer are exempt from these requirements.

18. Fugitive Emissions (§2105.49)

The person responsible for a source of fugitive emissions, in addition to complying with all other applicable provisions of this permit shall take all reasonable actions to prevent fugitive air contaminants from becoming airborne. Such actions may include, but are not limited to:

- a. The use of asphalt, oil, water, or suitable chemicals for dust control;
- b. The paving and maintenance of roadways, parking lots and the like;
- c. The prompt removal of earth or other material which has been deposited by leaks from transport, erosion or other means;
- d. The adoption of work or other practices to minimize emissions;
- e. Enclosure of the source; and
- f. The proper hooding, venting, and collection of fugitive emissions.

19. Episode Plans (§2106.02)

The permittee shall upon written request of the Department, submit a source curtailment plan, consistent with good industrial practice and safe operating procedures, designed to reduce emissions of air contaminants during air pollution episodes. Such plans shall meet the requirements of Article XXI §2106.02.

20. New Source Performance Standards (§2105.05)

- a. It shall be a violation of this permit giving rise to the remedies provided by §2109.02 of Article XXI for any person to operate, or allow to be operated, any source in a manner that does not comply with all requirements of any applicable NSPS now or hereafter established by the EPA, except if such person has obtained from EPA a waiver pursuant to Section 111 or Section 129 of the Clean Air Act or is otherwise lawfully temporarily relieved of the duty to comply with such requirements.
- b. Any person who operates, or allows to be operated, any source subject to any NSPS shall conduct, or cause to be conducted, such tests, measurements, monitoring and the like as is required by such standard. All notices, reports, test results and the like as are required by such standard shall be submitted to the Department in the manner and time specified by such standard. All information, data and the like which is required to be maintained by such standard shall be made available to the Department upon request for inspection and copying.

V. EMISSION UNIT LEVEL TERMS AND CONDITIONS

A. Electric Arc Furnaces (F1 and F2)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall not conduct, or allow to be conducted, F1 or F2 process operations unless the furnace pollution control equipment is on line and properly maintained and operated according to the following conditions: (2102.04.b.5; 25 Pa. Code §129.99)
 - 1) F1 and F2 shall be equipped with a direct evacuation control (DEC) system with water cooled ductwork;
 - 2) The fugitive emissions capture equipment shall consist of segmented canopy hood systems exhausting to baghouses C002B and C006, cross-draft partitions, a scavenger duct and closed roofs. The scavenger duct systems shall be installed in the exhaust duct work between each canopy where it will be most effective, based on the canopy and duct configuration and design;
 - 3) The F1 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to C001 baghouse;
 - 4) The F2 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to the C002A baghouses
 - 5) F1 and F2 shall be equipped with canopy hoods for collection of process fugitive emissions. Such hoods shall be in operation at all times during process steel making operations and emissions shall be exhausted to the C002B (F2 canopy) baghouse and C006 (F1 canopy) baghouse, respectively;
 - 6) The differential pressure drop across each baghouse compartment shall not exceed 15 in. w.c.;
 - 7) The differential pressure drop across each compartment in the F1 and F2 DEC and canopy baghouses, shall be recorded once per day, during furnace operations.
 - 8) Should the differential pressure across a baghouse exceed 15 in. w.c., the permittee shall promptly investigate the cause of the deviation. The permittee shall record and maintain records of the following information for each investigation:
 - a) The date and time the deviation was observed;
 - b) The magnitude of the deviation observed;
 - c) The date(s) the investigation was conducted;
 - d) The findings, recommendations and corrective actions for the investigation; and
 - e) The pressure drop reading after the deviation was corrected.
 - 9) The permittee shall take prompt action to correct any deviation and bring the control equipment back to normal operating parameters.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall check and record the fan motor amperes and damper positions for the F1 and F2 emission control systems on a once-per-shift basis. (§2103.12.i, 40 CFR 60.274a(b); 25 Pa. Code §129.100)
- b. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouses for F1 and F2. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d) ; 25 Pa. Code §129.100)
- c. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the F1 and F2 DEC and Canopy baghouses during operation of F1 and F2. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2103.12.a.2.D; 25 Pa. Code §129.100)
- d. The permittee shall inspect F1 and F2, the C001 and C002A DEC baghouses, and the C002B canopy and C006 canopy baghouses weekly for to insure proper operation and compliance with permit conditions. (§2103.12.i, 2102.04.b.5; 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the F1 and F2 and associated control equipment: (2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685; 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Fan motor amp and damper position data;
 - 3) Fan amps data;
 - 4) Monthly and 12-month production for each furnace;
 - 5) Inspection data; and
 - 6) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1; 25 Pa. Code §129.100)
- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a) ; 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information to the Department in its semiannual report. The reports shall contain all required information for the time period of the report: (§2103.12.k, 40 CFR §60.276a; 25 Pa. Code §129.100)
 - 1) Monthly and 12-month summaries of data required to be recorded by Condition V.A.4.a above. Monthly fan motor amperes data shall consist of the monthly maximum and minimum values observed for each fan; and

- 2) Non-compliance information required to be recorded by Condition V.A.4.b above.
- b. Reporting instances of non-compliance in accordance with Condition V.A.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. EAFs F1 and F2 shall be: (§210.04.b.5, RACT Order No. 260, Condition 1.3; 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

B. Argon-Oxygen Decarburization Vessel (AOD)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall not conduct, or allow to be conducted, AOD process operations unless the pollution control system is on-line, properly maintained and operated according to the following conditions: (2102.04.b.5, 40 CFR §60.272a(a), 40 CFR §63.10686(b)(1); 25 Pa. Code §129.99)
 - 1) Emissions from the AOD during process operations shall be exhausted to baghouse C006; and
 - 2) The differential pressure across the baghouses shall not exceed 15 inches w.c.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouse C006 for the AOD. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted, and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d) ; 25 Pa. Code §129.100)
- b. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the C006 Canopy baghouse during operation of the AOD. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2102.04.b.5; 25 Pa. Code §129.100)
- c. The permittee shall monitor production on a monthly and 12-month basis. (§2103.12.i, 2102.04.b.5; 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the AOD and associated control equipment: (§2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685; 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Monthly and 12-month production for the AOD; and
 - 3) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1; 25 Pa. Code §129.100)

- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a) ; 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k; 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded for Condition V.B.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.B.4.b above.
- b. Reporting instances of non-compliance in accordance, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)
- c. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k; 25 Pa. Code §129.100)

6. Work Practice Standards:

- a. The AOD shall be: (§2102.04.b.5; 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

C. No.2 A & P Line, H₂SO₄–HNO₃/HF Pickling (NO_x only)**1. Restrictions:**

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall at no time, conduct or allow to be conducted pickling operations in the No.2 A and P Pickling Tubs No.1, No.2 and No.3 unless all emissions from HNO₃/HF pickling are processed through the wet chemical packed tower scrubber D-019. The scrubber shall be properly maintained and operated according to the following conditions: (§210.04.b.5, Permit No. 0058-I002, Condition Nos. 26, 27 and 28; 25 Pa. Code §129.99)
 - 1) The pH shall be between 10.5 and 12;
 - 2) The scrubbing solution shall be NaOH and NaHS in water;
 - 3) The minimum scrubbing liquid flow-rate shall be 450 gallons per minute;
 - 4) The maximum differential pressure drop across the scrubber shall be 3.0" w.c. The exhaust flow-rate through the scrubber shall be no less than 60,000 acfm at all times;
 - 5) The scrubber shall be equipped with Instrumentation that shall at all times continuously monitor pH, scrubbing liquid flow-rate to within 1 gallon per minute of actual and differential pressure drop to within ½" w.c. of the actual pressure drop at all times.
- c. The permittee shall at no time, conduct or allow to be conducted pickling operations in the No.2 A and P pickling Tubs No.1, No.2 and No.3 unless all emissions from H₂SO₄ pickling are processed through the water wash packed tower scrubber D-017. The scrubber shall be properly maintained and operated according to the following conditions: (§210.04.b.5; 25 Pa. Code §129.99)
 - 1) The minimum scrubbing liquid flow-rate shall be 250 gpm;
 - 2) The scrubbing solution shall be water;
 - 3) The maximum differential pressure drop across the scrubber shall be 7" w.c.;
 - 4) The exhaust flow-rate through the scrubber shall be no less than 60,000 acfm at all times;
 - 5) The scrubber shall be equipped with Instrumentation that shall at all times continuously monitor the pH, scrubbing liquid flow-rate to within 1 gallon per minute of actual and differential pressure drop to within ½" w.c. of the actual pressure drop at all times.
- d. The throughput for the H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed 148,920 tons of steel in any consecutive twelve-month period. (§210.04.b.5; 25 Pa. Code §129.99)
- e. Emissions from the H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed the emissions limitations in Table V-C-1 below. (§210.04.b.5; ; 25 Pa. Code §129.99)

TABLE V-C-1: H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 & No.3 Emission Limitations

POLLUTANT	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Nitrogen Oxides	11.07	48.49

*A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall inspect the subject pickling tubs and scrubbers D017 and D019, weekly to insure compliance with Conditions V.C.1.b above and Condition V.C.1.c above. (§2103.12.i; 25 Pa. Code §129.100)
- b. The packed bed scrubbers shall be provided with monitoring instrumentation that shall at all times, continuously monitor the following parameters of the scrubbing liquid in the scrubber. The monitoring instrumentation shall be inspected for proper operation weekly. Calibration shall be conducted as required by manufacturer's instructions to ensure accurate measurements. (§2102.04.b.5, §2103.12.i; 25 Pa. Code §129.100)
 - 1) The pressure drop across the scrubber;
 - 2) The scrubbing liquid flow rate;
 - 3) The scrubbing liquid pH within 5%; and
 - 4) Fan amps
- c. The permittee shall perform daily visual inspection of fugitive emissions while the affected source is operating under normal conditions for proper operation and to ensure that there is no evidence of chemical attack on the structural integrity of the scrubber (§2102.04.b.5, §2103.12.i; 25 Pa. Code §129.100).
- d. The permittee shall monitor: (§2103.12.i; 25 Pa. Code §129.100)
 - 1) Steel throughput (monthly, and 12-month); and
 - 2) Operation, maintenance, inspection and calibration and/or replacement of process or pollution control equipment.

4. Record Keeping Requirements:

- a. The permittee shall keep and maintain the following data for the No.2 A and P Pickling Tubs No.1, No.2 and No.3 S092C and D: (§2102.04.b.5, §2103.12.j, Permit No. 0059-I002, Condition No. 29; 25 Pa. Code §129.100)
 - 1) The throughput in tons of steel (daily, monthly, and 12-month);
 - 2) The scrubbing solution flow-rate (daily, monthly, and 12-month);
 - 3) Differential pressure drop to within ½" w.c. of the actual pressure drop (daily, monthly, average and 12-month);
 - 4) Chemical Usage (daily, monthly, and 12-month);
 - 5) Oxidation Reduction Potential (daily, monthly, and 12-month);
 - 6) pH accurate to 5%, (daily, monthly, average and 12-month);
 - 7) The results of the inspections required by Condition V.C.3.a above; and
 - 8) Records of operation, maintenance, inspection, calibration and/or replacement of process or control equipment.

- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j; 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j; 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k; 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded by Condition V.C.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.C.4.b above.
- b. Reporting instances of non-compliance in accordance with Condition V.C.5.a above does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. The No.2 A & P Line, $H_2SO_4-HNO_3$ /HF Pickling shall be: (§210.04.b.5; 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

D. Lewis Temper Mill (VOCs only)**1. Restrictions:**

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The production of the Lewis temper mill shall not exceed 219,000 tons of steel in any consecutive twelve-month period. (§2102.04.b.5; 25 Pa. Code §129.99)
- c. The permittee shall not use more than 10,000 gallons of kerosene on the Lewis Temper Mill in any consecutive twelve-month period. (§2102.04.b.5; 25 Pa. Code §129.99)
- d. Maintain production and operating records in compliance with §1.9.A of Consent Decree No. 260 and §2105.06 of Article XXI. (§2105.06, Consent Decree No. 260; 25 Pa. Code §129.100)
- e. Fugitive emissions from the Lewis temper mill shall not exceed the emissions limitations in Table V-D-1 below. (§2102.04.b.5; ; 25 Pa. Code §129.99)

TABLE V-D-1: Lewis Temper Mill Emission Limitations

POLLUTANTS	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	14.00	61.32

* A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall monitor production on a monthly and a rolling 12-month basis. (2103.12.i; 25 Pa. Code §129.100)
- b. The permittee shall monitor kerosene on a monthly and a rolling 12-month basis. (2103.12.i; 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for Lewis temper mill: (§2102.04.b.5, §2103.12.j; 25 Pa. Code §129.100)
 - 1) Production (monthly, and 12-month);
 - 2) Kerosene usage (monthly, and 12-month); and

- 3) Records of operation, maintenance, inspection and calibration and/or replacement of process equipment; and
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j; 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j; 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k; 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded by Condition V.D.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.D.4.b above.
- b. Reporting instances of non-compliance in accordance with Condition V.D.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. The No.2 A & P Line, H₂SO₄-HNO₃/HF Pickling shall be: (§210.04.b.5; 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

E. Miscellaneous Paints (VOCs only)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 5.2 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. (RACT Order No. 260, Condition 1.10, §2105.10.a.3; 25 Pa. Code §129.99)
- c. Emissions from Miscellaneous Paints, based on an annual usage of 4,000 gallons per 12-month period, shall not exceed the emissions limitations in Table V-E-1 below (§2103.12.a.2.B; 25 Pa. Code §129.99)

TABLE V-E-1: Miscellaneous Paints Emission Limitations

POLLUTANT	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	10.4

*A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall monitor the following data for miscellaneous paints S115: (§2102.04.b.5, §2103.12.i, RACT Order No. 260, Condition 1.10; 25 Pa. Code §129.100)
 - 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

4. Record Keeping Requirements:

- a. The permittee shall record the following data for miscellaneous paints S115: (§2102.04.b.5, §2103.12.j, RACT Order No. 260, Condition 1.10; 25 Pa. Code §129.100)
 - 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

- b. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j; 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k; 25 Pa. Code §129.100)
 - 1) Quantity of paint and coatings used at the facility in gallons (monthly, 12-month); and
 - 2) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

6. Work Practice Standards:

- a. The permittee shall apply paint and coatings in a manner that minimizes VOC emissions. (§2102.04.b.5; 25 Pa. Code §129.99)

VI. ALTERNATIVE OPERATING SCENARIOS

There are no alternative operating scenarios for this permit

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ALLEGHENY COUNTY HEALTH DEPARTMENT AIR QUALITY PROGRAM

January 9, 2020

SUBJECT: Reasonable Available Control Technology (RACT II) Determination
ATI Flat Rolled Products Holdings, LLC
100 River Road
Brackenridge, PA 15014-1597
Allegheny County

Installation Permit No. 0059-I009

TO: JoAnn Truchan, P.E.
Section Chief, Engineering

FROM: Michael Dorman
Air Quality Engineer

I. Executive Summary

ATI Flat Rolled Products Holdings, LLC (ATI) is defined as a major source of NO_x and VOC emissions and was subjected to a Reasonable Available Control Technology II (RACT II) review by the Allegheny County Health Department (ACHD) required for the 1997 and 2008 Ozone National Ambient Air Quality Standard (NAAQS). The findings of the review established that technically and financially feasible RACT would result in the following emissions changes, summarized below.

Table 1 Technically and Financially Feasible Control Options Summary for NO_x

There are no technically feasible control options that are reasonably achievable for any processes at this facility.
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These findings are based on the following documents:

- RACT analysis performed by ERG/ACHD
- RACT analysis performed by ATI
- BACT analysis performed by ATI (see Application for Permit No. 0059-I008 dated 4-5-2006)
- Responses to questions from ATI dated 12-16-2019
- ATI Installation Permit No. 0059-I006 dated 11-08-2002

II. Regulatory Basis

ACHD requested all major sources of NO_x (potential emissions of 100 tons per year or greater) and all major sources of VOC (potential emissions of 50 tons per year or greater) to reevaluate NO_x and/or VOC RACT for incorporation into Allegheny County's portion of the PA SIP. ATI requested a case by case RACT II determination under 25 Pa Code 129.99 for five (5) of its emission units, the two (2) Electric Arc Furnace (F1 & F2), the Argon-Oxygen Decarburization Vessel (AOD), the No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations, the Lewis Temper Mill, and the miscellaneous painting/coating operations. This document is the result of ACHD's determination of RACT for these emission sources at ATI based on the materials submitted by the subject source and other relevant information.

Source	Still Exists? (yes/no)	RACT Order 260 Condition No.	RACT I Requirement
Scrap Preheaters No. 1 and No. 2; No. 2 A&P line; preheat furnace; and annealing furnace No. 1 A&P line; preheat furnace and annealing furnace; Boilers No. 1 and No. 2; Loftus soaking pits No. 9 through No. 23; and Hot-band normalizing furnace	No Yes Yes Yes Yes No	I.1.1 I.1.1.a I.1.1.b I.1.1.c I.1.2	ATI shall perform an annual adjustment or “tune-up” on the combustion process of the following equipment once every twelve (12) months. Such annual tune-up shall include: Inspections, adjustment, cleaning, or necessary replacement of fuel-burning equipment; Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NO _x ; and Inspections of the air-to-fuel ration control system. ATI shall maintain records of the annual tune-up.
BOF No. 71 and 72 Vessels; Electric Arc Furnace nos. 31 through 34; AOD vessel; Koppers BOF Ladle preheater no. 1; BOF vessel preheaters no. 1 and no. 2; Cadre BOF ladle preheaters no. 1 through no. 3; BOF mold preheaters No. 1 through No. 25; Olsen radiant tube annealing furnace no. 1; Slab warming furnaces no. 1 and no. 2; Bell annealing furnaces no. 1 though no. 5; No. 2 A&P line; Kolene heater; No. 3 B&P line; coil heater; Tandem mill radiant preheater;	No No No No No No No Yes No Yes	I.1.3	ATI shall maintain and operate the following equipment in accordance with good engineering and air pollution control practices.

EAF vertical ladle preheaters no. 1 and no. 2, horizontal ladle preheater and scrap preheaters no. 1 and no. 2;	Yes		
AOD mold preheaters 1 through no. 24 and vessel preheater no. 1;	Yes		
Tundish preheaters no. 1 and no. 2;	Yes		
Bloom horizontal ladle preheaters no. 1 and no. 2;	Yes		
American horizontal ladle preheaters no. 1 through no. 3;	Yes		
Department no. 2; plate torch cutters no. 1 and 2;	Yes		
Amsler-Morton soaking pits no. 35 through 42;	No		
Loftus soaking pits no. 43 through no. 46;	No		
No. 1 A&P line tubs;	Yes		
No. 2 A&P line tubs; and	Yes		
No. 3 B&P line tubs	No		
Combustion Units		I.1.4	ATI shall maintain fuel records for each combustion unit.
Salem & Rust Furnaces	No	I.1.5, 1.6, 1.7 & 1.8	These conditions referred to the Salem and Rust Furnace, which are no longer in operation.
BOF No. 71 and No. 72 vessels;	No	I.1.9	ATI shall record and maintain all appropriate records demonstrating compliance.
EAFs No. 31 through 34;	No		
56-inch Tandem Mill;	Yes		
Lewis Temper Mill; and	Yes		
Hot strip rolling mills	Yes		
Painting/coating	Yes	I.1.10	ATI shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 7.0 pounds/gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. ATI shall maintain records of the quantity used, the density, water content and weight percentage of VOCs per gallon of paints/coatings used at the facility.
		I.1.11	ATI shall retain records for at least two (2) years and shall make the same available to the Department upon request.

Table 3 Facility Sources Subject to Case-by-Case RACT II

Source ID	Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	NO _x / VOC Presumptive Limit (RACT II)	Case-by Case RACT II Determination
P001	Electric Arc Furnace (EAF 1)	66 tons steel/hr	133.9	71.9	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
P001	Electric Arc Furnace (EAF 2)	66 tons steel/hr	133.9	71.9	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.

Source ID	Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	NO _x / VOC Presumptive Limit (RACT II)	Case-by Case RACT II Determination
P002	Argon-Oxygen Decarburization Vessel (AOD)	125 tons of steel	9.62	7.17	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operations	17 tons of steel slabs/hr	48.5	0	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	Lewis Temper Mill	112 tons of hot metal/heat	0	61.32	NA	Maintain and operate the equipment in accordance with good engineering and air pollution control practices.
	Miscellaneous Painting/Coating		0	10.40	NA	

Table 4 Facility Sources Subject to the Presumptive RACT II per PA Code 129.97

Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	Basis for Presumptive	Presumptive RACT Requirement (25 Pa Code Section 129.97)
Horizontal EAF Ladle Pre-heater	4.5 MMBtu/hr	2.15	0.12	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices
Vertical EAF Ladle Pre-heaters No.1 and No.2	10.5 MMBtu/hr (each)	10.1	0.55	25 Pa Code § 129.97(c)(2), § 129.97(c)(3)	Install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices
Ladle Pre-heater Nos. 4 through 7	15.0 MMBtu/hr (each)	7.0	0.7	25 Pa Code § 129.97(c)(2), § 129.97(c)(3)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
American Horizontal AOD Ladle Pre-heaters No.1, No. 2 and No. 3	10.0 MMBtu/hr (each)	11.48	0.63	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
AOD Vessel Pre-heater	6.0 MMBtu/hr	2.9	0.16	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Tundish Pre-heaters No.1 and No.2	2.5 MMBtu/hr (each)	2.42	0.015	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Plate Burners/Torch Cutters No.1 and No.2	3.0 MMBtu/hr (each)	2.9	0.16	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Active Hot Boxes (3)	10.0 MMBtu/hr (each)	6.9	0.49	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Car Bottom Furnaces (4)	21.2 MMBtu/hr (each)	24.5	1.4	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Loftus Soaking Pits Nos. 9 to 23 (15)	26.0 MMBtu/hr (each)	187.3	10.5	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Walking Beam Furnaces (2)	465.0 MMBtu/hr (each)	320.8	24.75	25 Pa Code § 129.97(g)(1)(i)	For a natural gas-fired combustion unit or process heater with a rated heat input equal to or greater than 50 million Btu/hour, 0.10 lb NO _x /million Btu heat input.
Plasma Torch Cutting (NO _x only)		3.46	NA	25 Pa Code § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
No. 1 A & P Line Annealing Furnace	49.0 MMBtu/hr	38.8	1.3	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
No. 2 A & P Line Annealing Furnace	44.0 MMBtu/hr	34.7	1.18	25 Pa Code § 129.97(b)(1), § 129.97(c)(2)	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
No.2 A & P Line, Kolene Heater	4.5 MMBtu/hr	2.15	0.12	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
56" Tandem Mill Pre-heater	3.0 MMBtu/hr	1.45	0.79	25 Pa Code § 129.97(c)(1), § 129.97(c)(2)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.

Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)	Basis for Presumptive	Presumptive RACT Requirement (25 Pa Code Section 129.97)
Boilers No. 1 and 2	34.0 MMBtu/hr (each)	32.7	1.8	25 Pa Code §129.97(b)(1), §129.97(c)(2))	Perform a biennial tune-up conducted in accordance with the procedures in 40 CFR 63.11223
Space Heaters)	< 10 MMBtu/hr (largest unit)	91.15	4.99	25 Pa Code §129.97(c)(3)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
HRPF Emergency Generator No. 1	3,015 hp	3.19	3.19	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
HRPF Emergency Generator No. 2	2,682 hp	2.82	2.82	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.
Finishing WWTP Emergency Generator No. 3	268 hp	1.02	0.14	25 Pa Code §129.97(c)(8)	Maintain and operate in accordance with the manufacturer's specifications and good operating practices.

Table 5 Facility Sources Exempt from RACT II per PA Code 129.96(c) {< 1 TPY NO_x and < 1 TPY VOC}

Source ID	Description	Rating	NO _x PTE (TPY)	VOC PTE (TPY)
	AOD Mold Pre-heaters No. 1 to No. 24	2.0 MMBtu/hr (each)	0.99	0.05
	Torch Cutters No.1, No.2 and No. 3	1.17 MMBtu/hr (each)	0.58	0.03
	No.1 A & P Line, Strip Dryer	1.5 MMBtu/hr	0.75	0.04
	No.2 A & P Line, Strip Dryer	1.5 MMBtu/hr	0.74	0.04
	HRPF Fire Pumps	376 hp	0.4	0.4
	Parts Cleaner			

IV. RACT Determination

Electric Arc Furnaces (EAFs) F1 and F2:

NO_x

ACHD has determined that case-by-case (cbc) RACT II for EAFs F1 and F2 is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. NO_x emissions at Electric Arc Furnaces can be reduced to some degree through operational practices such as controlling the exhaust flows to reduce the input of outside air and minimizing the opening of the slag door.

There are no Technically Feasible Control Options for the EAFs at ATI. Since only electricity is used to melt the steel, the combustion NO_x emissions are already minimized to the greatest extent possible (there is no pre-heating of scrap steel or concurrent firing of oxy-fuel burners employed at this unit). Post-combustion controls such as Selective Catalytic Reduction (SCR) and Non-Selective Catalytic Reduction (NSCR) have technical constraints such that they have never been applied to EAF or AOD operations. These constraints include unstable gas flow rates, NO_x concentrations and temperature. Additionally, metals in the exhaust gasses such as nickel, zinc and chromium can react with the platinum catalyst to cause catalytic poisoning, as well as the probability that the high PM concentration will likely bind to the catalyst.

VOCs

ACHD has determined that cbc RACT II for EAFs F1 and F2 is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for VOC emissions from Electric Arc Furnaces, by ERG, were:

1. *Regenerative Thermal Oxidation;*
2. *Recuperative Thermal Oxidation;*

3. Afterburner;
4. Absorption;
5. Carbon Adsorption;
6. Inertial Separation;
7. Condensation; and
8. Scrap Management.

Scrap management, required by 40 CFR Part 63 Subpart YYYYYY, reduces sources of VOCs in the scrap but does not control the emissions of VOCs from the EAFs.

The economic analysis of the remaining control options reviewed by ERG indicate that they are all economically infeasible. The most cost effective solution was Regenerative Thermal Oxidation which demonstrated VOC removal costs of \$153,951.00 per ton in 2015 dollars.

Argon – Oxygen Decarburization (AOD):

NO_x

ACHD has determined that cbc RACT II for the AOD is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for NO_x emissions from the AOD, by ERG, were:

1. Selective Catalytic Reduction (SCR);
2. Selective Non-Catalytic Reduction (SNCR); and
3. Flue Gas Recirculation.

Analysis of these control options indicated that none were technically feasible. No further economic analysis was done.

VOCs

ACHD has determined that cbc RACT II for the AOD is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for VOC emissions from the AOD, by ERG, were:

1. Regenerative Thermal Oxidation;
2. Recuperative Thermal Oxidation;
3. Afterburner;
4. Absorption;
5. Carbon Adsorption;
6. Inertial Separation;
7. Condensation

The technical analysis identified four (4) feasible control options:

1. Regenerative Thermal Oxidation;
2. Recuperative Thermal Oxidation;
3. Afterburner; and
4. Absorption

The economic analysis of the remaining control options reviewed by ERG indicate that they are all economically infeasible. The most cost effective solution was Regenerative Thermal Oxidation which demonstrated VOC removal costs of \$585,498.00 per ton in 2015 dollars.

No. 2 A & P Line, H₂SO₄ – HNO₃/HF Pickling (NO_x only):

NO_x

Note: This analysis applies only to No. 2 Pickling line because No. 1 Pickling line no longer uses HNO₃/HF and No.3 Pickling line is no longer operating.

ACHD has determined that cbc RACT II for the AOD is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for NO_x emissions from the No. 2 A & P Line, H₂SO₄ – HNO₃/HF Pickling (NO_x only), by ERG, were:

1. SCR;
2. Absorption (Wet Scrubber);
3. SNCR;
4. Absorption + Chemical Reaction;
5. Oxidation +Absorption + Chemical Reaction; and
6. Hydrogen Peroxide Injection.

Those considered technically feasible were:

1. SCR;
2. Absorption (Wet Scrubber);
3. Oxidation +Absorption + Chemical Reaction; and
4. Hydrogen Peroxide Injection.

ERG considered SCR economically feasible at \$4,745.00 per ton of NO_x removed. This was based on emissions from Lines 1, 2 and 3. Currently only No. 2 Line emits NO_x. Using the NO_x emission limits of 48.5tpy in Installation Permit 0059-I002 for No. 2 Line and an expected emissions reduction of 80% using an SCR, the costs per ton of NO_x removed are:

SCR

- | | |
|----------------|----------------|
| 1. Capital: | \$1,732,226.00 |
| 2. Annualized: | \$1,159,624.00 |

Based on a reduction of 38.8 tpy (80% of 48.5 tpy allowable), the cost per ton is:

$$(1,732,226 + 1,159,624)/38.8 = 75,532 \text{ dollars per ton}$$

This cost makes SCR economically infeasible.

Lewis Temper Mill (VOCs only):

VOCs

ACHD has determined that cbc RACT II for the Lewis Temper Mill is to operate the sources in accordance with the manufacturer's specifications and with good operating practices. Control options reviewed for VOC emissions from Lewis Temper Mill by ERG, were:

1. Regenerative Thermal Oxidation;
2. Recuperative Thermal Oxidation;
3. Afterburner;
4. Absorption; and
5. Inertial Separation.

ERG' conclusion follows:

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. The use of an absorber is not cost effective given the quantities of solvent required. Additionally, the use of inertial separation is not cost effective given the high capital cost of the equipment and installation. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the Lewis Temper Mill must be maintained and operated in accordance with good engineering and air pollution control practices. Additionally, Allegheny Ludlum must maintain production and operating records for the Lewis Temper Mill to demonstrate compliance with 2105.06 of Article XXI and the agreed order.

Miscellaneous Paints (VOCs only):

VOCs

ACHD has determined that cbc RACT II for miscellaneous painting is to use low-volatility paints and coatings and good work practices. There are no feasible controls when painting buildings and other large objects.

The reduction of 17.6 tpy of VOCs was accomplished by lowering the annual paint usage from 10,000 gallons per year to 4,000 gallons per year and lowering the maximum VOC content of the paint to 5.2 pounds per gallon.

V. RACT Emissions Summary

Based on the findings in this RACT analysis, the ATI facility emissions can be summarized as follows:

Table 6 RACT II NO_x Emissions Reduction Summary

NO _x Potential Emissions (tpy)		
Current PTE	RACT Reduction	Revised PTE
1124.09	0	1124.09

As shown in Table 6, the new RACT II conditions will not result in any additional reductions of potential NO_x emissions from the ATI facility.

Table 7 RACT II Emission Reduction Summary

VOC Potential Emissions (tpy)		
Current PTE	RACT Reduction	Revised PTE
248.81	17.6	231.21

As shown in Table 7, the new RACT II conditions will result in additional reductions of 17.6 tons per year of potential VOC emissions from the ATI facility.

The conditions listed in the table in Section VI of this document below supersede the relevant conditions of Plan Approval Order and Agreement #260 (RACT I), issued December 19, 1996. The RACT II conditions are at least as stringent as those from RACT I. Other RACT I conditions not affected by RACT II remain in effect.

VI. RACT II Permit Conditions

Source ID	Description	Permit Condition 0059-I009	RACT II Regulations
P001	Electric Arc Furnace (EAF 1)	Condition V.A.1.b Condition V.A.3.a Condition V.3.b Condition V.A.3.c Condition V.A.3.d Condition V.A.4.a Condition V.A.4.b Condition V.A.4.c Condition V.A.5.a Condition V.A.6.a	25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
P002	Electric Arc Furnace (EAF 2)	Condition V.A.1.b Condition V.A.3.a Condition V.A.3.b Condition V.A.3.c Condition V.A.3.d Condition V.A.4.a Condition V.4.b Condition V.A.4.c Condition V.A.5.a Condition V.A.6.a	25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
P002	Argon-Oxygen Decarburization Vessel (AOD)	Condition V.B.1.b Condition V.B.3.a Condition V.B.3.b Condition V.B.3.c Condition V.B.4.a Condition V.B.4.b Condition V.B.4.c Condition V.B.5.a Condition V.B.5.c Condition V.B.6.a	25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
P002	No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operations	Condition V.C.1.b Condition V.C.1.c Condition V.C.1.d Condition V.C.1.e Condition V.C.3.a Condition V.C.3.b	25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100

Source ID	Description	Permit Condition 0059-I009	RACT II Regulations
		Condition V.C.3.c Condition V.C.3.d Condition V.C.4.a Condition V.C.4.b Condition V.C.4.c Condition V.C.5.a Condition V.C.6.a	25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
P002	Lewis Temper Mill	Condition V.D.1.b Condition V.D.1.c Condition V.D.1.d Condition V.D.1.e Condition V.D.3.a Condition V.D.3.b Condition V.D.4.a Condition V.D.4.b Condition V.D.4.c Condition V.D.5.a Condition V.D.6.a	25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99
	Miscellaneous Paints	Condition V.E.1.b Condition V.E.1.c Condition V.E.3.a Condition V.E.4.a Condition V.E.4.b Condition V.E.5.a Condition V.E.6.a	25 PA Code §129.99 25 PA Code §129.99 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.100 25 PA Code §129.99

**Allegheny County Health Department
Office of Air Quality**

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

Source Information

Source Name:	Allegheny Ludlum Corporation
Source Location:	100 River Road, Brackenridge, PA 15014-1597
Mailing Address:	100 River Road, Brackenridge, PA 15014-1597
County:	Allegheny
SIC Code:	3312 (Steel Works, Blast Furnaces (Including Coke Ovens), and Rolling Mills 3316 (Cold Rolled Steel, Sheet, and Strip) 3398 (Metal Heat Treating)
Facility ID No.:	0059
Major Source:	NOx and VOC
Permit Reviewer:	ERG/TRC

The Allegheny County Health Department (ACHD) has performed the following RACT analyses for a major source of NOx and VOC relating to a specialty steel making facility, located in Brackenridge, Pennsylvania.

Background

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

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

RACT Summary

VOC and NOx RACT evaluations were conducted for the emission units at the Allegheny Ludlum Corporation in Brackenridge, PA. The RACT determinations are summarized in the tables below.

Table 1. NOx RACT Findings for Allegheny Ludlum Corporation

Unit Description	RACT determined by ACHD	NOx PTE before RACT	NOx PTE after RACT (tons/yr)
Electric Arc Furnaces			
Two (2) electric arc furnaces (EAF1 & EAF 2)	Continued compliance with all applicable and regulatory requirements.	41.9	41.9
Argon-Oxygen Decarburization Vessel (AOD)			
Argon-oxygen decarburization vessel	Continued compliance with all applicable and regulatory requirements.	56.9	56.9
Heaters and Preheaters			
Six (6) melt shop ladle preheaters and one (1) coil pre-heater on the No. 3 B&P line.	Continued compliance with all applicable and regulatory requirements.	22.87	22.87
Soaking Pits			
Natural-gas fired Loftus Soaking Pits [Nos. 9-23]	Continued compliance with all applicable and regulatory requirements.	192.45	192.45
Annealing Furnaces (<100 MMBtu/hr)			
Hot band normalizing furnace, No. 1 A&P line annealing furnace, No. 2 A&P line annealing furnace	Continued compliance with all applicable and regulatory requirements.	70.5	70.5
Pickling Operations			
No. 1 A&P line H2SO4 – HNO3/HF pickling operation [P010], No. 2 A&P line H2SO4 pickling and No. 2 HNO3/HF pickling [P011], No. 3 A&P line H2SO4 – HNO3/HF pickling operation [P009]	Install a SCR unit as additional control for No.1 A&P, No. 2A&P, and No. 3 A&P pickling operations.	305.5	259.7
Boilers			
Two (2) 800 HP No. 3 Department Boilers No. 1 & 2	Install LNBS meeting an emission rate of 0.049 lb/MMBTU and conduct an annual tune-up.	29.2	14.6

Table 2. VOC RACT Findings for Allegheny Ludlum Corporation

Unit Description	RACT determined by ACHD	NOx PTE before RACT	NOx PTE after RACT
Electric Arc Furnaces			
Two (2) electric arc furnaces (EAF1 & EAF 2)	Continued compliance with all applicable and regulatory requirements and facility must follow the requirements of 40 CFR 63, subpart YYYYYY.	46.92	46.92
Argon-Oxygen Decarburization Vessel (AOD)			
Argon-oxygen decarburization vessel	Continued compliance with all applicable and regulatory	16.1	16.1

	requirements and facility must follow the requirements of 40 CFR 63, subpart YYYYYY.		
Mills			
One (1) Milling Operation, Lewis Temper Mill [P008]	Continued compliance with all applicable and regulatory requirements.	61.32	61.32
Miscellaneous Painting			
Painting/coating operations	Continued compliance with all applicable and regulatory requirements.	20	20
Degreasing			
Solvent parts cleaning	Use low volatility solvents and follow good operating practices for degreasing operations.	13.4	13.4

In addition ACHD determined that NOx and VOC RACT was continued compliance with all applicable permit and regulatory requirements for several of the equipment at Allegheny Ludlum. These equipment include:

- One (1) 360 MMBtu/hr Salem Reheat Furnace (P006) (decommissioned March 2015)
- One (1) 126 MMBtu/hr Rust Reheat Furnace (P006) (decommissioned March 2015)
- Three (3) 465 MMBtu/hr natural gas-fired Walking Beam Furnaces [S-201, S-202, S-203]
- One (1) 30 MMBtu/hr natural gas-fired Active Hot Box [S-206]
- Four (4) 21 MMBtu/hr natural gas-fired Annealing Furnaces [S-208, S-209, S-210, and S-211]
- Four (4) 21.2 MMBtu/hr natural gas-fired Car Bottom Furnaces [S-212, S-213, S-214, S-215]
- Two (2) 23.0 MMBtu/hr natural gas-fired Soaking Pits [S-216, S-217]
- One (1) 6.0 MMBtu/hr natural gas-fired Torch Cutting Operation [S-220]
- One (1) 30,000 ton/year Plasma Torch Cutting Operation [S-222]
- One (1) 2,250 KW natural gas and diesel-fired Emergency Generator [EG-01]
- One (1) 4.5 MMBtu/hr Horizontal EAF Ladle Pre-Heater (P002)
- Three (3) 8 MMBtu/hr American Horizontal AOD Ladle Pre-Heaters (P002)
- One (1) 6 MMBtu/hr AOD Vessel Pre-Heater (P002)
- Twenty-four (24) 2 MMBtu/hr AOD Mold Dryers (P002)
- Two (2) 2.5 MMBtu/hr Continuous Caster Tundish Pre-Heater (P003) [No. 1 & 2]
- Three (3) 1.174 MMBtu/hr Continuous Caster Torch Cutters (P003) [No. 1, 2, & 3]
- Two (2) 3 MMBtu/hr Plate Torch Burners/Slab Cutters (P005)
- Five (5) 6 MMBtu/hr Bell Annealing Furnace (P006) [No. 1 to 5]
- One (1) 5 MMBtu/hr Bell Annealing Furnace (P006) [No. 6]
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 3 B&P Line (P009)
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 1 A&P Line (P010)
- One (1) 3 MMBtu/hr 56 inch Tandem Mill Pre-Heater (P008)
- One (1) 4.5 MMBtu/hr Kolene Heater, No. 2 A&P Line (P011)
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 2 A&P Line (P011)
- One (1) 0.5 MMBtu/hr Cleaver Brooks Boiler (P013)
- One (1) 1.34 MMBtu/hr Peerless Boiler (P013)

- Space heaters which heat by direct heat transfer (combined heat input 160 MMBtu/hr)

ACHD determined that VOC RACT was continued compliance with applicable permit and regulatory requirements for several of the equipment at Allegheny Ludlum. These equipment include:

- One (1) 10.5 MMBtu/hr Vertical EAF Ladle Pre-Heater (P002)
- Four (4) 15 MMBtu/hr Bloom Horizontal AOD Ladle Pre-heater (P002)
- One (1) 71 MMBtu/hr Hot Band Normalizing Furnace (P006)
- Fifteen (15) 26 MMBtu/hr Loftus Soaking Pits (P007) [Nos. 9 to 23]
- One (1) 16 MMBtu/hr Coil Pre-Heater, No. 3 B&P Line (P009)
- One (1) 25 MMBtu/hr Annealing Furnace, No. 1 A&P Line (P010)
- One (1) 44 MMBtu/hr Annealing Furnace, No. 2 A&P Line (P011)
- Two (2) 34 MMBtu/hr Dept. 3, Boilers (P013) [No. 1 & 2]

Comparison of Selected RACT to Proposed PA Presumptive RACT

The proposed Pennsylvania presumptive RACT requires that combustion sources burning natural gas that are greater than 50 MMBtu/hr meet an emission rate of 0.1 lb/MMBtu of NO_x and that any combustion sources less than 50 MMBtu/hr and greater than 20 MMBtu/hr conduct biennial tune-ups. All smaller units must be installed, maintained and operated in accordance with manufacturer's specifications and with good operating practices. This is similar to current requirements in ACHD regulations in §2105.06. The only combustion sources at Allegheny Ludlum that are greater than 20 MMBtu/hr are:

- Three (3) 465 MMBtu/hr natural gas-fired Walking Beam Furnaces (HRPF) [S-201, S-202, S-203]
- One (1) 71 MMBtu/hr Hot Band Normalizing Furnace (P006)
- One (1) 49 MMBtu/hr No. 1 A&P Line Annealing Furnace, and
- One (1) 44 MMBtu/hr No. 2 A&P Line Annealing Furnace
- Two (2) 34 MMBtu/hr No. 3 Department Boilers No. 1 & 2
- One (1) 30 MMBtu/hr natural gas-fired Active Hot Box (HRPF) [S-206]
- Fifteen (15) 26 MMBtu/hr natural gas-fired Loftus Soaking Pits [Nos. 9 to 23]
- One (1) 25 MMBtu/hr Annealing Furnace, No. 1 A&P Line (P010)
- Two (2) 23.0 MMBtu/hr natural gas-fired Soaking Pits (HRPF) [S-216, S-217]
- Four (4) 21.2 MMBtu/hr natural gas-fired Car Bottom Furnaces (HRPF) [S-212, S-213, S-214, S-215]
- Four (4) 21 MMBtu/hr natural gas-fired Annealing Furnaces (HRPF) [S-208, S-209, S-210, and S-211]

All of the combustion sources listed above that are between 20 and 50 MMBtu/hr are already subject to annual tune-ups. All of the combustion sources greater than 50 MMBtu/hr either all already have a potential to emit that is less than 0.1 lb/MMBtu at or are limited to less than 0.1 lb/MMBtu, or will be as part of the ACHD RACT.

RACT Evaluations

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

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

1. The analysis shall address all reasonably possible controls of VOCs and NO_x including changes in operation and work practices.
2. All control technology that is found to be technically infeasible must be accompanied by detailed and documented reason(s) as to why the technology is not feasible. General statements about the non-applicability of control technology to your industry will not be sufficient.
3. All changes in operation and work practices that are found not to be feasible require the same documentation as the controls in step #2 above.
4. All feasible control technology, changes in operation, work practices, etc. that are found to be cost prohibitive require a cost analysis demonstrating the cost per ton of pollutant controlled.
5. The analysis shall be done according to the procedures in EPA's OAQPS Cost Manual, EPA's cost spreadsheets are recommended where applicable. The manual and spreadsheets may be found on the CATC/RBLC web page on EPA's Technology Transfer Network (TTN) at <http://www.epa.gov/ttn/catc/>.
6. All data used in cost estimates, such as exhaust flow rates or the amount of ductwork used need proper documentation. If vendor quotes are used in the analysis for equipment costs, they are required to be supplied. Old analyses increased for inflation will not be acceptable. VATAVUK Air Pollution Control Cost Indexes shall be used with the aforementioned cost spreadsheets.

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

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

Source/Process Description

Allegheny Ludlum Corporation, located at 100 River Road, Brackenridge, Allegheny County, PA, is a producer of specialty metals, irons, and steels, including ingots, slabs, and coils. Emissions from the source are primarily the result of combustion from furnaces, pre-heaters, dryers, torch-cutting, boilers, and ancillary operations. Detailed descriptions of the relevant emissions units are provided in the following sections.

The VOC and NO_x emitting emission units at the plant include:

Table 3. Emission Units Emitting VOC and NO_x

UNIT	SIZE	NUMBER OF UNITS	FUEL/RAW MATERIAL	CONTROL DEVICE(S)	RACT Evaluation Included	
					NO _x	VOC
Electric Arc Furnaces (P002)	112 tons/hr	2	Steel Scrap, Lime, Fluxes, O ₂ & N ₂	DEC Baghouses and Canopy Baghouse	✓	✓

Oxygen-Argon Decarburization Vessel (AOD) (P002)	100 tons/hr	1	Steel, Lime, Fluxes, Argon, O ₂ & N ₂	Canopy Baghouse D007	✓	✓
Horizontal EAF Ladle Pre-Heater (P002)	4.5 MMBtu/hr	1	Natural Gas	None		
Vertical EAF Ladle Pre-Heater (P002)	10.5 MMBtu/hr	2	Natural Gas	None	✓	
Bloom Horizontal AOD Ladle Pre-heater (P002)	15 MMBtu/hr	4	Natural Gas	None	✓	
American Horizontal AOD Ladle Pre-Heater (P002)	8 MMBtu/hr	3	Natural Gas	None		
AOD Vessel Pre-Heater (P002)	6 MMBtu/hr	1	Natural Gas	None		
AOD Mold Dryers (P002)	2 MMBtu/hr	24	Natural Gas	None		
Continuous Caster Tundish Pre-Heater (P003) [No.1 & 2]	2.5 MMBtu/hr	2	Natural Gas	None		
Continuous Caster Torch Cutter (P003) [No.1, 2, & 3]	1.174 MMBtu/hr	3	Natural Gas	Canopy baghouse D007		
Plate Torch Burners/Slab Cutter (P005) [No. 1 & 2]	3 MMBtu/hr	2	Natural Gas	Baghouse D011	✓	✓
Hot Band Normalizing Furnace (P006)	71 MMBtu/hr	1	Natural Gas	None	✓	
Bell Annealing Furnaces Nos.1 to 5	6 MMBtu/hr	5	Natural Gas	None		
Bell Annealing Furnaces No.6	5 MMBtu/hr	1	Natural Gas	None		
Salem Reheat Furnace (P006)	360 MMBtu/hr	1	Natural Gas	None		
Rust Reheat Furnace (P006)	126 MMBtu/hr	1	Natural Gas	None		
Loftus Soaking Pits (P007) [Nos. 9 to 23]	26 MMBtu/hr	15	Natural Gas	None	✓	
56 inch Tandem Mill Pre-Heater, Mills (P008)	3 MMBtu/hr	1	Natural Gas	None		
Lewis Temper Mill (P008)	25 tons/hr	1	Steel Slabs	None		✓
Coil Pre-Heater, No. 3 B&P Line (P009)	16 MMBtu/hr	1	Natural Gas	None	✓	
H ₂ SO ₄ – HNO ₃ /HF Pickling, No. 3 B&P Line (P009)	39 tons/hr	1	Steel Slabs	Water Wash Packed Bed Scrubber D017/19	✓	

Strip Dryer, No.3 B&P Line (P009)	1.5 MMBtu/hr	1	Natural Gas	None		
Annealing Furnace, No. 1A&P Line (P010)	49 MMBtu/hr	1	Natural Gas	None	✓	
H ₂ SO ₄ Pickling – HNO ₃ /HF Pickling, No. 1A&P Line (P010)	30 tons/hr	1	Steel Slabs	Water Wash Packed Bed Scrubber D017	✓	
Strip Dryer, No.1A&P Line (P010)	1.5 MMBtu/hr	1	Natural Gas	None		
Annealing Furnace, No. 2 A&P Line (P011)	44 MMBtu/hr	1	Natural Gas	None	✓	
Kolene Heater, No.2 A&P Line (P011)	4.5 MMBtu/hr; 17 tons/hr	1	Natural Gas	None		
H ₂ SO ₄ Pickling, – HNO ₃ /HF Pickling, No. 2 A&P Line (P011)	17 tons/hr	1	Steel Slabs	Water Wash Packed Bed Scrubber D017; Chemical Feed Packed Bed Scrubber D019	✓	
Strip Dryer, No.2 A&P Line (P011)	1.5 MMBtu/hr	1	Natural Gas	None		
Dept. 3, Boilers No. 1 & 2(P013)	34 MMBtu/hr	2	Natural Gas	None	✓	
Cleaver Brooks Boiler; Fuel Burning or Combustion Equipment (P013)	0.5 MMBtu/hr	1	Natural Gas	None		
Peerless Boiler; Fuel Burning or Combustion Equipment (P013)	1.34 MMBtu/hr	1	Natural Gas	None		
Space Heaters	160 MMBtu/hr combined	Various	Natural Gas	None		
Miscellaneous Paints	8000 gal/yr					✓
Onan Emergency Generator	200 KW	1	Diesel	None		
Parts Cleaners	20000 gal/yr	1	Non-chlorinated solvent	None	✓	✓
Volatile Organic Storage Tanks	3,000 gal – 20,000 gal	Various	Diesel Fuel, Kerosene, Lubricating Oil, Hydraulic Oil, Rolling Oil and Waste Oil	None		✓
Walking Beam Furnaces - Hot Rolling	465 MMBtu/hr	3	Natural Gas	Ultra low NOx Burners		

Processing Facility						
Active Hot Box - Hot Rolling Processing Facility	30 MMBtu/hr	1	Natural Gas	Ultra low NOx Burners		
Annealing Furnaces - Hot Rolling Processing Facility	21 MMBtu/hr	4	Natural Gas	Ultra low NOx Burners		
Car Bottom Furnaces -Hot Rolling Processing Facility	21.2 MMBtu/hr	4	Natural Gas	Ultra low NOx Burners		
Soaking Pits -Hot Rolling Processing Facility	23 MMBtu/hr	2	Natural Gas	Ultra low NOx Burners with Flue Gas Recirculation		
Torch Cutting Operation - Hot Rolling Processing Facility	6 MMBtu/hr	1	Natural Gas	Baghouse C-220		
Plasma Torch Cutting Operation - Hot Rolling Processing Facility	30000 tons/yr	1	Specialty Steel	Baghouse C-222		
Emergency Generator #1 - Hot Rolling Processing Facility	2250 KW	1	Natural Gas/Diesel	None		

RACT Analyses in this Document

This source is a major source of NOx and VOC; therefore RACT analyses for NOx and VOC have been conducted and are provided in this document. The table in the previous section identifies which emission units are included in the RACT analyses for VOC and NOx in this document.

For units for which a RACT evaluation is not identified in the table, ACHD has determined that a RACT evaluation for the identified pollutant(s) is not required. These units and the reasons for which a RACT evaluation is not included for the identified pollutant(s) are as follows:

1) ACHD has determined that neither a NOx nor VOC RACT evaluation is required for the following emission units:

- One (1) 4.5 MMBtu/hr Horizontal EAF Ladle Pre-Heater (P002)
- One (1) 8 MMBtu/hr American Horizontal AOD Ladle Pre-Heater (P002)
- One (1) 6 MMBtu/hr AOD Vessel Pre-Heater (P002)
- Twenty-four (24) 2 MMBtu/hr AOD Mold Dryers (P002)
- Two (2) 2.5 MMBtu/hr Continuous Caster Tundish Pre-Heater (P003) [No. 1 & 2]

- Three (3) 1.174 MMBtu/hr Continuous Caster Torch Cutters (P003) [No. 1, 2, & 3]
- Two (2) 3 MMBtu/hr Plate Torch Burners/Slab Cutters (P005)
- Five (5) 6 MMBtu/hr Bell Annealing Furnace (P006) [No. 1 to 5]
- One (1) 5 MMBtu/hr Bell Annealing Furnace (P006) [No. 6]
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 3 B&P Line (P009)
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 1 A&P Line (P010)
- One (1) 3 MMBtu/hr 56 inch Tandem Mill Pre-Heater (P008)
- One (1) 4.5 MMBtu/hr Kolene Heater, No. 2 A&P Line (P011)
- One (1) 1.5 MMBtu/hr Strip Dryer, No. 2 A&P Line (P011)
- One (1) 0.5 MMBtu/hr Cleaver Brooks Boiler (P013)
- One (1) 1.34 MMBtu/hr Peerless Boiler (P013)
- Space heaters which heat by direct heat transfer (combined heat input 160 MMBtu/hr)

ACHD has also determined that a VOC RACT evaluation is not required for the following emission units:

- One (1) 10.5 MMBtu/hr Vertical EAF Ladle Pre-Heater (P002)
- Four (4) 15 MMBtu/hr Bloom Horizontal AOD Ladle Pre-heater (P002)
- One (1) 71 MMBtu/hr Hot Band Normalizing Furnace (P006)
- Fifteen (15) 26 MMBtu/hr Loftus Soaking Pits (P007) [Nos. 9 to 23]
- One (1) 16 MMBtu/hr Coil Pre-Heater, No. 3 B&P Line (P009)
- One (1) 25 MMBtu/hr Annealing Furnace, No. 1 A&P Line (P010)
- One (1) 44 MMBtu/hr Annealing Furnace, No. 2 A&P Line (P011)
- Two (2) 34 MMBtu/hr Dept. 3, Boilers (P013) [No. 1 & 2]

These decisions were made based on the relatively low potential emissions of the pollutants identified from these units. ACHD considers it unlikely that additional controls would be technically and economically feasible for these units for the identified pollutants.

2) ACHD has also determined that the following units do not require a NO_x nor VOC RACT evaluation:

- One (1) 360 MMBtu/hr Salem Reheat Furnace (P006)
- One (1) 126 MMBtu/hr Rust Reheat Furnace (P006)

These decisions were made because the above units were shut down on March 31, 2015. These units were decommissioned and have been replaced with the Hot Rolling Processing Facility Walking Beam Reheat Furnaces [S-201, S-202, S-203].

3) ACHD has determined that the following units from the Hot Rolling Processing Facility do not require a further VOC or NO_x RACT evaluation:

- Three (3) 465 MMBtu/hr natural gas-fired Walking Beam Furnaces [S-201, S-202, S-203]
- One (1) 30 MMBtu/hr natural gas-fired Active Hot Box [S-206]
- Four (4) 21 MMBtu/hr natural gas-fired Annealing Furnaces [S-208, S-209, S-210, and S-211]
- Four (4) 21.2 MMBtu/hr natural gas-fired Car Bottom Furnaces [S-212, S-213, S-214, S-215]
- Two (2) 23.0 MMBtu/hr natural gas-fired Soaking Pits [S-216, S-217]
- One (1) 6.0 MMBtu/hr natural gas-fired Torch Cutting Operation [S-220]
- One (1) 30,000 ton/year Plasma Torch Cutting Operation [S-222]
- One (1) 2,250 KW natural gas and diesel-fired Emergency Generator [EG-01]

These units were previously included in Installation Permit 0059-I008b (issued September 20, 2013). ACHD has determined that the BACT/LAER determined for these units are sufficient to meet RACT, and no further analysis has been conducted. For these units, RACT are the limits and requirements outlined in Installation Permit 0059-I008b as shown in Table 4.

Table 4. BACT/LAER Limits as RACT for the Hot Rolling Processing Facility

Unit	NOx RACT is....	VOC RACT is...
	From Installation Permit #0059-I008b....	
Three (3) 465 MMBtu/hr natural gas-fired Walking Beam Furnaces [S-201, S-202, S-203]	Conditions V.A.1(a) through (e), (l), and (m), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.A.1(a) through (c), (f), (g), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
One (1) 30 MMBtu/hr natural gas-fired Active Hot Box [S-206]	Conditions V.D.1(a) through (e), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.D.1(a) through (c), (f), (g), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
Four (4) 21 MMBtu/hr natural gas-fired Annealing Furnaces [S-208, S-209, S-210, and S-211]	Conditions V.E.1(a) through (e), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.E.1(a) through (c), (f), (g), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
Four (4) 21.2 MMBtu/hr natural gas-fired Car Bottom Furnaces [S-212, S-213, S-214, S-215]	Conditions V.F.1(a) through (e), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.F.1(a) through (c), (f), (g), (k), and (l), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
Two (2) 23.0 MMBtu/hr natural gas-fired Soaking Pits [S-216, S-217]	Conditions V.G.1(a) through (e), (l), and (m), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.G.1(a) through (c), (f), (g), (l), and (m), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
One (1) 6.0 MMBtu/hr natural gas-fired Torch Cutting Operation [S-220]	Conditions V.I.1(a) through (d), (l), and (m), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.I.1(a), (b), (d), (e), (l), and (m), and all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
One (1) 30,000 ton/year Plasma Torch Cutting Operation [S-222]	Conditions V.K.1(a), (b), and (f), and all associated testing, recordkeeping and reporting.	Not a source of VOC

One (1) 2,250 KW natural gas and diesel-fired Emergency Generator [EG-01]	Conditions V.L.1(a), (b), and (d) through (g), all associated testing, monitoring, recordkeeping, reporting, and work practice standards.	Conditions V.L.1(a), (b), and (d) through (g), all associated testing, monitoring, recordkeeping, reporting, and work practice standards.
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The remaining units at the source, for which a RACT evaluation has been identified in the table and included in this document, consist of an argon-oxygen decarbization vessel, electric arc and natural gas-fired furnaces, natural gas-fired preheaters, mills, pickling operations, boilers, and fugitive VOC emissions. Where possible, emission units of similar type and function have been grouped together for the purposes of conducting NO_x and/or VOC RACT analyses. Specifically, a NO_x analysis has been conducted separately for the following units:

- A. Two (2) identical electric arc furnaces (EAF 1 and EAF2);
- B. One (1) argon-oxygen decarbization (AOD) vessel;
- C. Facility heaters and pre-heaters, including two (2) natural gas-fired melt shop ladle preheaters and one (1) natural gas-fired coil pre-heater on the No. 3 B&P line;
- D. Soaking pits, including fifteen (15) 26 MMBtu/hr natural gas-fired soaking pits (P007);
- E. Annealing furnaces, including one (1) 71 MMBtu/hr natural gas-fired hot band normalizing furnace (P006); one (1) 25 MMBtu/hr natural gas-fired Annealing Furnace, No. 1 A&P Line (P010); and one (1) 44 MMBtu/hr natural gas-fired Annealing Furnace, No. 2 A&P Line (P011);
- F. Three (3) H₂SO₄ and three (3) HNO₃/HF Pickling operations from the No. 1 A&P Line [P010], No. 2. A&P Line [P011], and No. 3 A&P Line [P009].
- G. Dept. 3, Boilers No.1 & 2.

Additionally, a VOC analysis has been conducted separately for:

- H. Two (2) identical electric arc furnaces (EAF 1 and EAF2);
- I. One argon-oxygen decarbization (AOD) vessel;
- J. One (1) Lewis Temper mill;
- K. One (1) miscellaneous painting/coating operation
- L. Parts cleaning

A. RACT for NO_x – Two (2) Electric Arc Furnaces (EAF 1 and EAF 2)

This process includes two (2) electric arc furnaces (EAF 1 and EAF2) with maximum transfer rate of 112 tons hot metal per heat per furnace, using scrap steel and lime as inputs.¹ The two EAF 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. The EAFs do not use oxy-fuel firing in the sidewall burners.

The use of electricity for steel melting in EAFs 1 and 2 transfers the generation of combustion NO_x from the iron and steel mill to a utility generating plant. However, these processes result in thermal NO_x formation.

The EAFs are controlled by a water cooled direct evacuation (DEC) System with baghouses D005/D006 (1A and 1B) and D008/D009 (2A and 2B), and Canopy Baghouses D004 and D007, with a manufacturer's estimated control efficiency of 99.5% each. The units are also

¹ A heat is defined as from beginning of furnace charge to end of furnace tap.

controlled by cooling towers no. 1 and no. 2, with a capacity of 20,000 gallons per minute for both towers combined. EAF1 and EAF2 exhaust to stacks P006 and P009 (Canopy Baghouse Exhaust) and P007/P008 and P010/P011 (DEC Baghouse Exhaust).

The electric arc furnaces are currently permitted under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.d of IP#0059-I006 states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel.

[§2102.04.b.6] Condition V.A.1.e of IP #0059-I006 states that "emissions from the 1A, 1B, 2A and 2B DEC baghouses, and D004 canopy and D007 canopy baghouses, due to EAFs #1 & #2 shall not exceed the following": 35.06 lbs/heat or 41.96 tons NOx per year. [§2102.04.b.6].

[Note to ACHD: The permit limit states "due to EAFs #1 &2" which indicates the limit is for both furnaces combined, however, looking through the TSD for IP 0059-006 and at throughput limits, these limits are based on emissions from *each* furnace.] The EAFs must also meet the requirements of 40 CFR part 60, subpart AAa for particulate matter.

[Note to ACHD: Source attempted to argue they aren't subject to RACT for these because they are subject to Subpart AAa, however, AAa only covers particulate. Req's for AAa are included in the IP.]

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's RACT submittal for the Electric Arc Furnaces and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills² and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis"³ to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify any controls for EAFs. The ACT states, "There is no information to suggest that EAFs have NOx emission controls or that suitable controls are available". The BART Engineering Analysis does not identify any controls for EAFs that do not use oxygen or natural gas to preheat the charge. Finally, the USEPA RACT-BACT-LAER Clearinghouse (RBLCL)⁴ indicates that EAFs without preheat or oxy-fuel burners have no add-on control technology for NOx emissions. Therefore, technology transfer of NOx control used on other sources are the only control technologies that were evaluated as part of this RACT analysis. EAFs 1 and 2 do not involve conventional combustion of a fuel and do not use burners, therefore, common combustion NOx control strategies such as overfire air, burners out of service, low NOx burners, and reburning were not considered. The identified controls are discussed below:

The following control technologies were identified as potential control measures:

1. Selective Catalytic Reduction (SCR)
2. Selective Non-Catalytic Reduction (SNCR)

² Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

³ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

⁴ EPA's RACT/BACT/LAER Clearinghouse (RBLCL) database is available at: <http://cfpub.epa.gov/RBLCL/>. Accessed March 12, 2015.

Allegheny Ludlum also identified the follow control measures in their RACT submittal:

3. Flue Gas Recirculation (FGR)

No additional control measures were identified for EAFs. These control measures have been organized into 3 groups: additions to combustion air or fuel and post combustion controls.

Additions to Combustion Air or Fuel

Furnace operation can be optimized to reduce NOx emissions by injecting flue gases or other materials into the combustion zone. This controls the formation of NOx by controlling the stoichiometric ratio of the chemicals that react to form NOx. The addition of flue gas dilutes the combustion zone and reduces the combustion temperature, which in turn reduces the formation of thermal NOx.

(a) Flue Gas Recirculation

As the name suggests, flue gas recirculation (FGR) involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into a combustion zone in order to lower flame temperature and reduce NOx formation. FGR can be classified into two types; external or induced. External FGR utilizes an external fan to recirculate the flue gases, and external piping routes the exhaust gases from the stack to a burner. Induced FGR utilizes the combustion air fan within the unit to recirculate the flue gases.

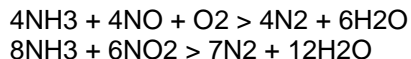
FGR is generally feasible for fuel-fired combustion units where there is no minimum operational temperature/oxygen requirement for the emission unit. NOx reductions vary considerably depending on the type of fuel. When operated without additional controls, the normal NOx control efficiency range for FGR used in a furnace is 30-50%.⁵

Post Combustion Control

Post combustion control includes the addition of technologies that reduce NOx emissions (as opposed to preventing NOx generation). Generally, these technologies include the addition of a catalyst or reactant into the exhaust stream which chemically reduces the NOx, allowing for removal from the gas stream.

(b) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH3 reacts with NOx to form molecular nitrogen and water with the following basic reaction pathways:



The normal NOx control efficiency range for SCR is 70-90%.⁶

⁵ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

⁶ *Id.*

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000°F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR requires a stable gas flow rate, temperature range, and NO_x concentration. Factors affecting SCR performance include space velocity (volume per hour of flue gas divided by the volume of the catalyst bed), ammonia/NO_x molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time, but will also cause an increase in catalyst bed pressure drop. Reaction temperature is also critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry.

(c) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1600-2100°F.

The normal NO_x control efficiency range for SNCR is 40-70%.⁷ To date there are no known installations of SNCR at iron and steel plants.⁸

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x at EAFs 1 and 2. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) **Flue Gas Recirculation**

FGR generally applies to the fuel-fired units and involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the

⁷ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

⁸ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

flame temperature and reduce NO_x formation. The ACT does not include FGR as an option for EAFs. FGR is not considered technically feasible for EAFs 1 and 2 because these units do not use burners or involve conventional combustion of a fuel.

(b) Selective Catalytic Reduction

SCR controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. In order for an SCR system to effectively reduce NO_x emissions, the exhaust gas stream must have relatively stable gas flow rates, NO_x concentration, and temperature profile. Due to the violent nature of the process that results from the melting of scrap and when process gases are used to stir the hot metal, the EAF exhaust stream gas is highly variable with regard to flow rate, temperature, and NO_x emissions. The temperature of the exhaust gas (which ranges from ambient melt shop to 2500°F) often exceeds the operating range of the catalyst. In addition, the NO_x concentration will vary from zero to ~15 to 20 ppm. This makes it infeasible to install the catalyst either prior to or after the baghouse and assure that the temperature will always be within the proper operating range. Additionally, metals and other particulates present in the exhaust stream would "blind" or erode the catalyst very quickly. SCR units have not been used on EAFs in similar facilities in the United States. Therefore, SCR is not considered technically feasible for EAFs 1 and 2.

(c) Selective Non-Catalytic Reduction

SNCR is similar to SCR, but it does not use a catalyst. As with SCR, exhaust heat variations, flow rates, gas composition, and oxygen content are expected to present issues in the operation of an SNCR on an EAF/melt shop. SNCR requires a more stable gas condition than SCR. Maintaining the near-stable gas conditions necessary for SNCR is infeasible given the highly variable nature of the gas stream. The temperature conditions in the EAF process that are required for SNCR are well upstream of the baghouse, and would subject the SCR injection heads to high mechanical wear and poor dispersal of fluids. In addition, the great variations in the gas NO_x concentration would make it infeasible to maintain the proper stoichiometric ratio of reducing reagent, which could result in reduced efficiency or unreacted ammonia being emitted directly to the atmosphere ("ammonia slip"). SNCR has not been used on EAFs in the United States. Therefore, SNCR is not considered technically feasible for EAFs 1 and 2.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The two (2) EAFs have a potential to emit 41.96 tpy NO_x each (or 83.92 tpy NO_x for both units) based on limits from Installation Permit #0059-I006 (issued November 8, 2002). No technically feasible NO_x control options were identified for EAFs 1 and 2 that would result in emissions reductions from these units.

Step 4 – Select RACT

No additional controls were identified as technically feasible for EAF 1 or EAF 2. Therefore, RACT for these units is no additional control beyond what is currently required. NO_x emissions from the electric arc furnaces are currently limited under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.e of IP #0059-I006 states that NO_x emissions shall not exceed 35.06 lbs/heat or 41.96 tons per year. Additionally, per the requirements §2105.03,

EAF 1 and EAF 2 must be maintained and operated in accordance with good engineering and air pollution control practices.

B. RACT for NO_x – Argon-Oxygen Decarburization Vessel (AOD)

This process consists of one (1) argon-oxygen decarburization vessel (AOD) with maximum design rate of 100 tons of steel per hour and a capacity of 125 tons, using steel, lime, fluxes, argon, oxygen, and nitrogen as inputs. In the AOD process, steel from the EAF is transferred into an AOD vessel and gaseous mixtures containing argon and oxygen are blown into the vessel to reduce the carbon content of the steel.

Potential NO_x emissions from the AOD vessel are estimated at 56.9 tpy based on an emission rate of 0.13 lb/ton steel (based on stack testing performed February 1996) and a maximum potential throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6] This effectively limits the throughput to the AOD process to 536,267 tons of steel and 34.9 tons NO_x per any consecutive twelve month period.

The AOD is controlled by a Wheelabrator Frye 264 Series 8S baghouse for the control of particulate matter, with a manufacturer's estimated control efficiency of 99.5%, exhausting to stack P009. Per the requirements of RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's ACT submittal for the AOD vessel and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills⁹ and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis"¹⁰ to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel and the BART Engineering analysis does not identify any controls for argon-oxygen decarburization processes. The USEPA RACT-BACT-LAER Clearinghouse (RBLC)¹¹ also does not indicate any add-on control technology for NO_x emissions for AOD vessels or stirring operations. Therefore, technology transfer of NO_x control used on other sources are the only control technologies that were evaluated as part of this RACT analysis. The AOD stirring operation does not directly involve conventional combustion of a fuel and does not use burners, therefore, common combustion NO_x control strategies such as overfire air, burners out of service, low NO_x burners, and reburning were not considered. The identified controls are discussed below:

⁹ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

¹⁰ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

¹¹ EPA's RACT/BACT/LAER Clearinghouse (RBLC) software is available at: <http://cfpub.epa.gov/RBLC/>. Accessed March 12, 2015.

The following control technologies were identified as potential control measures:

1. Selective Catalytic Reduction (SCR)
2. Selective Non-Catalytic Reduction (SNCR)

Allegheny Ludlum also identified the follow control measures in their RACT submittal:

3. Flue Gas Recirculation (FGR)

No additional control measures were identified for the AOD vessel.

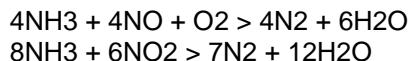
(a) **Flue Gas Recirculation**

As the name suggests, flue gas recirculation (FGR) involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into a combustion zone in order to lower flame temperature and reduce NO_x formation. FGR can be classified into two types; external or induced. External FGR utilizes an external fan to recirculate the flue gases, and external piping routes the exhaust gases from the stack to a burner. Induced FGR utilizes the combustion air fan within the unit to recirculate the flue gases.

FGR is generally feasible for fuel-fired combustion units where there is no minimum operational temperature/oxygen requirement for the emission unit. NO_x reductions vary considerably depending on the type of fuel. When used in iron and steel furnaces, the normal NO_x control efficiency range for FGR is 30-50%.¹²

(b) **Selective Catalytic Reduction**

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.¹³

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000°F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR requires a stable gas flow rate, temperature range, and NO_x concentration. Factors affecting SCR performance include space velocity (volume per hour of flue

¹² "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

¹³ *Id.*

gas divided by the volume of the catalyst bed), ammonia/NO_x molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time, but will also cause an increase in catalyst bed pressure drop. Reaction temperature is also critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry.

(c) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1600-2100°F.

The normal NO_x control efficiency range for SNCR is 40-70%.¹⁴ To date there are no known installations of SNCR at iron and steel plants.¹⁵

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x from the AOD vessel. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) **Flue Gas Recirculation**

FGR generally applies to the fuel-fired units and involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. The ACT does not include FGR as an option for argon-oxygen decarburization processes. FGR is not considered technically feasible for the AOD vessel because this unit does have a burner or involve conventional combustion of a fuel.

(b) **Selective Catalytic Reduction**

In order for an SCR system to effectively reduce NO_x emissions, the exhaust gas stream must have relatively stable gas flow rates, NO_x concentration, and

¹⁴ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonpollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

¹⁵ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

temperature profile. The AOD exhaust stream is highly variable with regard to flow rate, temperature, and NOx emissions because of the violent nature of the process which results when process gases are blown into the hot metal. The temperature of the exhaust gas (which ranges from ambient melt shop to 2500°F) often exceeds the operating range of a catalyst. This makes it infeasible to install the catalyst either prior to or after the baghouse and assure that the temperature will always be within the proper operating range. SCR units have not been used on AODs in similar facilities in the United States. Therefore, SCR is not considered technically feasible for the AOD vessel.

(c) **Selective Non-Catalytic Reduction**

SNCR is similar to SCR, but it does not use a catalyst. As with SCR, exhaust heat variations, flow rates, gas composition, and oxygen content are expected to present issues in the operation of an SNCR in an AOD/melt shop. SNCR requires a more stable gas condition than SCR. Maintaining the near-stable gas conditions necessary for SNCR is infeasible given the highly variable nature of the gas stream. In addition, the great variations in the gas NOx concentration would make it infeasible to maintain the proper stoichiometric ratio of reducing reagent, which could result in reduced efficiency or an undesirable amount of ammonia slip. SNCR has not been used on AODs in the United States. Therefore, SNCR is not considered technically feasible for the AOD vessel.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The AOD vessel has a potential to emit 56.9 tpy based on an emission rate of 0.13 lb/ton steel and a maximum throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel." [§2102.04.b.6] This effectively limits the throughput to the AOD process to 536,267 tons of steel and 34.9 tons NOx per any consecutive twelve month period.

No technically feasible NOx control options were identified for the AOD vessel that would result in emissions reductions from these units.

Step 4 – Select RACT

No additional controls were identified as technically feasible for the AOD vessel. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

C. RACT for NOx – Facility Preheaters

The facility includes several pre-heaters, including six (6) melt shop ladle preheaters and one (1) coil pre-heater on the No. 3 B&P line. Each of these units are open-air, direct-fired natural-gas combustion units of similar function. Therefore, one NOx RACT analysis has been conducted for these units. These units include:

- Two (2) 10.5 MMBtu/hr natural gas-fired Bloom Vertical EAF Ladle Preheaters (P002);

- Four (4) 15 MMBtu/hr natural gas-fired Bloom Horizontal AOD Ladle Preheaters (P002);
- One 16 MMBtu/hr natural gas-fired No. 3 B&P Line Coil Preheater (P009)

Vertical EAF Ladle Preheaters No. 1 and 2

The two (2) 10.5 MMBtu/hr natural gas-fired Bloom Vertical EAF Ladle Preheaters are used to preheat the ladles used to transfer hot metal from the EAF such that the hot metal tapped into the ladle will sustain minimal heat loss during transfer. The Vertical EAF Ladle Preheaters were each installed in 1983; the units are uncontrolled. Potential emissions from the Vertical EAF Ladle Preheaters are estimated at 4.5 tpy year each, or 9.0 tpy for both units. These estimates are based on AP 42 emission factors for natural gas combustion.

Per the requirements of RACT Order No. 260, issued December 19, 1996, the Vertical EAF Ladle Preheaters No. 1 and 2 must be maintained and operated in accordance with good engineering and air pollution control practices.

Bloom Horizontal AOD Ladle Preheaters No. 4 through 7

The four (4) 15 MMBtu/hr natural gas-fired Bloom Horizontal AOD Ladle Preheaters are used to preheat the ladles used to transfer hot metal such that the hot metal tapped into the ladle will sustain minimal heat loss during transfer. Bloom Horizontal AOD Ladle Preheaters No. 4 through 7 were installed in 2009 and permitted under IP# 0059-007 (issued March 27, 2009). Each unit is equipped with low-NOx oxy-fuel burners.

IP#0059-007, condition V.E.1.b, states that "The permittee shall only combust natural gas fuel." [§2102.04.b.6]. IP#0059-007, condition V.E.1.c states that the total natural gas consumption for all four (4) ladle pre-heaters shall not exceed 272 MMSCF in any 12 consecutive months [§2102.04.b.6]. IP#0059-007, condition V.E.1.d states that emissions from the ladle pre-heaters shall not exceed 1.6 lb/hour or 1.75 tpy each (or 7.0 tpy for all four heaters). [§2102.04.b.6]. IP#0059-007, condition V.E.6 also states that the permittee shall operate and maintain the ladle pre-heaters in a manner consistent with manufacturer's recommendations and good engineering and pollution control practices [§2105.03].

No. 3 B&P Line Coil Preheater

The 16 MMBtu/hr natural gas-fired No 3. B&P Line Coil Preheater is used to heat steel coils prior to pickling. The unit is uncontrolled. Potential emissions from the Coil Preheater are estimated at 6.87 tpy year. These estimates are based on AP 42 emission factors for natural gas combustion.

Per the requirements of RACT Order No. 260, issued December 19, 1996, No. 3 B&P Line Coil Preheater must be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's ACT submittal for the Vertical EAF Ladle Preheaters No. 1 and 2, Bloom Horizontal AOD Ladle Preheaters, and No. 3 B&P Line Coil Preheater and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills¹⁶ and the study "Midwest Regional Planning Organization Iron and Steel Mills Best

¹⁶ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at:

Available Retrofit Technology (BART) Engineering Analysis"¹⁷ to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify specific NOx controls for preheaters but includes controls for similar types of open-air, direct-fired iron and steel combustion operations, including reheat, annealing, and galvanizing furnaces, including the following:

1. LNB
2. LNB + FGR
3. SCR

Allegheny Ludlum also identified the following control measures in their RACT submittal:

4. Conventional Burners with Oxygen Enrichment/Oxy-Firing
5. Selective Non-Catalytic Reduction (SNCR)
6. Other Post-Combustion NOx Emissions Controls (i.e., SCONOx™)

ACHD also identified the following potential controls for the preheaters:

7. Tune-ups

[Note for ACHD: For these units, AL referred to the 2009 BACT analysis for two similar ladle preheaters in IP # 0059-1007 for rationale for technical/economic feasibility. This analysis included conventional burner with oxy-firing, conventional burners, LNB, FGR, SCR, SNCR, SCONOx, and ULNB. The two soaking pits were ultimately required to use ULNB+FGR. For the purposes of RACT, I have not included conventional burners or ULNB as an option. Does ACHD want to consider ULNB?]

(a) **Flue Gas Recirculation**

Flue gas recirculation works similarly in annealing furnaces as it does in reheat furnaces. Flue gas recirculation involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NOx formation. From a strictly technical standpoint, FGR is feasible as long as there is no minimum operational temperature/oxygen requirement for the fuel fired emission unit. FGR may also affect fan capacity, furnace pressure, burner pressure drop, and turndown stability.

NOx reductions vary considerably depending on the type of fuel. When operated without additional controls, the normal NOx control efficiency range for FGR used in a furnace is 30-50%. When used in conjunction with LNB, FGR is capable of reducing NOx emissions by 50-72%.¹⁸

(b) **Oxygen Enrichment/Oxy-firing**

http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

¹⁷ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

¹⁸ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

Oxygen enrichment refers to the substitution of oxygen for nitrogen in the combustion air used in a combustion unit. In the steel industry, oxy-firing is used to enhance the melting process in electric arc and furnace processes; it has not been used in coil preheating processes. The level of oxygen enrichment can be anywhere from its level in ambient air (21%) to up to nearly 99%. By reducing the nitrogen in the oxidant gas to 5% or less, the amount of NO_x generated is much less. The flame temperature when oxygen is used is higher. This technique has achieved between 50% - 90% reduction of NO_x in various applications.^{19,20} However, unless oxygen concentrations exceed 90%, a partial replacement of combustion air with oxygen only increases NO_x formation.²¹

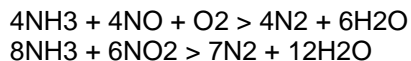
(c) **Low NOx Burners**

Low NOx burners involve a burner design in which the supplied fuel and air are staged across the burner which results in fuel-lean and fuel-rich combustion zones at the burner. In the fuel-lean zones, the combustion temperature is lowered, reducing the production of NOx emissions. Both the temperature and oxygen concentrations are lowered in the fuel-rich zones.

The estimated NOx control efficiency for LNBs in high temperature applications, such as would be found for the ladle preheaters, is 25%.²² However when coupled with FGR or SNCR these efficiencies increase 50-72 and 50-89%, respectively.²³

(d) **Selective Catalytic Reduction**

Selective Catalytic Reduction (SCR) controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NOx to form molecular nitrogen and water with the following basic reaction pathways:



The normal NOx control efficiency range for SCR is 70-90%.²⁴

¹⁹ Sara Jones, Oxy-Fuel Combustion in Coal-Fired Power Plants, presentation November 24, 2008, http://www.che.utexas.edu/course/che359&384/lecture_notes/topic_3/oxy_fuel_combustion.ppt, accessed January 12, 2015.

²⁰ Energy Tips – Process Heating: Oxygen-Enriched Combustion. DOE/GO-102005-2178, U.S. Department of Energy, September, 2005. Available at: http://energy.gov/sites/prod/files/2014/05/f16/oxygen_enriched_combustion_process_htgts3.pdf. Accessed March 12, 2015.

²¹ Alternative Control Techniques (ACT) Document – NO_x Emissions from Glass Manufacturing (EPA-453/R-94-037) <http://www.epa.gov/ttn/catc/dir1/glassact.pdf>

²² Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994) Available at: http://www.epa.gov/airquality/ozonpollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

²³ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

²⁴ *Id.*

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000 °F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry. SCR has not been used with ladle or coil preheaters. As indicated above, the optimum temperature for SCR depends on the catalyst. Thus the exit gas temperatures from some of the processes at iron and steel plants may either be too high or too low, requiring either reheat (if too low) or dilution/quenching (if too high) in order to effectively use SCR.

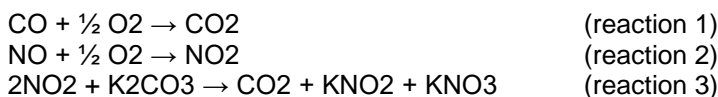
(e) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1600-2100°F).

The normal NO_x control efficiency range for SNCR is 40-70%.²⁵ To date there are no known installations of SNCR at iron and steel plants.²⁶

(f) **Other Post-Combustion Controls (EMx™, SCONOx™)**

EMx™ (formerly referred to as SCONOx™) is a multi-pollutant reduction catalytic control system offered by EmeraChem. EMx™ is a complex technology that is designed to reduce NO_x, VOC, and CO simultaneously through a series of oxidation/absorption catalytic reactions. The EMx™ system employs a single catalyst to oxidize CO to CO₂ and NO to NO₂, simultaneously. NO₂ formed by the oxidation of NO is absorbed subsequently onto the catalyst surface through the use of a potassium carbonate absorber coating. The EMx™ oxidation/absorption cycle reactions are:



Due to the absorption of NO₂ on the catalyst coating, the catalyst must be regenerated periodically. The EMx™ operates at a temperature range of 300-700°F and, therefore, must be installed in the appropriate temperature section of a HRSG.

For installations below 450°F, the EMx™ system uses an inert gas generator for the production of hydrogen and CO₂. For installations above 450°F, the EMx™ catalyst

²⁵ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

²⁶ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

is regenerated by introducing a small quantity of natural gas with a carrier gas, such as steam, over a steam reforming catalyst and then to the EMx™ catalyst. Consumable materials needed for the operation of the EMx™ control system include ambient air, natural gas and steam. The primary consumable is natural gas used for regeneration gas production. Steam is used as the carrier/dilution gas for the regeneration gas.

EMx™/SCONox™ has not been used in iron and steel preheater applications. Commercial experience to date with the EMx™ control system is based upon several small combined-cycle power plants located in California.

(g) **Tune-ups**

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

In a study by the North Carolina State University on the effect of tune-ups on state operated boilers,²⁷ it was found that 1 to 5% fuel savings could be achieved. Although the effect on emissions was not reported, an emission decrease of 1 to 5% would have occurred based on the use of less fuel. However, additional NOx and CO emission reductions would be expected above those associated with efficiency improvements. It is difficult to predict the overall reduction in emissions that tune-ups can achieve because the pre-tune-up status is unknown.

Step 2 – Eliminate Technically Infeasible Control Options

Oxy-firing was determined to be technically feasible for the Vertical EAF Ladle Preheaters No. 1 and 2, but not for the No. 3 B&P Line Coil Preheater. The four Bloom Horizontal AOD Ladle Preheaters are already using oxy-firing; therefore, this control is not considered further for these preheaters. A number of the control options identified are not technically feasible for controlling NOx from the seven preheaters (i.e., Vertical EAF Ladle Preheaters No. 1 and 2, Bloom Horizontal AOD Ladle Preheaters, and No. 3 B&P Line Coil Preheater). This section presents the rationale explaining why each control option is, or is not, technically feasible for these units.

(a) **Flue Gas Recirculation**

FGR involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NOx

²⁷ Eckerlin, Dr. Herbert M. and Eric W. Soderberg, USI Boiler Efficiency Program: A Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities. Prepared for the State Energy Office, NC Department of Administration. Revised 2/25/04.

formation. Control of excess air used in the combustion process can typically only be performed in equipment designed for contained combustion, such as indirect fired equipment with chambers or windboxes. Steel making equipment (i.e. ladle preheaters and coil preheaters) are open-air, direct fired sources and not typically amenable to substantive excess oxygen control. Furthermore, although the ACT for Iron and Steel Mills considers the use of LNB plus FGR for similar process heating and furnace operations, the ACT does not provide that FGR has been applied to ladle preheaters or coil preheaters in the iron and steel industry. Due to these issues, the use of FGR is considered not technologically feasible for the seven preheaters.

(b) **Oxygen Enrichment/Oxy-firing**

The use of conventional burners with oxy-firing has previously been installed on the four (4) Bloom Horizontal AOD Ladle Preheaters and has been used in ladle preheat activities in other facilities. Therefore, oxy-firing is considered technologically feasible for the Vertical EAF Ladle Preheaters No. 1 and 2. However, oxy-firing is not currently available or recommended for coil preheating activities, therefore, it is not considered technologically feasible for the No. 3 B&P Line Coil Preheater. **[Note to ACHD: In this case, the source pointed to a 2009 BACT for the Bloom ladle preheaters for the rationale for why “no add-on controls are feasible” for the coil preheater. However, that 2009 BACT identifies oxy-firing as feasible for the Bloom Ladle Preheaters, but states that due to low NOx emissions they’re likely not economically feasible. ERG could not locate any use of oxy-firing for coil preheaters.]**

(c) **Low NOx Burners**

Low NOx burners (LNBs) have previously been installed in ladle preheaters at other iron and steel facilities and other types of preheaters. However, LNBs are designed to complete the combustion of fuel at a lower flame temperature than is produced by conventional burners. This results in longer and wider flames, and is not compatible with the type of open heaters used at Allegheny Ludlum. Because the seven preheaters are open-air, direct-fired sources, the introduction of oxygen into the flame zone cannot be precisely controlled and would not ensure minimization of NOx emissions. Therefore, LNBs are considered not technically feasible for these units. **[Note to ACHD: This rationale was accepted in the 2009 BACT analysis for these units, therefore, we have adopted the same rationale here.]**

(d) **Selective Catalytic Reduction**

SCR controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. Due to the open-air, direct-fired nature of the ladle preheat and coil preheat operations, it is not feasible to capture the emissions and vent them to an SCR in a manner that would allow the emissions stream to be at the proper temperature and concentration for an SCR to function effectively. SCR is typically not applied to units such as these that are not directly vented. SCR units have not been used in similar operations in the United States. Therefore, SCR is considered not technically feasible for these units.

(e) **Selective Non-Catalytic Reduction**

SNCR is similar to SCR, but it does not use a catalyst. The preheaters do not operate within the typical SNCR temperature window ranges (1,600°F-2,100°F). Further, due to the open-air, direct-fired nature of the ladle preheat and coil preheat operations, it is not feasible to capture the emissions and vent them to an SCR in a manner that would allow the emissions stream to be at the proper temperature and concentration

for an SNCR to function effectively. SNCR is typically not applied to units such as these that are not directly vented. SNCR units have not been used for preheaters in similar operations in the United States. Therefore, SNCR is considered not technically feasible for these units.

(f) **Other Post-Combustion Controls (EMx™, SCONOx™)**

Other post-combustion control technologies, such as EMx™ or SCONOx™, are not technically feasible for the ladle preheat and coil preheat operations. Due to the open-air, direct-fired nature of the ladle preheat and coil preheat operations, it is not feasible to capture the emissions and vent them to a post-combustion control technology.

(g) **Tune-up**

Tune-ups are applicable to all types of furnaces, including preheaters, combusting all types of fuels. Such practices are generally used throughout the industry to increase energy efficiency and lower fuel costs, as well as pollutant emissions. Currently, Allegheny Ludlum is required operate and maintain the two 10.5 MMBtu/hr natural gas-fired Bloom Vertical EAF Ladle Preheaters, four 15 MMBtu/hr natural gas-fired Bloom Horizontal AOD Ladle Preheaters, and the one 16 MMBtu/hr natural gas-fired No. 3 B&P Line Coil Preheater in accordance with good combustion and air pollution control practices, per RACT Order No. 258. However, a tune-up is not required for these units. It is considered technically feasible for an annual tune-up to be performed for these sources, as it is performed for similar sources.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The Vertical EAF Ladle Preheaters have a potential to emit of 4.5 tpy year each, or 9.0 tpy for both units, based on AP 42 emission factors for natural gas combustion. The Bloom Horizontal AOD Ladle Preheaters No. 4 through 7 have a potential to emit 1.75 tpy each (or 7.0 tpy for all four heaters) based on limited emissions from IP#0059-0007 (Issued March 27, 2009). The No. 3 B&P Line Coil Preheater has a potential to emit of 6.87 tpy year, based on AP-42 emission factors for natural gas combustion.

The technically feasible control options with their estimated control efficiency are as follows:

Table 5. Preheaters – NOx Technically Feasible Control Options

Unit(s)	Potential to Emit (tpy)	Control Type	Estimated NOx Control Efficiency (%)	Estimated NOx Emission Reductions (tpy)
Vertical EAF Ladle Preheaters (2 units)	9.0	Conventional Burners with Oxygen Enrichment/Oxy-Firing	70 ^a	6.3
		Tune-up	2% fuel savings ^b	0.2
Bloom Horizontal AOD Ladle	7.0	Tune-up	2% fuel savings ^b	0.5

Preheaters (4 units)				
No. 3 B&P Line Coil Preheater (1 unit)	6.87	Tune up	2% fuel savings ^b	0.1

^a Based on average NOx control efficiency from "Oxy-Fuel Combustion in Coal-Fired Power Plants, presentation November 24, 2008" and "Energy Tips – Process Heating: Oxygen-Enriched Combustion. DOE/GO-102005-2178, U.S. Department of Energy, September, 2005" (references provided in Step 1).

^b Based on average fuel savings as determined in "USI Boiler Efficiency Program: A Report Summarizing the Findings and Recommendations of an Evaluation of Boilers in State Operated Facilities. Eckerlin, Dr. Herbert M. and Eric W. Soderberg, Prepared for the State Energy Office, NC Department of Administration. Revised 2/25/04.

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the Vertical EAF Ladle Preheaters No. 1 and 2 was conducted - see Appendix A for more information. The analysis estimates the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 6. Vertical EAF Ladle Preheaters – Economic Analysis of NOx Technically Feasible Control Options

Unit(s)	Option	Total Capital Investment (TCI) (\$/furnace) ^a	Total Annualized Cost (\$/yr/furnace)	Potential NOx removal (ton/yr/furnace)	Cost Effectiveness (\$/ton NOx removed/furnace)
Vertical EAF Ladle Preheaters (2 units)	Conventional Burners with Oxygen Enrichment/Oxy-Firing	\$334,131	\$120,131	6.3	\$66,739
	Tune-up	\$13,100	\$4,048	0.2	\$24,500
Bloom Horizontal AOD Ladle Preheaters (4 units)	Tune-up	\$26,100	\$8,086	0.5	\$17,100
No. 3 B&P Line Coil Preheater (1 unit)	Tune-up	\$6,500	\$2,019	0.1	\$16,000

^a Costs were not available for the use of conventional burners with oxygen enrichment/oxyfiring. Estimates provided are based on costs for low NOx burners for a similar furnace (Hot Band Normalizer). It is anticipated that burners with oxy-firing would result in higher costs.

Step 4 – Select RACT

None of the control options are considered cost effective. Although both low-NOx oxy-fuel burners and tune-ups have relatively low annualized costs; the emission reductions are low for each individual furnace, which makes the cost effectiveness value high. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the Vertical EAF Ladle Preheaters No. 1 and 2, the Bloom Horizontal AOD Ladle Preheaters, and the No. 3 B&P Coil Preheater must be maintained and operated in accordance with good engineering and air pollution control practices. Additionally, emissions from the Bloom Horizontal AOD Ladle Preheaters shall not exceed 1.6 lb/hour or 1.75 tpy each (or 7.0 tpy for all four heaters), per the requirements of §2102.04.b.6.

D. RACT for NOx – Soaking Pits

The source includes fifteen (15) 26 MMBtu/hr natural gas-fired Loftus Soaking Pits [Nos. 9 to 23] that are a similar type of natural-gas combustion unit; therefore, one NOx RACT analysis has been conducted for these units.

The fifteen (15) 26 MMBtu/hr Loftus Soaking Pits [Nos. 9 through 23] are part of the hot-forming process and used for the reheat of ingots prior to hot rolling operations. The soaking pits are direct-fired, one-way pits. The pits are covered during the heating of the ingots, and the quantity of fuel, desired air-to-fuel ratio, and draft or pressure in the pits are controlled to maintain uniform heating of all ingots in the pits. Heating in the pits occurs in a series of graduated temperature steps to control the rate at which the ingots are heated to their final rolling temperature. The Loftus Soaking Pits were installed in 1970, and are currently uncontrolled.

Potential NOx emissions from the Loftus Soaking Pits are estimated at 11.2 tons per year each, or 167 tons per year from all units. These estimates are based on AP 42 emission factors for natural gas combustion. Per the requirements of RACT Order No. 260, issued December 19, 1996, an annual tune-up must be performed on each Loftus Soaking Pit, including:

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

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's ACT submittal for the fifteen (15) Loftus Soaking Pits, and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills²⁸ and the study "Midwest Regional Planning Organization Iron and Steel Mills Best

²⁸ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

Available Retrofit Technology (BART) Engineering Analysis”²⁹ to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify specific NOx controls for soaking pits but states “the similarity of reheat furnaces and soaking pits indicate that controls suitable for reheat furnaces would also be suitable for soaking pits”³⁰. The ACT identifies the following controls for reheat furnaces:

1. Low Excess Air (LEA)
2. Low NOx Burners (LNB)
3. LNB + Flue Gas Recirculation (FGR)

Allegheny Ludlum also identified the following control measures in their RACT submittal:

4. Selective Catalytic Reduction (SCR)
5. Selective Non-Catalytic Reduction (SNCR)
6. Other Post-Combustion NOx Emissions Controls (i.e., SCONOX™)
7. Catalytic Combustion Systems (i.e., XONON™)

No additional control measures were identified for these soaking pits, except for combinations of the above.

[Note: For these units, AL referred to the 2013 BACT/LAER submittal for two similar soaking pits in IP # 0059-1008b for rationale for technical/economic feasibility. This analysis included LNB, LNB+FGR, FGR, SCR, SNCR, SCONOX, XONON, and ULNB. The two soaking pits were ultimately required to use ULNB+FGR. For the purposes of RACT, I have not included ULNB as an option. Does ACHD want to consider ULNB as RACT?]

(a) **Low Excess Air (LEA)**

LEA is a burner optimization strategy in which the furnace is operated at the lowest excess air level that provides efficient, reliable, safe and complete combustion. In a reheat furnace application at a steel mini-mill, LEA resulted in a reduction of NOx emissions by 14%³¹ (in natural gas-fired units), reduced the total flue gas flow, and improved heat transfer. One notable advantage of this strategy is that no significant capital expenses for new or modified hardware are required.

The potential of LEA as a NOx control technique is limited by the onset of smoke or CO emissions. A number of other factors affect the excess air levels that can be implemented. These include the type of fuel fired, uniformity of the air/fuel ratio, air and fuel control lags during load swings, and other combustion control features such

²⁹ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

³⁰ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

³¹ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

as staging of fuel or air. Although LEA is a feasible technique for furnaces, the trend in NOx control for these sources has been in improved burner design.³²

(b) **Flue Gas Recirculation**

As the name suggests, flue gas recirculation (FGR) involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NOx formation. FGR can be classified into two types; external or induced. External FGR utilizes an external fan to recirculate the flue gases, and external piping routes the exhaust gases from the stack to the burner. Induced FGR utilizes the combustion air fan within the unit to recirculate the flue gases. A portion of the flue gases are routed by duct work or internally to the combustion air fan, where they are premixed with the combustion air and introduced into the flame through the burner.

From a strictly technical standpoint, FGR is feasible as long as there is no minimum operational temperature/oxygen requirement for the fuel fired emission unit. FGR may also affect fan capacity, furnace pressure, burner pressure drop, and turndown stability. If these are critical parameters for processes associated with iron and steel production, then FGR may be infeasible.

NOx reductions vary considerably depending on the type of fuel. When operated without additional controls, the normal NOx control efficiency range for FGR used in a furnace is 30-50%. When used in conjunction with LNB, FGR is capable of reducing NOx emissions by 50-72%.³³

(c) **Low NOx Burners**

Low NOx Burners (LNB) is a relative term that refers to a burner design in which the supplied fuel and air are staged across the burner. The staging results in fuel-lean and fuel-rich combustion zones in the furnace at the burner. In the fuel-lean zones, the combustion temperature is lowered, reducing the production of NOx emissions. Both the temperature and oxygen concentrations are lowered in the fuel-rich zones. LNB technology is available from many manufacturers and applicable to all fuels. Retrofitting older furnaces with newer LNB can be technically feasible, but comes at a high capital cost.

The estimated NOx control efficiency for LNBs in high temperature applications, such as a reheat furnace or soaking pit, is 25%. However when coupled with FGR or selective non-catalytic reduction (SNCR) these efficiencies increase to 50-72 and 50-89%, respectively.³⁴

(d) **Selective Catalytic Reduction**

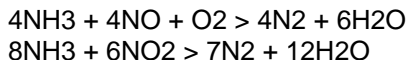
Selective Catalytic Reduction (SCR) controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. NH3, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst

³² *Id.*

³³ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

³⁴ *Id.*

bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.³⁵

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000°F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

Factors affecting SCR performance include space velocity (volume per hour of flue gas divided by the volume of the catalyst bed), ammonia/NO_x molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time, but will also cause an increase in catalyst bed pressure drop. Reaction temperature is also critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry.

(e) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1600-2100°F.

The normal NO_x control efficiency range for SNCR is 40-70%.³⁶ To date there are no known installations of SNCR at iron and steel plants.³⁷

(f) **Other Post-Combustion Controls (EMx™, SCONox™)**

³⁵ *Id.*

³⁶ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

³⁷ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

EMx™ (formerly referred to as SCONOx™) is a multi-pollutant reduction catalytic control system offered by EmeraChem. EMx™ is a complex technology that is designed to reduce NOx, VOC, and CO simultaneously through a series of oxidation/absorption catalytic reactions. The EMx™ system employs a single catalyst to oxidize CO to CO₂ and NO to NO₂, simultaneously. NO₂ formed by the oxidation of NO is absorbed subsequently onto the catalyst surface through the use of a potassium carbonate absorber coating. The EMx™ oxidation/absorption cycle reactions are:



Due to the absorption of NO₂ on the catalyst coating, the catalyst must be regenerated periodically. The EMx™ operates at a temperature range of 300-700°F and, therefore, must be installed in the appropriate temperature section of a HRSG.

For installations below 450°F, the EMx™ system uses an inert gas generator for the production of hydrogen and CO₂. For installations above 450°F, the EMx™ catalyst is regenerated by introducing a small quantity of natural gas with a carrier gas, such as steam, over a steam reforming catalyst and then to the EMx™ catalyst. Consumable materials needed for the operation of the EMx™ control system include ambient air, natural gas and steam. The primary consumable is natural gas used for regeneration gas production. Steam is used as the carrier/dilution gas for the regeneration gas.

EMx™/SCONOx™ has not been used in iron and steel soaking applications. Commercial experience to date with the EMx™ control system is based upon several small combined-cycle power plants located in California.

(g) **Catalytic Combustion Systems (i.e., XONON™)**

XONON™ is a catalytic combustion control system. The overall combustion process in the XONON™ system is a partial combustion of fuel in a catalyst module, followed by complete combustion downstream of the catalyst in the burnout zone. In the catalyst module, a portion of the fuel is combusted without a flame to produce a high temperature gas. Partial combustion within the catalyst produces no NOx. Located immediately downstream of the catalyst module, the homogeneous combustion region is where the remainder of the fuel is combusted, and carbon monoxide and unburned hydrocarbons are reduced to very low levels in a flameless combustion process. Homogeneous combustion downstream of the catalyst usually produces no NOx, because combustion occurs at a uniformly low temperature. A small amount of fuel is usually combusted in a preburner to raise the air temperature to about 470°C (880°F). Any NOx in the exhaust is usually from the preburner. Generally, XONON™ technology has been installed on gas turbines; there are no current applications of XONON™ in iron and steel foundries. Testing on a 1.5-MW, Kawasaki M1A-13A unit showed that XONON™ results in NOx emissions below 3 ppm.³⁸

Step 2 – Eliminate Technically Infeasible Control Options

Low NOx burners and flue gas recirculation are each considered technically feasible control options for the fifteen (15) Loftus Soaking Pits [No. 9 through 23]. A number of the control

³⁸ Environmental Technology Verification Report: NOx Control Technologies - Catalytica Combustion Systems, Inc. Xonon™ Flameless Combustion System (December 2000). Available at: http://www.epa.gov/etv/pubs/05_vr_xonon.pdf. Accessed March 16, 2015.

options identified are not technically feasible for controlling NO_x from the soaking pits. This section presents the rationale explaining why each control option is, or is not, technically feasible for these units.

(a) **Low Excess Air (LEA)**

LEA involves operating the furnaces at the lowest excess air level that provides efficient, reliable, safe and complete combustion. The higher the excess air used for fuel combustion, the higher the potential NO_x generation. Control of excess air used in the combustion process can typically only be performed in furnace equipment designed for contained combustion and/or staging of combustion, such as indirect fired equipment with chambers or windboxes. The soaking pits at Allegheny Ludlum are direct-fired sources and not typically amenable to substantive excess oxygen control. Furthermore, the ACT for Iron and Steel Mills only reports the use of LEA for a single reheat furnace in a retrofit application, wherein the emissions reductions achieved were only 14%. The ACT further noted that another control option would likely have been preferred for this source.³⁹ These emissions reductions are not considered substantive for control and may not be applicable to smaller soaking pits. Therefore, LEA is considered not technologically feasible for the fifteen (15) Loftus Soaking Pits [No. 9 through 23].

(b) **Flue Gas Recirculation**

FGR involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. Although the ACT for Iron and Steel Mills considers the use of LNB plus FGR for reheat furnaces, the ACT provides that FGR has principally been applied to boilers and process heaters and only reports use of LNB plus FGR controls for two reheat furnaces.⁴⁰ The ACT does not provide for FGR for soaking pits. However, FGR was considered technically feasible for two (2) similar soaking pits at this facility that were permitted as part of the Hot Rolling Processing Facility (see IP# 0059-0008b). Therefore, FGR is considered technically feasible for the fifteen (15) Loftus Soaking Pits [No. 9 through 23].

(c) **Low NO_x Burners**

LNB technology is available from many manufacturers and applicable to all fuels, including coke oven gas. Low NO_x burners (LNBs) have previously been installed in reheat furnaces, usually as part of a new furnace unit. Existing furnaces have also been retrofitted with LNBs. LNBs have been shown to be effective in reducing NO_x emissions in reheat furnaces, both new and retrofitted, and similar reductions would be expected for soaking pits. Therefore, LNBs are considered technically feasible for the fifteen (15) Loftus Soaking Pits [No. 9 through 23].

(d) **Selective Catalytic Reduction**

SCR controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. The soaking pits are not a steady state operation and the temperature in the pits and out of the stack fluctuates significantly. For this reason it would not be possible to operate an SCR in a manner that would

³⁹ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

⁴⁰ *Id.*

allow the emissions stream to be at the proper temperature and concentration for an SCR to function properly. Ingots are frequently moved into and out of the Soaking Pits and the temperature out of the stack will vary significantly based on the heating cycle. SCR units have not been used in similar operations in the United States. Therefore, SCR is considered not technically feasible for these units.

(e) **Selective Non-Catalytic Reduction**

SNCR is similar to SCR, but it does not use a catalyst. The Soaking Pits do not operate within the typical SNCR temperature window ranges (1,600°F-2,100°F). Further, as with SCR, SCNR cannot be applied because the Soaking Pits are not a steady state operation and the temperature in the pits and out of the stack fluctuates significantly. SNCR units have not been used for preheaters in similar operations in the United States. Therefore, SNCR is considered not technically feasible for these units.

(f) **Other Post-Combustion Controls (EMx™, SCONOx™)**

Other post-combustion control technologies, such as EMx™ or SCONOx™, are not technically feasible for the Loftus Soaking Pits. Due to the direct-fired nature of the soaking pits and because they are not a steady state operation, it is not feasible to capture the emissions and vent them to a post-combustion control technology.

(g) **Catalytic Combustion Controls (XONON™)**

Catalytic control technologies such as XONON™ are not technically feasible for the Loftus Soaking Pits. Due to the direct-fired nature of the soaking pits and because they are not a steady state operation, it is not feasible to capture the emissions and vent them to a catalytic combustion control technology.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The fifteen (15) Loftus Soaking Pits [No. 9 through 23] have a potential to emit of 11.2 tons per year NOx each, or 167 tons per year NOx from all units. These estimates are based on AP 42 emission factors for natural gas combustion. The technically feasible control options with their estimated control efficiency are as follows:

Table 7. Loftus Soaking Pits - NOx Technically Feasible Control Options

Control Type	Estimated NOx Control Efficiency*	Estimated NOx Emission Reduction, each furnace (tpy)	Estimated NOx Emission Reductions, all furnaces (tpy)
LNB+FGR	60%	6.7	100.2
FGR	40%	4.5	66.8
LNB	25%	2.8	41.8

*Average from ranges provided in "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005).

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the fifteen (15) Loftus

Soaking Pits was conducted - see Appendix B for more information. The analysis estimates the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 8. Loftus Soaking Pits – Economic Analysis of NOx Technically Feasible Control Options

Option	Total Capital Investment (TCI) (\$/furnace) ^a	Total Annualized Cost (\$/yr/furnace)	Potential NOx removal from add-on control (ton/yr/furnace)	Cost Effectiveness (\$/ton NOx removed/furnace)
LNB+FGR	\$1,202,115	\$290,446	6.7	\$43,221
FGR	\$867,984	\$240,395	4.5	\$53,660
LNB	\$334,131	\$120,131	2.8	\$42,904

^a Costs were not provided by the source. All estimates provided are based on costs for similar controls for a similar furnace (Hot Band Normalizer).

Step 4 – Select RACT

None of the control options are considered cost effective. Although the low NOx burners and FGR have relatively low annualized costs, the emission reductions are low for each individual soaking pit, which makes the cost effectiveness value high. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.3 and RACT Order No. 260, issued December 19, 1996, Allegheny must perform an annual tune-up on each of the fifteen (15) Loftus soaking pits, including:

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

E. RACT for NOx – Annealing Furnaces (<100 MMBtu/hr)

This section includes a single NOx RACT analysis for the one (1) 71 MMBtu/hr Hot Band Normalizing Furnace, one (1) 49 MMBtu/hr No. 1 A&P Line Annealing Furnace, and one (1) 44 MMBtu/hr No. 2 A&P Line Annealing Furnace because these units have a similar design and function, combust the same fuels, and are expected to have similar emission profiles.

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.

Hot Band Normalizing Furnace

The one (1) 71 MMBtu/hr Hot Band Normalizing Furnace is a direct-fired natural gas heat-treating furnace which processes thin sheets of silicon-bearing, low carbon, low sulfur steel. Normalizing is a finishing process that involves raising the temperature of the steel above a critical temperature and then air cooling; the normalizing operation yields a higher quality steel product and prepares the material for subsequent heating. The Hot Band Normalizing Furnace, which was installed in 1973, consists of seven heat zones, with temperatures ranging from 1,700°F to 1,825°F. The furnace exhausts to stack P025.

Potential NO_x emissions from the Hot Band Normalizing Furnace are estimated at 30.5 tons per year; these estimates are based on AP 42 emission factors for natural gas combustion. Per the requirements of RACT Order No. 260, issued December 19, 1996, a tune-up must be performed on the Hot Band Normalizing furnace annually, including:

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

No. 1 A&P Line Annealing Furnace

The one (1) 49 MMBtu/hr natural gas-fired No. 1 A&P Line Annealing Furnace is a direct-fired, open-air furnace that exhausts fugitive emissions indoors. Low temperatures range from 1,350°F to 1,650°F, and temperatures for more common stainless steels are in the range of 1,800-2,200°F. The furnace is a source of fugitive emissions that exhausts indoors.

Potential NO_x emissions from the No. 1 A&P Line Annealing Furnace are 21.0 tons per year, based on AP 42 emission factors for natural gas combustion. As with the Hot Band Normalizing Furnace, per RACT Order No. 260, issued December 19, 1996, a tune-up (and associated inspection requirements) must be performed on the No. 1 A&P Line Annealing Furnace.

No. 2 A&P Line Annealing Furnace

The one (1) 44 MMBtu/hr natural gas-fired No. 1 A&P Line Annealing Furnace is a direct-fired, open-air furnace that exhausts fugitive emissions indoors. Low temperatures range from 1,350°F to 1,650°F, and temperatures for more common stainless steels are in the range of 1,800-2,200°F. The furnace is a source of fugitive emissions that exhausts indoors.

Potential NO_x emissions from the No. 1 A&P Line Annealing Furnace are 18.9 tons per year, based on AP 42 emission factors for natural gas combustion. As with the Hot Band Normalizing Furnace, per RACT Order No. 260, issued December 19, 1996, a tune-up (and associated inspection requirements) must be performed on the No. 2 A&P Line Annealing Furnace.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's ACT submittal for the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills⁴¹ and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis"⁴² to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT identifies the following controls for annealing furnaces:

1. LNB
2. LNB + FGR
3. SCR

Allegheny Ludlum also identified the following control measures in their RACT submittal:

6. SCR + LNB
7. SNCR

No additional control measures were identified for annealing furnaces, except for combinations of controls listed above.

a) Flue Gas Recirculation

Flue gas recirculation works similarly in annealing furnaces as it does in reheat furnaces. Flue gas recirculation involves the recirculation of a portion - typically 20-30% - of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. From a strictly technical standpoint, FGR is feasible as long as there is no minimum operational temperature/oxygen requirement for the fuel fired emission unit. FGR may also affect fan capacity, furnace pressure, burner pressure drop, and turndown stability.

NO_x reductions vary considerably depending on the type of fuel. When operated without additional controls, the normal NO_x control efficiency range for FGR used in a furnace is 30-50%. When used in conjunction with LNB, FGR is capable of reducing NO_x emissions by 50-72%.⁴³

(b) Low NO_x Burners

Low NO_x Burners (LNB) may be applied in annealing furnaces the same way in which they may be applied in reheat furnaces. Low NO_x burners involve a burner design in which the supplied fuel and air are staged across the burner which results

⁴¹ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

⁴² "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

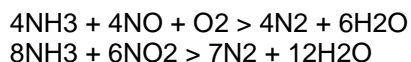
⁴³ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

in fuel-lean and fuel-rich combustion zones at the burner. In the fuel-lean zones, the combustion temperature is lowered, reducing the production of NO_x emissions. Both the temperature and oxygen concentrations are lowered in the fuel-rich zones.

The estimated NO_x control efficiency for LNBs in moderate temperature applications, such as an annealing furnace, is 50%.⁴⁴ However when coupled with FGR or SCR these efficiencies increase 82 and 85%, respectively.⁴⁵

(c) **Selective Catalytic Reduction**

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



The normal NO_x control efficiency range for SCR is 70-90%.⁴⁶

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000 °F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry. SCR has been used with annealing furnaces. As indicated above, the optimum temperature for SCR depends on the catalyst. Thus the exit gas temperatures from some of the processes at iron and steel plants may either be too high or too low, requiring either reheat (if too low) or dilution/quenching (if too high) in order to effectively use SCR.

(d) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1600-2100°F).

⁴⁴ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994) Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

⁴⁵ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

⁴⁶ *Id.*

The normal NOx control efficiency range for SNCR is 40-70%.⁴⁷ To date there are no known installations of SNCR at iron and steel plants.⁴⁸

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NOx from the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace. This section presents the rationale explaining why each control option is, or is not, technically feasible for these units.

(a) Flue Gas Recirculation

FGR involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NOx formation. Although the ACT provides that FGR has principally been applied to boilers and process heaters, it reports use of LNB plus FGR controls for one annealing furnace.⁴⁹ Use of FGR with LNB has a reported efficiency of 60%.⁵⁰ FGR has been used in similar operations at other facilities and is considered technically feasible for these types of units. Therefore, FGR is considered technologically feasible for the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace.

(b) Low NOx Burners

LNB technology is available from many manufacturers and applicable to all fuels, including coke oven gas. Low NOx burners (LNBs) have previously been installed in annealing furnaces, usually as part of a new furnace unit. Existing furnaces have also been retrofitted with LNBs. LNBs have been shown to be effective in reducing NOx emissions in annealing furnaces, both new and retrofitted, and similar reductions would be expected for soaking pits. Use of LNBs on an annealing furnace is 50%. Therefore, LNBs are considered technically feasible for the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace.

(c) Selective Catalytic Reduction

SCR controls NOx emissions by promoting the conversion of NOx into molecular nitrogen and water vapor using a catalyst. There has been limited application of SCR units on furnaces that are similar in size to the annealing furnaces. Where it has been applied, SCR in annealing furnaces in the United States has resulted in a reduction of NOx emissions. However, the use of SCR in annealing furnaces has resulted in degrading of the SCR system very quickly (i.e., frequent catalyst damage), and ammonia slip has been a problem. Exhaust heat variations, flow rates, gas

⁴⁷ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

⁴⁸ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

⁴⁹ *Id.*

⁵⁰ Alternative Control Techniques Document – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

composition, and oxygen content all present issues in the operation of an SCR on an annealing furnace. With these considerations, SCR is considered to be technically feasible for the Hot Band Normalizing Furnace.

The No. 1 A&P Line Annealing Furnace and No. 2 A&P Line Annealing Furnace are direct-fired, fugitive emissions sources that do not exhaust to a stack or flue. Due to the open-air, direct-fired nature of these units, it is not feasible to capture the emissions and vent them to an SCR in a manner that would allow the emissions stream to be at the proper temperature and concentration for an SCR to function effectively. SCR is typically not applied to units such as these that are not directly vented. Therefore, SCR is considered not technically feasible for these units.

(d) **Selective Non-Catalytic Reduction**

SNCR is similar to SCR, but it does not use a catalyst. As with SCR, exhaust heat variations, flow rates, gas composition, and oxygen content are expected to present issues in the operation of an SNCR on an annealing furnace. SNCR has not been used on annealing furnaces in the United States. With these considerations, SNCR is not considered to be technically feasible for the Hot Band Normalizing Furnace.

The No. 1 A&P Line Annealing Furnace and No. 2 A&P Line Annealing Furnace are direct-fired, fugitive emissions sources that do not exhaust to a stack or flue. Due to the open-air, direct-fired nature of these units, it is not feasible to capture the emissions and vent them to an SNCR in a manner that would allow the emissions stream to be at the proper temperature and concentration for an SNCR to function effectively. SNCR is typically not applied to units such as these that are not directly vented. Therefore, SCR is considered not technically feasible for these units.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The Hot Band Normalizing Furnace has a potential to emit NO_x of 30.5 tons per year. The No. 1 A&P Line Annealing Furnace has a potential to emit NO_x of 21.0 tons per year. Potential NO_x emissions from the No. 1 A&P Line Annealing Furnace are estimated at 18.9 tons per year. These emissions are based on AP-42 emission factors for natural gas combustion. The technically feasible control options for each unit, with their estimated control efficiency, are as follows:

Table 9. Annealing Furnaces – NO_x Control Options

Unit(s)	Potential to Emit NO _x (tpy, all units)	Control Type	Estimated NO _x Control Efficiency (%)	Total Estimated NO _x Emission Reductions (tpy, all units)
Hot Band Normalizing Furnace	30.5	LNB	50 ^a	15.3
		LNB + FGR	60 ^a	18.3
		SCR	80 ^b	24.4
		SCR + LNB	90 ^a	27.5
No. 1 A&P Line Annealing Furnace	21.0	LNB	50 ^a	10.5
		LNB + FGR	60 ^a	12.6
No. 2 A&P Line Annealing Furnace	18.9	LNB	50 ^a	9.45
		LNB + FGR	60 ^a	11.3

^a Based on average NOx control efficiency from Alternative Control Techniques – NOx Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994).

^b Based on average NOx control efficiency from "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005).

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the annealing and normalizing furnaces was conducted - see Appendix C for more information. The analysis estimates the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 10. Annealing Furnaces – Economic Analysis of NOx Technically Feasible Control Options

Unit(s)	Option	Total Capital Investment (\$/furnace)	Total Annualized Cost (\$/furnace/yr)	Potential NOx removal from control (ton/furnace/yr)	Cost Effectiveness (\$/ton NOx removed/furnace)
Hot Band Normalizing Furnace	LNB	\$334,131	\$120,131	15.3	\$7,887
	LNB + FGR	\$1,202,115	\$290,446	18.3	\$15,871
	SCR	\$1,709,706	\$366,481	24.4	\$15,020
	SCR + LNB	\$2,043,834	\$416,531	27.5	\$15,174
No. 1 A&P Line Annealing Furnace	LNB	\$334,131	\$120,131	10.5	\$11,441
	LNB + FGR	\$1,202,115	\$290,446	12.6	\$23,051
No. 2 A&P Line Annealing Furnace	LNB	\$334,131	\$120,131	9.45	\$12,712
	LNB + FGR	\$1,202,115	\$290,446	11.3	\$25,613

Step 4 – Select RACT

None of the control options are considered cost effective. Although the low NOx burners and FGR have relatively low annualized costs, the emission reductions are low for each individual soaking pit, which makes the cost effectiveness value high. It is also not surprising that the SCR is not cost effective given the additional natural gas that must be burned to get the exhaust temperatures high enough to use these controls.

Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.3 and RACT Order No. 260, issued December 19, 1996, Allegheny must perform an annual tune-up on the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace, including:

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

F. RACT for NO_x – Pickling Operations

The source includes three acid pickling operations that emit NO_x. These units include:

- One (1) No. 1 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation (P010), Tubs No. 1, 2, and 3, with a maximum capacity of 39 tons of steel slabs per hour, exhausting to wet chemical packed bed scrubber D017/D019;
- One (1) No. 2 A&P Line H₂SO₄ Pickling and No. 2 HNO₃/HF Pickling (P011), Tubs No. 1, 2, and 3, with a maximum capacity of 17 tons of steel slabs per hour, exhausting to wet chemical packed bed scrubber D017/D019;
- One (1) No. 3 B&P Line H₂SO₄ – HNO₃/HF Pickling Operation (P009), Tubs No. 1, 2, and 3, with a maximum capacity of 30 tons of steel slabs per hour, exhausting to wet chemical packed bed scrubber D017/D019;

The three pickling lines use hydrofluoric and nitric acid to remove scale from steel slabs by oxidation. In the process of oxidation, NO₃⁻¹ is converted to NO₂ which saturates the acid/water solution and is emitted to the atmosphere as NO_x. As acid is spent by oxidation it is replaced as needed.

The No. 1 B&P Line, No. 2 A&P Line, and No. 3 A&P Line operations are routed to a Ceilcote HAW-300 wet chemical packed bed scrubber utilizing sodium hydroxide (NaOH) and sodium hydrosulfide (NaHS) in water. The scrubber is primarily designed to reduce acidic, particulate, and NO_x emissions from the tanks, using absorption plus a chemical reaction. The NaOH is used to neutralize the acid vapors and the NaHS reacts with NO₂ to reduce NO_x. The scrubber was upgraded in 1998 and accepted as Best Available Control Technology (BACT) for the control of HF and HNO₃ acid emissions and NO_x emissions under IP#0059-0002 (issued January 20, 1998) at that time, with anticipated reduction efficiencies of 99+% for acid emissions control and 45% for NO_x emissions control. Subsequent testing of the scrubber performed in 1998 showed 28% control efficiency for NO_x. **[Note to ACHD: Since the source claims that subsequent testing shows the efficiency of the scrubber at 28%, you may want to review source test records with respect to compliance with the BACT requirement of 45% control efficiency in IP#0059-0002.]**

The potential to emit NO_x from the pickling lines is limited as follows:

- Condition 33 of Installation Permit No. 0059-0002 limits combined emissions from the No. 1 Pickling Line Acid Tubs to 29.5 lbs per hour or 128.5 tons per year.
- Condition 34 of Installation Permit No. 0059-0002 limits combined emissions from the No. 2 Pickling Line Acid Tubs to 11.5 lbs per hour or 48.5 tons per year.
- Condition 35 of Installation Permit No. 0059-0002 limits combined emissions from the No. 3 Pickling Line Acid Tubs to 29.5 lbs per hour or 128.5 tons per year.

Additionally, pursuant to RACT Order No. 260, issued December 19, 1996, the pickling operations shall be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's ACT submittal for the Hot Band Normalizing Furnace, No. 1 A&P Line Annealing Furnace, and No. 2 A&P Line Annealing Furnace and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) Document for Iron and Steel Mills⁵¹, and the study "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis"⁵², EPA's "Control Technologies for Hazardous Air Pollutants"⁵³ and investigated other sources to determine if any other controls have been demonstrated since 1994 when the ACT was published.

The ACT for Iron and Steel does not identify any controls for acid pickling processes. The USEPA RACT-BACT-LAER Clearinghouse (RBLC)⁵⁴ indicated the following control technologies for similar acid pickling operations:

1. SCR
2. Absorption (Wet Scrubber)

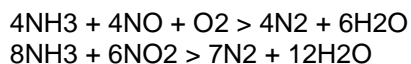
Allegheny Ludlum also identified the follow control measures in their RACT submittal:

3. SNCR
4. Absorption + Chemical Reaction (currently used)
5. Oxidation + Absorption + Chemical Reaction
6. Hydrogen Peroxide Injection

No additional control measures were identified for the acid pickling lines. These control measures are all considered post combustion controls.

(a) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



⁵¹ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed March 12, 2015.

⁵² "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

⁵³ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

⁵⁴ EPA's RACT/BACT/LAER Clearinghouse (RBLC) software is available at: <http://cfpub.epa.gov/RBLC/>. Accessed March 12, 2015.

The normal NO_x control efficiency range for SCR is 70-90%.⁵⁵

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. Optimum NO_x reduction occurs at catalyst bed temperatures of 600–750 °F for conventional (vanadium or titanium based catalysts), 470–510 °F for platinum catalysts, and 600–1000 °F temperature range for a zeolite catalyst. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

SCR has been extensively and quite successfully used in a very cost effective manner on coal- and gas-fired utility boilers, industrial boilers, gas turbines and internal combustion diesel engines in the United States. There have been few uses of SCR in the iron and steel industry. SCR has been used to control acid regeneration lines at steel plants. As indicated above, the optimum temperature for SCR depends on the catalyst. Thus the exit gas temperatures from some of the processes at iron and steel plants may either be too high or too low, requiring either reheat (if too low) or dilution/quenching (if too high) in order to effectively use SCR.

(b) Selective Non-Catalytic Reduction

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1600-2100°F).

The normal NO_x control efficiency range for SNCR is 40-70%.⁵⁶ To date there are no known installations of SNCR at iron and steel plants.⁵⁷

(c) Absorption (Wet Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Physical absorption occurs when the absorbed compound simply dissolves in the solvent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is

⁵⁵ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed March 12, 2015.

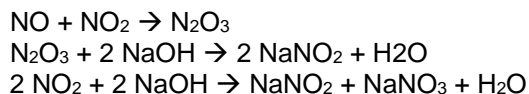
⁵⁶ Alternative Control Techniques Document – NO_x Emissions from Iron and Steel Mills (EPA 453/R-94-065) (September 1994). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199409_nox_epa453_r-94-065_iron_steel_mills.pdf. Accessed January 26, 2015.

⁵⁷ "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005). Available at: http://www.ladco.org/reports/control/bart/iron_and_steel_mills.pdf. Accessed January 26, 2015.

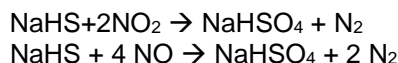
recycled to the absorber). For inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.⁵⁸

Absorption can also be chemical. When a reaction occurs between the absorbed compound and the solvent, it is termed chemical absorption or reactive absorption. This type of absorption depends upon the stoichiometry of the reaction and the concentration of its reactants. For removal of NO₂, the reduction process is designed to reduce NO₂ to molecular nitrogen and water. The reduction process is carried out in a packed column which is fed from a recirculation tank having chemical concentrations held to specific levels based on pH and reduction potential requirements. Sodium hydroxide (NaOH) and sodium hydrosulfide (NaHS) in an aqueous solution are typically used for scrubbing at stainless steel facilities.

The reactions for NaOH scrubbing are shown as follows:



The NaHS reactions proceed as follows:



The NO_x removal efficiency of the process is highly dependent on the ratio of NO₂ to total NO_x. Allegheny Ludlum previously used physical absorption to control NO_x emissions from the acid pickling lines. The scrubber was upgraded to include chemical absorption in 1998; a stack test performed on the scrubber in 1998 showed 28% control efficiency for NO_x from chemical absorption.

(d) **Oxidation + Chemical Absorption (TriNOx® Multi-Chem System)**

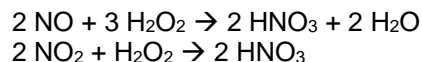
Oxidation and absorption with chemical reaction is very similar to the process described for absorption with chemical reaction, with the addition of an oxidation column. The oxidation column is designed to first convert NO in the exhaust stream to NO₂, followed by reduction of NO₂ using chemical absorption. This system is commercially known as the TriNOx® Multi-Chem System. The oxidation column does not incorporate a recirculation tank since it accepts a direct feed from its chemical storage tank. The removal efficiency of this process is very high (80-90%) and can result in NO_x outlet emissions of less than 25 ppm.⁵⁹

(e) **Hydrogen Peroxide Injection**

Hydrogen peroxide (H₂O₂) injection is a means of reducing NO_x emissions from mixed acid (nitric and hydrofluoric) solutions used in pickling. During the pickling process, the nitric acid is converted to nitrous acid which is insoluble in the mixed acid solution and decomposes into mixed NO_x. Injecting H₂O₂ into the acid bath oxidizes the dissolved NO_x back to nitric acid before it escapes solution. The chemical reaction is as follows:

⁵⁸ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

⁵⁹ Tri-NOx®: A Cost-Effective NO_x Control System (2004). Available at: <https://duckduckgo.com/l/?kh=-1&uddg=http%3A%2F%2Fwww.iwiinc.com%2FCatalog%2FTri-Mer%2Fnox-control-system.pdf>. Accessed March 16, 2015.



The rate of peroxide injection is controlled by the oxidation-reduction potential of the acid bath. This technology is capable of high NO_x reductions (95% percent).⁶⁰

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x from the No.3 B& P Line, No. 1 A&P Line, and No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations. ACHD identified SCR, chemical absorption, oxidation plus chemical absorption (TriNO_x®), and hydrogen peroxide injection as technologically feasible control options. This section presents the rationale explaining why each control option is, or is not, technically feasible for these units.

(a) Selective Catalytic Reduction

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. SCR has been used to control acid pickling and acid regeneration lines at similar steel plants. As indicated above, the optimum temperature for SCR depends on the catalyst. The exit gas temperatures from the acid pickling tanks are too low to apply SCR without reheat, thus an auxiliary burner would be required. With these considerations, SCR is considered technically feasible for control of NO_x from the No.3 B& P Line, No. 1 A&P Line, and No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations.

(b) Selective Non-Catalytic Reduction

SNCR is similar to SCR, but SNCR does not utilize a catalyst. Without the participation of a catalyst, the reaction requires a high temperature range to obtain activation energy (1600-2100°F). The use of SNCR has not been demonstrated on acid pickling lines in the stainless steel industry, nor has it been demonstrated on acid regeneration lines at similar facilities. Additionally, the exit gas temperatures from the acid pickling tanks are too low to apply SNCR without reheat. Given the high temperature applications of SNCR, the amount of excess heat required would likely be costly to generate. Therefore, SNCR is considered not technologically feasible for control of NO_x from the No.3 B& P Line, No. 1 A&P Line, and No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations.

(c) Absorption (Wet Scrubber)

The No. 1 B&P Line, No. 2 A&P Line, and No. 3 A&P Line operations were previously controlled using absorption (without chemical reaction). Stack testing from July 1994 revealed the NO_x control from absorption was 14.8%; the scrubber was subsequently upgraded in 1998. The No. 1 B&P Line, No. 2 A&P Line, and No. 3 A&P Line operations have been controlled using chemical absorption since 1998. The exhaust from the acid pickling lines are routed to a Ceilcote HAW-300 wet chemical packed bed scrubber utilizing sodium hydroxide (NaOH) and sodium hydrosulfide (NaHS) in water. The scrubber was accepted as Best Available Control Technology (BACT) for

⁶⁰ "How to Control NO_x: Hydrogen peroxide can eliminate NO_x in some treatment situations." Nicholas J. Rossi. Pollution Engineering, April 1995, pp. 50-52. Available at: <https://duckduckgo.com/l/?kh=-1&uddg=http%3A%2F%2Finfohouse.p2ric.org%2Fref%2F39%2F38701.pdf>. Accessed March 16, 2015.

the control of HF and HNO₃ acid emissions and NO_x emissions under IP#0059-0002 (issued January 20, 1998), with anticipated reduction efficiencies of 99+% for acid emissions control and 45% for NO_x emissions control. Subsequent testing of the scrubber performed in 1998 showed 28% control efficiency for NO_x. Because the source is currently using this technology, absorption with chemical reaction is considered technologically feasible for these units; therefore, no additional emissions reductions would be anticipated.

(d) **Oxidation + Chemical Absorption (TriNO_x® Multi-Chem System)**

Oxidation and absorption with chemical reaction (TriNO_x®) is very similar to the process described for absorption with chemical reaction, but includes the addition of an oxidation column. This technology has been used in similar other acid fume control applications to reduce NO_x emissions, and is anticipated to be feasible for stainless steel acid pickling using a "deep tank" design. Therefore, TriNO_x® technology is considered technologically feasible for these units.

(e) **Hydrogen Peroxide Injection**

Hydrogen peroxide (H₂O₂) injection is a means of reducing NO_x emissions from mixed acid (nitric and hydrofluoric) solutions used in pickling, and has been demonstrated in stainless steel pickling applications. Although it is anticipated to be costly due to H₂O₂ consumption, H₂O₂ injection is considered technologically feasible for control of NO_x from the No.3 B&P Line, No. 1 A&P Line, and No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operations.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The potential to emit NO_x from the No. 1 Pickling Line Acid Tubs is 29.5 lbs per hour or 128.5 tons per year. The potential to emit NO_x from the No. 2 Pickling Line Acid Tubs is 11.5 lbs per hour or 48.5 tons per year. The potential to emit NO_x from the No. 3 Pickling Line Acid Tubs is 29.5 lbs per hour or 128.5 tons per year. Therefore, the total potential to emit NO_x from the No. 3 Department Scrubber is 305.5 tons per year

The technically feasible control options for each unit, with their estimated control efficiency are as follows:

Table 11. Acid Pickling Lines – NO_x Control Options

Unit(s)	Potential to Emit NO _x (tpy, all units)	Control Type	Estimated NO _x Control Efficiency (%)	Total Estimated NO _x Emission Reductions (tpy)
No. 1 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation; No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation; No. 3 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation	305.5	SCR	80 ^a	259.7
		Oxygen + Chemical Absorption	85 ^b	244.4
		H ₂ O ₂ Injection	95 ^c	290.2

^a Based on average NO_x control efficiency from "Midwest Regional Planning Organization Iron and Steel Mills Best Available Retrofit Technology (BART) Engineering Analysis" (March 30, 2005).

^b Based on estimate from TriNOx® vendor.

^c Based on estimate from "How to Control NOx: Hydrogen peroxide can eliminate NOx in some treatment situations." Nicholas J. Rossi. Pollution Engineering, April 1995, pp. 50-52. **[Note to ACHD: The control efficiency of 95% from this document is higher than the control efficiency provided by the source (75%).]**

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the acid pickling lines was conducted - see Appendix D for more information. The analysis estimates the total costs associated with the NOx control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NOx (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 12. Acid Pickling Lines – Economic Analysis of NOx Technically Feasible Control Options

Unit(s)	Option	Total Capital Investment (\$/furnace) ^a	Total Annualized Cost (\$/furnace/yr) ^a	Potential NOx removal from control (ton/furnace/yr)	Cost Effectiveness (\$/ton NOx removed/furnace)
No. 1 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation; No. 2 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation; No. 3 A&P Line H ₂ SO ₄ – HNO ₃ /HF Pickling Operation	SCR	\$1,732,226	\$1,159,624	259.7	\$4,745
	Oxygen + Chemical Absorption	\$9,417,436	\$3,397,449	244.4	\$13,083
	H ₂ O ₂ Injection	\$540,890	\$2,191,398	290.2	\$7,551

^a Costs based on construction cost estimates from SE Technologies, RACT Proposal, rev. 1996, updated to 2014 dollars.

Step 4 – Select RACT

Oxygen with chemical absorption and peroxide injection are not considered cost effective control options. These options require routine addition of chemicals to the existing process that would add significant annual costs.

Based on the costs shown in Table 9, installing an SCR unit as an additional control for the No. 1 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation; No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation; No. 3 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation would be a cost effective NOx control option. The SCR, in addition to the existing wet chemical packed bed scrubber system, would significantly reduce NOx emissions from these operations. **[Note to ACHD: Although SCR is cost effective, AL may be open to a permit limit for NOX. Correspondence from AL indicates that they tested the scrubber in 1998, which may**

show lower PTE (ACHD was unable to locate this stack test.) Additionally, only a couple of pickling lines in the U.S. use SCR; AL would need to install the SCR in series with the absorber (there are no facilities in the RBLC that use both).]

ACHD considers the application of a single SCR unit to be considered RACT for the No. 1 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation; No. 2 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation; No. 3 A&P Line H₂SO₄ – HNO₃/HF Pickling Operation.

G. RACT for NOx – Boilers

The sections includes a single NOx RACT analysis for two (2) 34 MMBtu/hr natural-gas fired boilers, referred to as No. 3 Department Boilers No. 1 & 2 (P013), because these units have a similar design and function, combust the same fuels, and are expected to have similar emission profiles.

Boilers No. 1 and 2 are 800 HP Johnston firetube scotch marine-type package boilers of a single-burner design that were installed in 1983. The boilers are uncontrolled and exhaust to stack P035.

These boilers were permitted under IP# 0025603-000-00905; the boilers are 34 MMBtu/hr natural gas fired boilers with the capability to burn No. 2 fuel oil (standby only); however, these units have never used fuel oil and there is no plan for fuel oil to ever be burned. Per the requirements of RACT Order No. 260, issued December 19, 1996, a tune-up must be performed on Boilers No. 1 and 2 annually, including:

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

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's RACT submittal for the two (2) natural gas-fired boilers and consulted several references to ensure that all possible control options were identified. ACHD reviewed EPA's Alternative Control Techniques (ACT) document for Industrial/Commercial/Institutional (ICI) Boilers⁶¹ and the "Assessment of Control Technology Options for BART-Eligible Sources"⁶² and investigated additional resources to determine if any other ICI boiler controls have been demonstrated since 1994 when the ACT was published. The identified controls are discussed below.

The ACT identifies the following controls for gas fired ICI boilers:

1. Water or steam injection
2. Staged combustion (Air Staging or Fuel Staging)

⁶¹ Alternative Control Techniques (ACT) Document – NOx Emissions from Industrial/Commercial/Institutional (ICI) Boilers (EPA-453/R-94-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/199403_nox_epa453_r-94-022_ici_boilers.pdf. Accessed January 28, 2015.

⁶² "Assessment of Control Technology Options for BART-Eligible Sources: Steam Electric Boilers, Industrial Boilers, Cement Plants and Paper and Pulp Facilities" (March 2005). Available at: <http://www.nescaum.org/documents/bart-control-assessment.pdf>. Accessed January 26, 2015.

3. Fuel reburning
4. Low NO_x burners
5. Flue gas recirculation (FGR)
6. Fuel induced recirculation (FIR)
7. Selective noncatalytic reduction (SNCR)
8. Selective catalytic reduction (SCR)
9. Fuel switching

No additional control measure was identified for ICI boilers, except for combinations of controls listed above.

(a) **Air Staging**

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

(b) **Fuel Staging**

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

(c) **Fuel Reburn**

Fuel reburn is a staged fuel combustion technique where fuel is introduced downstream of the primary combustion chamber in a boiler to create a secondary combustion zone. However, with fuel reburning, the NO_x formed in the primary combustion area is destroyed in the reburn area. The fuel added can be any type of fuel, but most experience is with natural gas. Emission reductions of 35 to 60% are possible.⁶³

(d) **Flue Gas Recirculation (FGR)**

FGR consists of recycling a portion of the flue gas back to the primary combustion zone. Heating of the inert flue gas in the primary combustion zone lowers the peak flame temperatures in the primary combustion zone and thereby lowers thermal NO_x formation. In addition, the flue gas lowers the oxygen concentration in the primary combustion zone and thereby lowers thermal NO_x. FGR technology is frequently

⁶³ Northeast States For Coordinated Air Use Management (NESCAUM), and Praveen Amar. Applicability and Feasibility of NO_x, SO₂, and PM Emissions Control Technologies for Industrial Commercial, and Institutional Boilers. November, 2008 (Revised January 2009). Available at: <http://www.nescaum.org/documents/ici-boilers-20081118-final.pdf>. Accessed January 23, 2015.

used in conjunction with low NO_x burner design. FGR reduces emissions of NO_x in a natural gas boiler by about 53 to 74%.⁶⁴

(e) **Water / Steam Injection (WSI)**

With this technique, water or steam is injected into the primary combustion zone to reduce the formation of thermal NO_x, but not fuel NO_x, by decreasing the peak combustion temperature. More specifically, water injection decreases the peak flame temperature by diluting the combustion gas stream and acting as a heat sink by absorbing heat necessary to vaporize the water (latent heat of vaporization) and raise the vaporized water temperature to the combustion temperature. WSI reduces NO_x emissions by as much as 80% (in natural gas-fired units).⁶⁵

(f) **Fuel Induced Recirculation (FIR)**

FIR is a combustion control used in natural gas boilers. With FIR, flue gas is recirculated and mixed with the fuel. This technique cools the temperature similarly to how FGR reduces the temperature and thermal NO_x is reduced. However, FIR also reduces prompt NO_x. Prompt NO_x is from the oxidation of compounds formed from reactions between atmospheric nitrogen and radicals formed in the combustion of fuel. For example, nitrogen monohydride, hydrogen cyanide, and other compounds can form during combustion and then be oxidized to nitric oxide.

(g) **Low NO_x Burners (LNB)**

LNB is a relative term that refers to a burner that has been designed to generate less NO_x. It is relative in the sense that a LNB in a furnace that is several decades old may have a NO_x emission rate of approximately 50 ppm, while a LNB on a new boiler may have a NO_x emission rate of less than 30 ppm.⁶⁶ LNB technology is available from many manufacturers and applicable to all fuels. Low NO_x burners achieve 32 to 71% reduction.⁶⁷ The staging results in fuel-lean and fuel-rich combustion zones in the furnace at the burner. In the fuel-lean zones, the combustion temperature is lowered, reducing the production of NO_x emissions. Both the temperature and oxygen concentrations are lowered in the fuel-rich zones. LNB technology is available from many manufacturers and applicable to all fuels. Retrofitting older boilers with newer LNB can be technically feasible, but comes at a high capital cost. Compared to conventional burners, Low NO_x burners achieve 32 to 71% reduction.⁶⁸

h) **Selective Catalytic Reduction**

⁶⁴ Alternative Control Techniques (ACT) Document – NO_x Emissions from Industrial/ Commercial/ Institutional (ICI) Boilers (EPA-453/R-94-022). <http://www.epa.gov/ttnecat1/dir1/icboiler.pdf>, accessed January 12, 2015.

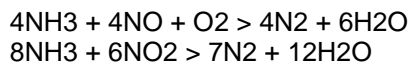
⁶⁵ Cleaver Brooks. Boiler Emission Guide - Reference Guide, 3rd Edition. Thomasville, GA: 2010. http://www.cleaverbrooks.com/uploadedFiles/Internet_Content/Reference_Center/Insights/Boiler%20Emissions%20Guide.pdf, accessed January 23, 2015.

⁶⁶ Cleaver Brooks. Boiler Emission Guide - Reference Guide, 3rd Edition. Thomasville, GA: 2010. http://www.cleaverbrooks.com/uploadedFiles/Internet_Content/Reference_Center/Insights/Boiler%20Emissions%20Guide.pdf, accessed January 23, 2015.

⁶⁷ Alternative Control Techniques (ACT) Document – NO_x Emissions from Industrial/ Commercial/ Institutional (ICI) Boilers (EPA-453/R-94-022). <http://www.epa.gov/ttnecat1/dir1/icboiler.pdf>, accessed January 12, 2015.

⁶⁸ *Id.*

Selective Catalytic Reduction (SCR) controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. NH₃, usually diluted with air or steam, is injected into the exhaust upstream of a catalyst bed. On the catalyst surface, NH₃ reacts with NO_x to form molecular nitrogen and water with the following basic reaction pathways:



Depending on system design, NO_x removal of 80-90% can be achieved under optimum conditions.⁶⁹

The catalyst serves to lower the activation energy of these reactions, which allows the NO_x conversions to take place at a lower temperature than the exhaust gas. The optimum temperatures can range from 350°F to 1,100°F, but in boilers, is typically designed to occur between 600°F and 750°F, depending on the catalyst.⁷⁰ Typical SCR catalysts include metal oxides (titanium oxide and vanadium), noble metals (combinations of platinum and rhodium), zeolite (alumino-silicates), and ceramics. Water vapor and elemental nitrogen are released to the atmosphere as part of the exhaust stream.

Factors affecting SCR performance include space velocity (volume per hour of flue gas divided by the volume of the catalyst bed), ammonia/NO_x molar ratio, and catalyst bed temperature. Space velocity is a function of catalyst bed depth. Decreasing the space velocity (increasing catalyst bed depth) will improve NO_x removal efficiency by increasing residence time, but will also cause an increase in catalyst bed pressure drop.

Reaction temperature is critical for proper SCR operation. Below the minimum temperature, reduction reactions will not proceed. At temperatures exceeding the optimal range, oxidation of ammonia will take place resulting in an increase in NO_x emissions.

SCR catalyst can be subject to deactivation by a number of mechanisms. Loss of catalyst activity can occur from thermal degradation, if the catalyst is exposed to excessive temperatures over a prolonged period of time. Catalyst deactivation can also occur due to chemical poisoning. Principal poisons include arsenic, sulfur, potassium, sodium, and calcium.

(i) **Selective Non-Catalytic Reduction**

Like SCR, SNCR operates by promoting the conversion of NO_x into molecular nitrogen and water vapor using urea or ammonia. However, unlike SCR, SNCR does not utilize a catalyst and therefore requires an exhaust of 1600-2000°F.

Depending on system design, NO_x removal of 25-50% can be achieved under optimum conditions in utility boilers, and 30-70% in industrial boilers.

⁶⁹ The Babcock & Wilcox Company. Steam Its Generation and Use, 40th Edition. Ed. S C Stultz and J B Kitto. Barberton, Ohio: 1992

⁷⁰ California Environmental Protection Agency - Air Resources Board, and Stephanie Kato. Report to the Legislature: Gas-Fired Power Plant NO_x Emission Controls and Related Environmental Impacts. May: 2004.

(j) **Fuel Switching**

Nitrogen concentrations in fuel have a large impact on total NO_x emissions from fuel combustion in boilers. Replacing high-nitrogen fuels with low-nitrogen fuels, such as distillate oil or natural gas, can be an effective means in reducing NO_x. Low-nitrogen fuels can be used to displace a fraction of the boiler combustion fuel, or replace it entirely. Either means of reducing the use of high-nitrogen fuels can result in significant NO_x emissions. Because Allegheny Ludlum currently uses natural gas in Boilers No. 1 and 2 and there are no plans to burn other fuel types; therefore, this control option was not considered further.

Step 2 – Eliminate Technically Infeasible Control Options

A number of the control options identified are not technically feasible for controlling NO_x at for the two (2) natural gas-fired boilers [No. 1 & 2]. A review of available controls identified low NO_x burners, selective catalytic reduction, and selective non-catalytic reduction as technically feasible controls. This section presents the rationale explaining why each control option is, or is not, technically feasible for the boilers.

(a) **Staged Combustion (i.e., air staging and fuel staging)**

Over-fire air (OFA) is a combustion design in which a controlled portion of the combustion airflow is diverted to injection ports beyond the last row of burners. Over-fire air is considered to be technically feasible for No. 3 Department Boilers No. 1 and 2, as it has previously been used in similar types of units.

Use of BOOS is not applicable to single-burner packaged firetube boilers⁷¹; therefore, use of BOOS is not technically feasible for Boilers No. 1 and 2.

(b) **Fuel Reburning**

Reburning has been chiefly developed and applied in coal-fired boilers. Typically natural gas is introduced downstream of the primary combustion chamber to create a secondary combustion zone. The No. 3 Department Boilers No. 1 and 2 are currently natural gas fired, which are nitrogen-free fuels. Therefore, fuel re-burn is considered technically infeasible for controlling NO_x emissions.

(c) **Flue Gas Recirculation**

FGR involves the recirculation of a portion of relatively cool exhaust gases back into the combustion zone in order to lower the flame temperature and reduce NO_x formation. FGR is considered to be technically feasible for the No. 3 Department Boilers No. 1 and 2, as it has previously been used in similar types of units.

(d) **Water/Steam Injection**

WSI can control NO_x, but it has severe operational drawbacks, namely: reduced thermal efficiency, reduced steam production, and increased equipment corrosion. For these reasons, WSI has been primarily used on gas turbines where the reduction in thermal efficiency is much less than on a steam boiler. Therefore, WSI is considered technically infeasible for controlling NO_x emissions from the No. 3 Department Boilers No. 1 and 2.

⁷¹ *Id.*

(e) **Fuel Induced Recirculation (FIR)**

EPA's RBLC (RACT-BACT-LAER Clearinghouse) shows only a single industrial sized natural gas fired boiler equipped with an FIR for NO_x control over the last 10 years.⁷² Therefore, FIR is removed from further consideration.

(f) **Low NO_x Burners**

Low NO_x Burner (LNB) technology is available from many manufacturers and applicable to all fuels. LNBs have previously been installed in similar boilers, and have been shown to be effective in reducing NO_x emissions in similar types of boilers. LNBs are considered technically feasible for No. 3 Department Boilers No. 1 through 4. Each burner would need to be replaced with a burner of similar size and design (i.e., flame speed, temperature length, heat output).

(g) **Selective Catalytic Reduction**

SCR controls NO_x emissions by promoting the conversion of NO_x into molecular nitrogen and water vapor using a catalyst. SCR units have been used on boilers that are similar to the natural gas and COG fired boilers in similar facilities in the United States. For this reason, SCR is considered to be technically feasible for the No. 3 Department Boilers No. 1 and 2.

(h) **Selective Non-Catalytic Reduction**

SNCR is similar to SCR, but it does not use a catalyst. SNCR units have been used on natural gas fired boilers in facilities in the United States. However, the ACT for ICI Boilers indicates it has not been demonstrated in packaged firetube boilers⁷³; additionally, no natural-gas fired boilers using SNCR were identified in the RBLC⁷⁴. For this reason, SNCR is not considered to be technically feasible for the No. 3 Department Boilers No. 1 and 2.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The table below shows the emissions from the No. 3 Department Boilers No. 1 and 2, the technically feasible control options for these units, and the estimated control efficiency of each control option.

The technically feasible control options with their estimated control efficiency are as follows:

Table 13. Boilers No. 1 and 2 – NO_x Control Options

⁷² The following RBLC Codes were included in the search: 12.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces size 100-250 MMBtu/hr; Natural Gas) and 13.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces <100 and MMBtu/hr; Natural Gas).

⁷³ Alternative Control Techniques (ACT) Document – NO_x Emissions from Industrial/ Commercial/ Institutional (ICI) Boilers (EPA-453/R-94-022). <http://www.epa.gov/ttn/catc1/dir1/icboiler.pdf>, accessed January 12, 2015.

⁷⁴ The following RBLC Codes were included in the search: 12.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces size 100-250 MMBtu/hr; Natural Gas) and 13.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces <100 and MMBtu/hr; Natural Gas).

Unit(s)	Potential to Emit NO _x (tpy, both boilers)	Control Type	Estimated NO _x Control Efficiency (%)	Controlled NO _x Emissions (lb/MMBtu)
Boilers No. 1 and 2 (34 MMBtu/hr each)	29.2 ^a	FGR or OFA	40 ^c	0.058
		LNB	50 ^b	0.049
		LNB+FGR	60 ^b	0.039
		SCR	80 ^d	0.019
		SCR+LNB	95 ^e	0.005

^a Based on AP-42 Table1.4-1.

^b Based on data from "Alternative Control Techniques (ACT) Document – NO_x Emissions from Industrial/ Commercial/ Institutional (ICI) Boilers (EPA-453/R-94-022)."

^c Based on average from "Assessment of Control Technology Options for BART-Eligible Sources: Steam Electric Boilers, Industrial Boilers, Cement Plants and Paper and Pulp Facilities" (March 2005).

^d Based on average from EPA's Air Pollution Cost Control Manual, 6th Edition, January 2002 (EPA/452/B-02-001).

^e Based on estimates provided by SE Technologies in July 15, 1994 RACT Proposal provided by Allegheny Ludlum.

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD, thorough economic analyses of the technically feasible control options for Boilers No. 1 through 4 was conducted - see Appendix E for more information. The analyses estimate the total costs associated with the NO_x control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 20 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of NO_x (tons) removed per year. A summary of the cost figures determined in the analysis for each unit is provided in the table below:

Table 14. Boilers No. 1 and 2 – Economic Analysis for Technically Feasible NO_x Control Options

Unit(s)	Option	Total Capital Investment (\$/furnace)	Total Annualized Cost (\$/boiler/yr)	Potential NO _x removal from control (ton/boiler/yr)	Cost Effectiveness (\$/ton NO _x removed/boiler)
Boilers No. 1 and 2	LNB	\$334,131	\$50,051	14.6	\$3,428
	LNB+FGR	\$1,202,115	\$290,446	17.5	\$16,578
	FGR/OFA	\$867,984	\$240,395	11.7	\$20,582
	SCR	\$1,709,706	\$366,481	23.4	\$15,688
	SCR + LNB	\$2,043,834	\$416,531	27.7	\$15,016

Step 4 – Select RACT

Based on the costs shown in Table 14, installing LNB would be a cost effective control option for Boilers No. 1 and 2. The use of FGR, SCR, and SNCR is much more costly.

ACHD reviewed the EPA's RBLC determinations for natural gas boilers less than 100 MMBtu/hr. Specifically, the ACHD reviewed 8 boilers, representing 4 facilities, listed under the RBLC Code 13.310 (Fuel Combustion; Industrial-Size Boilers/Furnaces <100 MMBtu/hr; Natural Gas). Table 15 provides the RBLC findings.

Table 15. Boilers < 100 MMBtu/hr – EPA's RBLC Findings.

Source	RBLC ID	Date of Permit Issuance	NO _x Limit (lb/MMBtu)	NO _x Control
13.31 – Gas Ray Compressor Station [12.25 MMBtu/hr]	*MI-0393	10/14/2010	0.0350	LNB
11.31 – Gas Harrah's Operating Company, Inc. [16.7 MMBtu/hr]	NV-0049	8/20/2009	0.0490	LNB
12.31 – Gas Harrah's Operating Company, Inc. [21 MMBtu/hr]	NV-0049	8/20/2009	0.0366	LNB
13.31 – Gas Harrah's Operating Company, Inc. [31.38 MMBtu/hr]	NV-0049	8/20/2009	0.0306	LNB
13.31 – Gas Harrah's Operating Company, Inc. [33.48 MMBtu/hr]	NV-0049	8/20/2009	0.0367	LNB
13.31 – Gas Chouteau Power Plant [33.5 MMBtu/hr]	OK-0129	1/23/2009	0.0700	LNB
13.31 – Gas Harrah's Operating Company, Inc. [35.4 MMBtu/hr]	NV-0049	8/20/2009	0.0350	LNB
13.31 – Gas Carty Plant [91 MMBtu/hr]	OR-0048	12/29/2010	0.0495	LNB

Although the RBLC data reflects boilers with a lower lb/MMBtu limit, a limit of 0.049 lb/MMBtu is comparable to other boilers burning natural gas. Therefore, ACHD considers LNB meeting an emission rate of 0.049 lb/MMBtu to be considered RACT for Boilers No. 1 and 2.

An annual tune-up is also a cost effective NO_x control option. Per the requirements of §2105.3 and RACT Order No. 260, issued December 19, 1996, Allegheny must perform an annual tune-up on the No. 3 Department Boilers No. 1 and 2, including:

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

H. RACT for VOC – Two (2) Electric Arc Furnaces (EAF 1 and EAF 2)

This process includes two (2) electric arc furnaces (EAF 1 and EAF2) with maximum transfer rate of 112 tons hot metal per heat per furnace, using scrap steel and lime as inputs.⁷⁵ The two EAF were installed in 2003 and 2004 and an oxygen stirring system (where oxygen is injected into the bath after melting) was added in 2005. The EAFs do not use oxy-fuel firing in the sidewall burners.

The EAFs are controlled by a water cooled direct evacuation (DEC) System with baghouses D005/D006 (1A and 1B) and D008/D009 (2A and 2B), and Canopy Baghouses D004 and D007, with a manufacturer's estimated control efficiency of 99.5% each. The units are also controlled by cooling towers no. 1 and no. 2, with a capacity of 20,000 gallons per minute for both towers combined. EAF1 and EAF2 exhaust to stacks P006 and P009 (Canopy Baghouse Exhaust) and P007/P008 and P010/P011 (DEC Baghouse Exhaust).

The electric arc furnaces are currently permitted under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.d of IP#0059-I006 states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6] Condition V.A.1.e of IP #0059-I006 states that "emissions from the 1A, 1B, 2A and 2B DEC baghouses, and D004 canopy and D007 canopy baghouses, due to EAFs #1 & #2 shall not exceed the following": 39.20 lbs/heat or 46.92 tons VOC per year. The EAFs must also meet the requirements of 40 CFR part 60, subpart AAa for particulate matter.

In addition, the EAFs are subject to 40 CFR 63, subpart YYYYYY. This rule was issued since the last installation permit for the electric arc furnaces. This rule applies to facilities that own or operate EAFs that is an area source of hazardous air pollutants. Facilities subject to 40 CFR 63, subpart YYYYYY must either restrict the use of certain metallic scrap or implement a scrap management plan to reduce chlorinated plastics, lead, and free organic liquids in the scrap that is charged to the furnace. In addition to reducing HAP emissions, it is anticipated that either of these measures would reduce VOC emissions from these sources.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's RACT submittal for EAF 1 and EAF 2 and consulted several references to ensure that all possible control options were identified. ACHD reviewed the RBLC, EPA's CTG for Volatile Organic Emissions from Stationary Sources⁷⁶, EPA's "Control Technologies for Hazardous Air Pollutants",⁷⁷ and investigated additional resources to determine if VOC controls for EAFs have been demonstrated. The CTG documents do not identify any specific controls for EAFs at iron and steel facilities. However, Allegheny Ludlum also reviewed the following controls:

1. Regenerative Thermal Oxidation
2. Recuperative Thermal Oxidation
3. Afterburner
4. Absorption
5. Carbon Adsorption
6. Inertial Separation
7. Condensation

⁷⁵ A heat is defined as from beginning of furnace charge to end of furnace tap.

⁷⁶ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

⁷⁷ Control Technologies for Hazardous Air Pollutants, EPA 625/6-86/014, September 1986. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed January 28, 2015.

ACHD additionally reviewed common VOC control techniques for similar stationary sources. This included the review of the following controls:

8. Scrap Management Plan

These controls are discussed in detail below.

(a) **Thermal Oxidation**

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

Regenerative thermal oxidation

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.⁷⁸

(b) **Absorption (Scrubber)**

⁷⁸ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.⁷⁹

(c) **Carbon Adsorption**

Carbon adsorption is a process by which VOC is retained on a granular carbon surface, which is highly porous and has a very large surface-to-volume ratio. Organic vapors retained on the adsorbent are thereafter desorbed and both the adsorbate and adsorbent are recovered. Carbon adsorption systems operated in two phases: adsorption and desorption. Adsorption is rapid and removes most of the VOC in the stream. Eventually, the adsorbent becomes saturated with the vapors and the system's efficiency drops. Regulatory considerations dictate that the adsorbent be regenerated or replaced soon after efficiency begins to decline. In regenerative systems, the adsorbent is reactivated with steam or hot air and the adsorbate (solvent) is recovered for reuse or disposal. Non-regenerative systems require the removal of the adsorbent and replacement with fresh or previously regenerated carbon. Removal efficiencies of 95 to 99 percent can be achieved using carbon adsorption.⁸⁰ The effectiveness of carbon adsorption is largely dependent on available carbon sites.

(d) **Inertial Separation**

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%⁸¹.

⁷⁹ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

⁸⁰ Carbon Adsorption for Control of VOC Emissions: Theory and Full Scale System Performance (EPA-450/3-88-012). Available at: <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockkey=91009Z7B.txt>. Accessed February 5, 2015.

⁸¹ Air Pollution Control Technology Fact Sheet: Cyclones, EPA-452/F-03-005. Available at: <http://www.epa.gov/ttn/catc/dir1/fcyclon.pdf>. Accessed March 18, 2015.

(e) **Condensers**

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the latter, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC.

(f) **Restricted Use of Scrap Containing Organics or Scrap Management Plan**

VOC emissions from electric arc furnaces are present from volatile organic compounds (VOCs) and dirt particles in the melted scrap. Currently, steelmaking facilities that are area sources of HAP and subject to 40 CFR part 63, subpart YYYYYY must either restrict the use of certain metallic scrap or implement a scrap management plan to reduce chlorinated plastics, lead, and free organic liquids in the scrap that is charged to the furnace. In addition to reducing HAP emissions, it is anticipated that either of these measures would reduce VOC emissions from these sources.

Generally, facilities that restrict metallic scrap to reduce organic emissions would not charge to the furnaces any scrap from motor vehicle bodies, engine blocks, oil filters, oily turnings, machine shop borings, transformers or capacitors containing polychlorinated biphenyls, lead-containing components (if producing non-lead steel), chlorinated plastics, or free organic liquids.

For facilities requiring more flexibility, a scrap management plan may be used. A scrap management plan involves provisions for scrap selection and inspection that minimize the amount of organic contaminants in the scrap. Generally, a scrap management plan would include (1) specifications that scrap materials must be depleted (to the extent practicable) of undrained used oil filters, chlorinated plastics, and free organic liquids at the time of charging to the furnace; (2) removal (to the extent practicable) of lead-containing components (such as batteries, battery cables, and wheel weights) from the scrap, except for scrap used to produce leaded steel; and (3) procedures such as visual inspection or periodic audits of scrap providers, as well as and procedures for taking corrective actions with vendors whose shipments are not within specifications.

Restricted use of scrap and scrap management plans do not result in specific VOC emissions reductions from an EAF, but instead reduce the flow of materials to the EAF that would generate VOC emissions.

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation and absorption were identified as technically feasible VOC control options for EAFs 1 and 2. However, a number of the control options identified are not technically feasible for controlling VOC at EAFs 1 and 2. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Thermal Oxidation

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Thermal oxidation has been used in limited application for EAFs in the United States, usually in conjunction with a Direct Evacuating Control (DEC) system. Therefore, thermal oxidation, including regenerative thermal oxidation, recuperative thermal oxidation, and afterburners, are considered technically feasible add-on VOC controls, and costs are provided for each of these options in Step 3 below. These units can achieve a relatively high organic vapor removal efficiency (95%)⁸².

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption technology has been applied for reductions of NO_x, CO and VOC from an assortment of similar melt shop applications, including furnaces. Therefore, absorption is considered a technically feasible add-on VOC control for EAFs 1 and 2. Costs are provided for this option in Step 3 below.

(c) Carbon Adsorption

Carbon adsorbers generally require the exhaust gas temperature to be within a range of 100-200°F, which is significantly lower than the exhaust temperature of the EAFs. Additionally, the exhaust streams from the respective EAFs contain a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the EAFs 1 and 2.

(d) Inertial Separation

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Inertial separation is applicable to the removal of liquid droplets only, and therefore would not be effective for removal of VOC from the exhaust stream. Therefore, inertial separation is not considered technically feasible for the EAFs 1 and 2.

(e) Condensers

⁸² Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for EAFs 1 and 2. Based on stack testing from October 2011, the concentration of VOC in the exhaust stream from EAFs 1 and 2 is less than 20 ppm. In general, a condenser requires an inlet concentration stream of at least 5,000 ppm VOC to be effective.⁸³ As such, the use of a condenser would not result in a measurable reduction of VOC. Therefore, the use of a condenser is considered not technically feasible for EAFs 1 and 2.

(f) **Restricted Use of Scrap Containing Organics or Scrap Management Plan**

Restricting the use of certain metallic scrap or implementation of a scrap management plan reduces the amount of volatile organic materials that may be charged in an EAF, therefore lowering VOC emissions. Such provisions are required for similar specialty steel manufacturers, including area sources of HAP subject to 40 CFR 63, Subpart YYYYYY. Allegheny Ludlum is an area source of HAP, and is currently required to meet the requirements of subpart YYYYYY. The facility current complies with the requirements for restricted metallic scrap for chlorinated plastics, lead, and free organic liquids in accordance with 40 CFR 63.10685(a)(2) and participates and purchases motor vehicle scrap only from scrap providers who participate in a program for removal of mercury switches in accordance with 40 CFR 63.10685(b)(2). The facility also only charges materials from motor vehicles in the EAFs that are materials recovered for specialty alloy content in accordance with 40 CFR 63.10685(b)(3). Therefore, although these VOC reduction techniques are technically feasible, the source is already performing these activities, and no additional emissions reductions for EAFs 1 and 2 are expected.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The two (2) EAFs have a potential to emit 46.92 tpy VOC each (or 93.84 tpy VOC for both units) based on limits from Installation Permit #0059-I006 (issued November 8, 2002). The technically feasible control options for EAFs 1 and 2, with their estimated control efficiency and VOC emissions reductions, are as follows:

Table 16. EAFs 1 and 2 – VOC Control Options

Unit(s)	Potential to Emit NOx (tpy)	Control Type	Estimated NOx Control Efficiency (%)	Total Estimated NOx Emission Reductions (tpy)
EAF 1	46.92	Regenerative TO	96 ^a	45.04
		Recuperative TO	96 ^a	45.04
		Afterburner	96 ^a	45.04
		Absorption	93 ^b	43.64
EAF 2	46.92	Regenerative TO	96 ^a	45.04
		Recuperative TO	96 ^a	45.04
		Afterburner	96 ^a	45.04
		Absorption	93 ^b	43.64

^a Based on data from "Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022)."

⁸³ *Id.*

^b Based on average from "Control Technologies for Hazardous Air Pollutants (EPA 625/6-91/014)" (June 1991).

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for EAFs 1 and 2 was conducted - see Appendix F for more information. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 17. Electric Arc Furnaces – Economic Analysis of VOC Technically Feasible Control Options

Unit(s)	Option	Total Capital Investment (\$/furnace)	Total Annualized Cost (\$/furnace/yr)	Potential VOC removal from control (ton/furnace/yr)	Cost Effectiveness (\$/ton VOC removed/furnace)
EAF 1	Regenerative TO	\$12,133,346	\$6,934,459	45.04	\$153,951
	Recuperative TO	\$2,752,898	\$13,785,132	45.04	\$306,042
	Afterburner	\$1,128,741	\$32,603,780	45.04	\$723,834
	Absorption	\$1,917,898	\$22,361,044	43.64	\$512,450
EAF 2	Regenerative TO	\$17,991,108	\$10,557,206	45.04	\$234,380
	Recuperative TO	\$3,150,088	\$21,013,699	45.04	\$466,523
	Afterburner	\$1,282,078	\$50,009,565	45.04	\$1,110,258
	Absorption	\$3,017,964	\$34,747,653	43.64	\$796,314

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. Additionally, the use of an absorber is not cost effective given the quantities of solvent required. RACT for these units is no additional control beyond what is currently required, including the requirements of 40 CFR 63, subpart YYYYY that the facility is currently following in 40 CFR 63.10685(a)(2), (b)(2), and b(3). VOC emissions from the electric arc furnaces are currently limited under IP# 0059-I006 (issued November 8, 2002). Condition V.A.1.e of IP #0059-I006 states that VOC emissions shall not exceed 39.20 lbs/heat or 46.92 tons VOC per year. Additionally, per the requirements of §2105.03, EAF 1 and EAF 2 must be maintained and operated in accordance with good engineering and air pollution control practices.

I. RACT for VOC – Argon-Oxygen Decarburization Vessel (AOD)

This process consists of one (1) argon-oxygen decarburization vessel (AOD) with maximum design rate of 100 tons of steel per hour and a capacity of 125 tons, using steel, lime, fluxes, argon, oxygen, and nitrogen as inputs. In the AOD process, steel from the EAF is transferred into an AOD vessel and gaseous mixtures containing argon and oxygen are blown into the vessel to reduce the carbon content of the steel.

Potential VOC emissions from the AOD vessel are estimated at 26.3 tpy based on an emission rate of 0.06 lb/ton steel (based on stack testing performed in February 1996) and a maximum throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-I006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel. [§2102.04.b.6] This effectively limits the throughput to AOD to 536,267 tons of steel and 16.1 tons NOx per any consecutive twelve month period.

The AOD is controlled by a Wheelabrator Frye 264 Series 8S baghouse ("AOD/Canopy Baghouse" D007) with a manufacturer's estimated control efficiency of 99.5%, and exhausts to stack P009. Per the requirements of RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's RACT submittal for the argon-oxygen decarburization vessel and consulted several references to ensure that all possible control options were identified. ACHD reviewed the RBLC, EPA's CTG for Volatile Organic Emissions from Stationary Sources⁸⁴, EPA's "Control Technologies for Hazardous Air Pollutants",⁸⁵ and investigated additional resources to determine if VOC controls for AOD vessels have been demonstrated. The CTG documents do not identify any specific controls for AODs at iron and steel facilities. However, Allegheny Ludlum also reviewed the following controls:

1. Regenerative Thermal Oxidation
2. Recuperative Thermal Oxidation
3. Afterburner
4. Absorption
5. Carbon Adsorption
6. Inertial Separation
7. Condensation

ACHD additionally reviewed common VOC control techniques for similar stationary sources. This included the review of the following controls:

8. Restriction Use of Scrap Containing Organics or Scrap Management Plan

These controls are discussed in detail below.

⁸⁴ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

⁸⁵ Control Technologies for Hazardous Air Pollutants, EPA 625/6-86/014, September 1986. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed January 28, 2015.

(a) **Thermal Oxidation**

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

Regenerative thermal oxidation

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.⁸⁶

(b) **Absorption (Scrubber)**

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent

⁸⁶ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.⁸⁷

(c) **Carbon Adsorption**

Carbon adsorption is a process by which VOC is retained on a granular carbon surface, which is highly porous and has a very large surface-to-volume ratio. Organic vapors retained on the adsorbent are thereafter desorbed and both the adsorbate and absorbent are recovered. Carbon adsorption systems operated in two phases: adsorption and desorption. Adsorption is rapid and removes most of the VOC in the stream. Eventually, the adsorbent becomes saturated with the vapors and the system's efficiency drops. Regulatory considerations dictate that the adsorbent be regenerated or replaced soon after efficiency begins to decline. In regenerative systems, the adsorbent is reactivated with steam or hot air and the absorbate (solvent) is recovered for reuse or disposal. Non-regenerative systems require the removal of the adsorbent and replacement with fresh or previously regenerated carbon. Removal efficiencies of 95 to 99 percent can be achieved using carbon adsorption.⁸⁸ The effectiveness of carbon adsorption is largely dependent on available carbon sites.

(d) **Inertial Separation**

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%⁸⁹.

(e) **Condensers**

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system

⁸⁷ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

⁸⁸ Carbon Adsorption for Control of VOC Emissions: Theory and Full Scale System Performance (EPA-450/3-88-012). Available at: <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91009Z7B.txt>. Accessed February 5, 2015.

⁸⁹ Air Pollution Control Technology Fact Sheet: Cyclones, EPA-452/F-03-005. Available at: <http://www.epa.gov/ttn/catc/dir1/fcyclon.pdf>. Accessed March 18, 2015.

pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the later, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC.

(f) **Restricted Use of Scrap Containing Organics or Scrap Management Plan**

VOC emissions from melting operations, including AOD vessels, are present from volatile organic compounds (VOCs) and dirt particles in the melted scrap. Currently, steelmaking facilities that are area sources of HAP and subject to 40 CFR part 63, subpart YYYYY must either restrict the use of certain metallic scrap or implement a scrap management plan to reduce chlorinated plastics, lead, and free organic liquids in the scrap that is charged to the furnace. In addition to reducing HAP emissions, it is anticipated that either of these measures would reduce VOC emissions from these sources.

Generally, facilities that restrict metallic scrap to reduce organic emissions would not charge any scrap from motor vehicle bodies, engine blocks, oil filters, oily turnings, machine shop borings, transformers or capacitors containing polychlorinated biphenyls, lead-containing components (if producing non-leaded steel), chlorinated plastics, or free organic liquids.

For facilities requiring more flexibility, a scrap management plan may be used. A scrap management plan involves provisions for scrap selection and inspection that minimize the amount of organic contaminants in the scrap. Generally, a scrap management plan would include (1) specifications that scrap materials must be depleted (to the extent practicable) of undrained used oil filters, chlorinated plastics, and free organic liquids at the time of charging to the furnace; (2) removal (to the extent practicable) of lead-containing components (such as batteries, battery cables, and wheel weights) from the scrap, except for scrap used to produce leaded steel; and (3) procedures such as visual inspection or periodic audits of scrap providers, as well as and procedures for taking corrective actions with vendors whose shipments are not within specifications.

Restricted use of scrap and scrap management plans do not result in specific VOC emissions reductions from an AOD vessel, but instead reduce the flow of materials to the AOD that would generate VOC emissions.

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation and absorption were identified as technically feasible VOC control options for the AOD. However, a number of the control options identified are not technically feasible

for controlling VOC at the AOD. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) **Thermal Oxidation**

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Although thermal oxidation has not currently been demonstrated in use with an argon-oxygen decarburization vessel, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only five facilities using six argon-oxygen decarburization vessels or stirring stations. Allegheny Ludlum provided information in their RACT submittal indicating that regenerative thermal oxidation, recuperative thermal oxidation, and afterburners were considered as options for VOC control for this unit; therefore, ACHD has considered each of these options as technically feasible, and costs are provided for each option in Step 3 below.

(b) **Absorption (Scrubber)**

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Although absorption has not been demonstrated in use with an argon-oxygen decarburization vessel, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only five facilities using argon-oxygen decarburization vessels. Allegheny Ludlum provided information in their RACT submittal indicating that absorption was considered as an option for VOC control for this unit; therefore, ACHD has considered absorption as technically feasible, and costs are provided in Step 3 below.

(c) **Carbon Adsorption**

Carbon adsorbers generally require the exhaust gas temperature to be within a range of 100-200°F, which is significantly lower than the exhaust temperature of the AOD vessel. Additionally, the exhaust stream from the AOD vessel contains a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the AOD vessel.

(d) **Inertial Separation**

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Inertial separation is applicable to the removal of liquid droplets only, and therefore would not be effective for removal of VOC from the exhaust stream. Therefore, inertial separation is not considered technically feasible for the AOD vessel.

(e) **Condensers**

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for the AOD vessel. Based on stack testing from October 2011, the concentration of VOC in the exhaust stream from the AOD baghouse is less than 20 ppm. In general, a condenser requires an inlet concentration stream of at least 5,000

ppm VOC to be effective.⁹⁰ As such, the use of a condenser would not result in a measurable reduction of VOC. Therefore, the use of a condenser is considered not technically feasible for the AOD vessel.

(f) **Restricted Use of Scrap Containing Organics or Scrap Management Plan**

Restricting the use of certain metallic scrap or implementation of a scrap management plan reduces the amount of volatile organic materials that may be entered into an AOD, therefore lowering VOC emissions. Such provisions are required for similar specialty steel manufacturers, including area sources of HAP subject to 40 CFR 63, Subpart YYYYYY. Allegheny Ludlum is an area source of HAP, and is currently required to meet the requirements of subpart YYYYYY. The facility current complies with the requirements for restricted metallic scrap for chlorinated plastics, lead, and free organic liquids in accordance with 40 CFR 63.10685(a)(2) and participates and purchases motor vehicle scrap only from scrap providers who participate in a program for removal of mercury switches in accordance with 40 CFR 63.10685(b)(2). The facility also only charges materials from motor vehicles in the EAFs that are materials recovered for specialty alloy content in accordance with 40 CFR 63.10685(b)(3). Therefore, although these VOC reduction techniques are technically feasible, the source is already performing these activities, and no additional emissions reductions for the AOD are expected.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The potential to emit VOC from the AOD vessel is estimated at 26.3 tpy based on an emission rate of 0.06 lb/ton steel (based on stack testing performed in February 1996) and a maximum throughput of 876,000 tpy (100 tph x 8,760 hr/yr). However, Condition V.A.1.d of IP#0059-1006 (issued November 8, 2002) states "the combined production of EAFs #1 and #2 shall not exceed 536,267 tons of steel in any consecutive twelve month period. The production in any one heat for either furnace shall not exceed 112 tons of steel." [§2102.04.b.6] This effectively limits the throughput to AOD to 536,267 tons of steel and 16.1 tons VOC per any consecutive twelve month period.

The technically feasible control options with their estimated control efficiency are as follows:

Table 18. AOD – VOC Technically Feasible Control Options

Control Type	Estimated VOC Control Efficiency ^a	Estimated VOC Emission Reductions (tpy)
Regenerative TO	96 ^a	15.5
Recuperative TO	96 ^a	15.5
Afterburner	96 ^a	15.5
Absorption	93 ^b	15.0

^a Based on data from "Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022)."

^b Based on average from "Control Technologies for Hazardous Air Pollutants (EPA 625/6-91/014)" (June 1991).

⁹⁰ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the AOD was conducted - see Appendix G for more information. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital costs are based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 19. AOD – Economic Analysis of VOC Technically Feasible Control Options

Option	Total Capital Investment (TCI) (\$/furnace)	Total Annualized Cost (\$/yr/furnace)	Potential NOx removal from add-on control (ton/yr/furnace)	Cost Effectiveness (\$/ton NOx removed/furnace)
Regenerative TO	\$14,869,978	\$9,049,451	15.5	\$585,498
Recuperative TO	\$1,860,288	\$17,942,355	15.5	\$1,160,867
Afterburner	\$749,948	\$42,797,151	15.5	\$2,768,967
Absorption	\$1,020,898	\$30,177,726	14.9	\$2,015,476

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. Additionally, the use of an absorber is not cost effective given the quantities of solvent required. Therefore RACT for these units is no additional control beyond what is currently required, including the requirements of 40 CFR 63, subpart YYYYYY that the facility is currently following in 40 CFR 63.10685(a)(2), (b)(2), and b(3). . Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the argon-oxygen decarburization vessel must be maintained and operated in accordance with good engineering and air pollution control practices.

J. RACT for VOC – Lewis Temper Mill

The source includes one milling operation, the Lewis Temper Mill (P008), which emits VOC. In the rolling process, the steel is pinched between two rollers to form strips of steel coils. To lubricate the steel as it moves through the rollers, mixtures of oil and water are sprayed on the steel surface. The unit has a maximum design capacity of 25 tons of steel per hour, with annual production of 219,000 tons steel per year. The unit is uncontrolled.

The Lewis Temper Mill has a potential to emit VOC of 61.32 tons per year. Emissions are based on an application of 0.56 lbs VOC/ton of steel (as provided in the Title V permit application submitted July 8, 2013) and the maximum capacity of 25 tons steel/hr. Per the requirements of RACT Order No. 260, issued December 19, 1996, Allegheny Ludlum must

maintain production and operating records for the Lewis Temper Mill to demonstrate compliance with 2105.06 of Article XXI and the agreed order. **[Note to ACHD: Other than the RACT order, this unit does not actually appear to be permitted, unless it is under a very old IP. The TV application lists the installation date as "unknown". Not included in any other recent IPs.]**

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's RACT submittal for the Lewis Temper Mill and consulted several references to ensure that all possible control options were identified. ACHD reviewed the RBLC, EPA's CTG for Volatile Organic Emissions from Stationary Sources⁹¹, EPA's "Control Technologies for Hazardous Air Pollutants",⁹² and investigated additional resources to determine if VOC controls for similar mills have been demonstrated. The CTG documents do not identify any specific controls for rolling mills at iron and steel facilities. However, Allegheny Ludlum also reviewed the following controls:

1. Regenerative Thermal Oxidation
2. Recuperative Thermal Oxidation
3. Afterburner
4. Absorption
5. Carbon Adsorption
6. Inertial Separation
7. Condensation

ACHD additionally reviewed common VOC control techniques for similar sources. This included the review of the following controls:

8. Oil substitution

These controls are discussed in detail below.

(a) Thermal Oxidation

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

Regenerative thermal oxidation

⁹¹ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

⁹² Control Technologies for Hazardous Air Pollutants, EPA 625/6-86/014, September 1986. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed January 28, 2015.

Regenerative thermal oxidation uses a ceramic bed to transfer recovered heat from the high-temperature oxidized gases to the low-temperature polluted stream. This form of oxidation achieves higher destruction efficiencies and greater fuel economy than traditional 'straight' thermal oxidation.

Recuperative thermal oxidation

A recuperative thermal oxidizer has a primary and/or secondary heat exchanger within the system. The primary heat exchanger preheats the inlet air by recuperating heat from the outlet exhaust using a tube heat exchanger or a plate-type exchanger. A secondary heat exchanger may be used to transfer the heated outlet stream to another part of the process.

Afterburners

In an afterburner, the process stream is introduced into a firing box through or near the burner, and does not include heat recovery. Afterburners are best applied where there is a very high concentration of VOCs to act as the fuel source (instead of natural gas or oil) for complete combustion at the targeted operating temperature.

Thermal oxidizers can achieve a wide range of efficiencies, and usually achieve organic vapor removal efficiencies in excess of 95 percent.⁹³

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Absorption of a gaseous component by a liquid occurs when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual concentration and the equilibrium concentration provides the driving force for absorption. Absorption may be purely physical, in which the solute simply dissolves in the absorbent, or chemical, in which the solute chemically reacts with the absorbent or with reagents dissolved in the absorbent. Liquids commonly used as solvents for organic and inorganic compounds include water, mineral oils, nonvolatile hydrocarbon oils, and aqueous solutions (e.g., sodium hydroxide).

The efficiency of absorption for removing pollutants from a gaseous stream depends on several factors, including (a) solubility of the pollutant in a given solvent, (b) concentration, (c) temperature, (d) flow rates of gaseous and liquid streams (liquid to gas ratio), (e) contact surface area, and (f) efficiency of stripping (if solvent is recycled to the absorber). The removal efficiency for an absorber may range from 90-95%; for inorganic compounds, the removal efficiency achievable with absorbers can be greater than 99 percent.⁹⁴

(c) Carbon Adsorption

Carbon adsorption is a process by which VOC is retained on a granular carbon surface, which is highly porous and has a very large surface-to-volume ratio. Organic

⁹³ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

⁹⁴ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

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

(d) **Catalytic Oxidation**

Catalytic oxidizers are similar to thermal oxidizers - the units are enclosed structures that use heat to oxidize the combustible materials. However, in a catalytic oxidizer, a catalyst is used to lower the operating temperature needed to oxidize the VOCs by lowering the activation energy for oxidation. When a preheated gas stream is passed through a catalytic oxidizer, the catalyst bed initiates and promotes the oxidation of the VOC without being permanently altered itself. Note that steps must be taken to ensure complete combustion. The types of catalysts used include platinum, platinum alloys, copper chromate, copper oxide, chromium, manganese, and nickel. These catalysts are deposited in thin layers on an inert substrate, usually a honeycomb shaped ceramic. The effectiveness of catalytic oxidizers is largely dependent on the presence of active catalyst, and may be affected when the inlet gas stream contains a high number of particulate contaminants. The efficiency of a catalytic oxidizer for controlling organic emissions generally ranges from 90-95%.⁹⁶

(e) **Inertial Separation**

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. The collection efficiency of inertial separators varies as a function of particle size and separator design. Efficiency generally increases with (1) particle size and/or density, (2) inlet duct velocity, (3) separator body length, (4) number of gas revolutions in the separator, (5) ratio of separator body diameter to gas exit diameter, (6) loading, and (7) smoothness of the inner separator wall. Generally, cyclonic separators are used for removing aerosols greater than 100 μm in diameter and a properly sized cyclone can have a reasonable removal efficiency of aerosols as low as 10 μm . The control efficiency range for conventional inertial separators is estimated to be 70 to 90%.⁹⁷

(f) **Condensers**

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. The condensed organic vapors can be recovered, refined, and might be reused, preventing their release to the ambient air. There are two ways to obtain condensation. First, at a given temperature, the system

⁹⁵ Carbon Adsorption for Control of VOC Emissions: Theory and Full Scale System Performance (EPA-450/3-88-012). Available at: <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91009Z7B.txt>. Accessed February 5, 2015.

⁹⁶ Control Technologies for Hazardous Air Pollutants, EPA 625/6-91/014, June 1991. Available at: <http://nepis.epa.gov/Adobe/PDF/20013494.PDF>. Accessed March 16, 2015.

⁹⁷ Air Pollution Control Technology Fact Sheet: Cyclones, EPA-452/F-03-005. Available at: <http://www.epa.gov/ttn/catc/dir1/fcyclon.pdf>. Accessed March 18, 2015.

pressure may be increased until the partial pressure of the condensable components equals its vapor pressure. Alternately, at a fixed pressure, the temperature of the gaseous mixture may be reduced until the vapor pressure of the condensable component equals its partial pressure. In practice, condensation is achieved mainly through the later, with removal of heat from the vapor. Condensation is usually applied in combination with other air pollution control systems. Condensers are often located upstream of afterburners; carbon beds, or absorbers to reduce the total load entering the control equipment. When used alone, a refrigerated condenser works best on emission streams containing high concentrations of volatile organic emissions. A refrigerated condenser works best in situations where the air stream is saturated with the organic compound, the organic vapor containment system limits air flow, and the required air flow does not overload a refrigeration system with heat. The removal efficiency of a refrigerated condenser is directly related to lowest temperature that can be achieved in the condenser. Removal efficiencies depend on the hydrocarbon concentration of the inlet vapors, but are greater than 96% for the removal of saturated VOC.

(g) Oil Substitution

Oil substitution is not considered a VOC control technique, but more of a pollution prevention or source reduction technique. When considering the lubricants used in the rolling process, the physical properties that affect the amount of VOC that results from vaporization are vapor pressure, specific heat, and heat of vaporization. An oil with higher vapor pressure implies a shorter chain length of hydrocarbons and thus a lower molecular weight. This allows higher lubricant evaporation during the rolling process when compared to a lubricant with lower vapor pressure. For reducing emissions, an oil with a relatively low vapor press (less than 1 mmHg) and high specific heat and heat of vaporization properties is preferred. These properties result in reduced vapor generation and greater capture control of the oil.

Step 2 – Eliminate Technically Infeasible Control Options

Thermal oxidation, absorption, and inertial separation were identified as technically feasible VOC control options for the AOD. However, a number of the control options identified are not technically feasible for controlling VOC at the AOD. This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Thermal Oxidation

Thermal oxidizers are used to route the emission stream through a high temperature combustion zone where it is heated and the combustible materials are burned. Although thermal oxidation has not currently been demonstrated in use with a rolling mill, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only four facilities using similar cold rolling mills. Allegheny Ludlum provided information in their RACT submittal indicating that regenerative thermal oxidization, recuperative thermal oxidation, and afterburners were considered as options for VOC control for this unit; therefore, ACHD has considered each of these options as technically feasible, and costs are provided for each option in Step 3 below.

(b) Absorption (Scrubber)

Absorption is an operation in which one or more components of a gas mixture are selectively transferred into a relatively nonvolatile liquid. Major factors affecting the performance of absorbers on a rolling mill including inlet VOC concentration and

volume of lubricant remaining in the wash oil; both of these factors affect the rate of mass transfer of VOC. Typically removal efficiencies from absorption technology range from 90-95%. Use of absorption has been demonstrated in similar rolling mills in the iron and steel industry, therefore, absorption is considered a technically feasible control option for the Lewis Temper Mill; costs are provided in Step 3 below.

(c) **Carbon Adsorption**

The exhaust stream from the Lewis Temper Mill contains a number of organic and inorganic contaminants. If an adsorber were applied, particulates in the outlet gas would rapidly result in fouling of the carbon beds and limit the efficiency of the system. Therefore, carbon adsorption is not considered technically feasible for the Lewis Temper Mill.

(d) **Catalytic Oxidation**

The effectiveness of catalytic oxidizers is largely dependent on the presence of active catalyst. The exhaust streams from the Lewis Temper Mill contains a number of organic and inorganic contaminants. If catalytic oxidation were applied, particulates in the outlet gas would rapidly result in fouling of the catalyst bed and limit the efficiency of the system. Therefore, catalyst oxidation is considered not technically feasible for controlling VOC emissions from the Lewis Temper Mill.

(e) **Inertial Separation**

Inertial separation uses centrifugal forces to remove liquid droplets or aerosols from a gas stream. Although inertial separation has not currently been demonstrated in use with a rolling mill, there is a relatively small population of these units for which any controls are demonstrated; the RBLC lists only four facilities using similar cold rolling mills. Allegheny Ludlum provided information in their RACT submittal indicating that inertial separation was considered as an option for VOC control for this unit; therefore, ACHD has considered inertial separation as technically feasible, and costs are provided in Step 3 below.

(f) **Condensers**

Condensation is a process in which a phase change (gaseous to liquid) is induced to remove VOCs from the emission stream. A condenser is not considered technically feasible for the Lewis Temper Mill. In general, a condenser requires an inlet concentration stream of at least 5,000 ppm VOC to be effective.⁹⁸ As such, the use of a condenser would not result in a measurable reduction of VOC in the Lewis Temper Mill. Therefore, the use of a condenser is considered not technically feasible for the AOD vessel.

(g) **Oil Substitution**

[An email has been sent to the source regarding the current VOC content of emulsions used by source, and whether emulsions with a lower VOC content may be used.]

⁹⁸ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

The potential to emit VOC from the Lewis Temper Mill is estimated at VOC of 61.32 tons per year. Emissions are based on an application of 0.56 lbs VOC/ton of steel (as provided in the Title V permit application submitted July 8, 2013) and the maximum capacity of 25 tons steel/hr.

The technically feasible control options with their estimated control efficiency are as follows:

Table 20. Lewis Temper Mill – VOC Technically Feasible Control Options

Control Type	Estimated VOC Control Efficiency ^a	Estimated VOC Emission Reductions (tpy)
Regenerative TO	96 ^a	58.87
Recuperative TO	96 ^a	58.87
Afterburner	96 ^a	58.87
Absorption	93 ^b	57.02
Inertial Separation	80 ^c	49.05

^a Based on data from "Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources" (EPA-450/R-78-022).

^b Based on average from "Control Technologies for Hazardous Air Pollutants" (EPA 625/6-91/014) (June 1991).

^c Based on average from "Air Pollution Control Technology Fact Sheet: Cyclones" (EPA-452/F-03-005)

Economic Analysis

Using information provided by Allegheny Ludlum and collected by ACHD a thorough economic analysis of the technically feasible control options for the Lewis Temper Mill was conducted - see Appendix H for more information. The analysis estimates the total costs associated with the VOC control equipment, including the total capital investment of the various components intrinsic to the complete system, the estimated annual operating costs, and indirect annual costs. All costs, except for direct installation costs, were calculated using the methodology described in Section 6, Chapter 1 of the "EPA Air Pollution Control Cost Manual, Sixth Edition" (document # EPA 452-02-001). Direct capital cost is based on a vendor quote. Annualized costs are based on an interest rate of 7% and an equipment life of 15 years.

The basis of cost effectiveness, used to evaluate the control option, is the ratio of the annualized cost to the amount of VOC (tons) removed per year. A summary of the cost figures determined in the analysis is provided in the table below:

Table 21. Lewis Temper Mill – Economic Analysis of VOC Technically Feasible Control Options

Option	Total Capital Investment (TCI) (\$/furnace)	Total Annualized Cost (\$/yr/furnace)	Potential NOx removal from add-on control (ton/yr/furnace)	Cost Effectiveness (\$/ton NOx removed/furnace)
Regenerative TO	\$6,167,423	\$1,034,223	58.87	\$17,569
Recuperative TO	\$4,901,551	\$844,602	58.87	\$14,348

Afterburner	\$3,838,744	\$685,399	58.87	\$11,643
Absorption	\$12,949,327	\$2,050,116	57.02	\$35,950
Inertial Separation	\$6,230,583	\$1,043,684	49.05	\$24,315

Step 4 – Select RACT

None of the control options are considered cost effective. The use of thermal oxidation is not cost effective given the additional natural gas that must be burned. The use of an absorber is not cost effective given the quantities of solvent required. Additionally, the use of inertial separation is not cost effective given the high capital cost of the equipment and installation. Therefore, it was determined that RACT for these units is no additional control beyond what is currently required. Per the requirements of §2105.03 and RACT Order No. 260, issued December 19, 1996, the Lewis Temper Mill must be maintained and operated in accordance with good engineering and air pollution control practices. Additionally, Allegheny Ludlum must maintain production and operating records for the Lewis Temper Mill to demonstrate compliance with 2105.06 of Article XXI and the agreed order.

K. RACT for VOC – Miscellaneous Painting Operations

The source includes miscellaneous painting/coating operations for maintenance and safety painting purposes. Hand rails, machine safety guards, parking lot and safe walkway markings, etc., are routinely painted. Paint usage is tracked and estimated VOC emissions are reported annually.

Emissions of VOC from the painting operations are estimated at 20 tons per year, based on a maximum paint usage of 8,000 gallons per year (based on prior maximum annual paint usage + 25% safety factor) and a maximum annual average VOC content of 5.1 lbs/gallon.

Per the requirements of RACT Order No. 260, issued December 19, 1996, Allegheny Ludlum must perform miscellaneous painting/coating activities using paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. Allegheny Ludlum is required to maintain records of the quantity used, density, water content, and weight percent of VOCs per gallon of the paints/coatings used at the facility.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's miscellaneous painting operations and consulted several references to ensure that all possible control options were identified for the determination of RACT submittal. ACHD reviewed EPA's CTG document for Volatile Organic Emissions from Stationary Sources ⁹⁹ and investigated additional resources to determine if any other VOC controls for miscellaneous painting operations have been demonstrated since the CTG document was published, including the National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources (40 CFR part 63, subpart HHHHHH). The identified controls are discussed below.

⁹⁹ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

The CTG document does not identify control measures for the type of maintenance painting operations conducted. Due to the fugitive nature of the painting operations, it is not feasible to capture the emissions and vent them to an add-on control device. Additionally, 40 CFR part 63, subpart HHHHHH excludes the type of maintenance activities that are performed by Allegheny Ludlum. Therefore, ACHD's review of the literature focuses on material reductions and good work practices.

(a) **Use of Low-Volatility Paints and Coatings**

Use of low-volatility paintings and coatings is not considered a VOC control technique, but more of a pollution prevention or source reduction technique. When considering the paintings and coatings used for maintenance, a painting or coating with a lower VOC content will result in fewer VOC emissions.

(b) **Work Practices**

Good work practices for painting/coating materials generally include practices that ensure that exposure of the painting/coating to the atmosphere is minimized and evaporation is reduced. The following are considered good housekeeping practices for painting/coating materials:

1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers.
2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials.
3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately.
4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers.

Step 2 – Eliminate Technically Infeasible Control Options

This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) **Use of Low-Volatility Paints and Coatings**

Allegheny Ludlum currently uses paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. Allegheny Ludlum is required to maintain records of the quantity used, density, water content, and weight percent of VOCs per gallon of the paints/coatings used at the facility. The highest annual average of pounds of VOC per gallon purchases for the facility is 5.1 pounds VOC/gallon (2012). In 2013, the annual average pound VOC per gallon purchased was 4.2 pounds VOC/gallon. Therefore, although use of low-volatility paints and coatings is considered technically feasible for this source, based on the current limitations, no additional emissions reductions are anticipated.

(b) **Work Practices**

Good work practices for painting/coating materials generally include practices that ensure that exposure of the coating to the atmosphere is minimized and evaporation is reduced. Such practices are recommended and are generally used throughout the industry. Because the facility is currently using these practices, it is unclear how

much using good work practices would reduce emissions from the miscellaneous painting and coating operations.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

Although use of low-volatility paints is considered technically feasible for the miscellaneous painting operations, the facility is currently using paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. Additionally, the source is already using good work practices for these operations. Therefore, minimal emission reductions are expected.

Economic Analysis

Because the source is currently using low-volatility paintings and coatings and using good work practices, no additional costs are anticipated.

Step 4 – Select RACT

The miscellaneous painting operation is already subject to the requirements of RACT Order No. 260, issued December 19, 1996, which are equivalent to §2105.06 of Article XXI. Per these requirements, Allegheny Ludlum must perform miscellaneous painting/coating activities using paints/coatings with a maximum VOC content equal to or less than 7.0 lbs per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 lbs per gallon and a solids basis. Allegheny Ludlum is also required to maintain records of the quantity used, density, water content, and weight percent of VOCs per gallon of the paints/coatings used at the facility. Therefore, it was determined that RACT for this operation is no additional control, the existing limit on VOC content, and compliance with Article XXI.

RACT also includes the use of good work practices, including the following good housekeeping practices for painting/coating materials:

1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers.
2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials.
3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately.
4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers.

L. RACT for VOC – Solvent Cleaning Operations

The source utilizes multiple parts cleaners for routine maintenance-related parts cleaning activities. The solvent parts cleaning operation consists of cold cleaning degreasing machines that are self-contained and covered, with degreaser openings that are less than 10 square feet. The parts cleaners are used throughout the facility for cleaning and degreasing of rollers, bearings, steels parts, etc. Emissions are uncontrolled and fugitive. Some parts

cleaner units are owned by Allegheny Ludlum, and some units are leased; therefore, cleaning machines and capacities may periodically change.

The potential to emit VOC from the parts cleaning operations is estimated at 13.4 tons per year, based on a maximum potential usage of 20,000 gallons of solvent, an average VOC content of 6.7 lb VOC per gallon, and assuming 20% of the solvent is lost to evaporation.

Article XXI §2105.15 establishes limitations for degreasing operations. Although the requirements of §2105.15 do not apply to cold cleaning degreasers with an opening less than 10 square feet, Allegheny Ludlum currently goes beyond the regulatory requirements and employs good operating practices such as the use of low vapor pressure petroleum naphtha based cleaning fluids, allowing cleaning fluid to drain from parts, utilizing lids or covers when parts cleaners are not in use, proper handling and recycling of used cleaning fluids.

Step 1 – Identify Control Options

ACHD reviewed Allegheny Ludlum's parts cleaning operations and consulted several references to ensure that all possible control options were identified for determination of RACT. ACHD reviewed EPA's CTG document for Volatile Organic Emissions from Stationary Sources¹⁰⁰ and Control of Volatile Organic Emissions from Solvent Metal Cleaning¹⁰¹ and investigated additional resources to determine if any other VOC controls for degreasing operations have been demonstrated since the CTG document was published. The identified controls are discussed below.

The CTG documents identify the following control for cold-cleaner degreasers:

(a) **Use of Low-Volatility Solvents**

Use of a low-volatility solvent is not considered a VOC control technique, but more of a pollution prevention or source reduction technique. When considering the solvents used for degreasing, a solvent with a lower VOC content will result in fewer VOC emissions.

(b) **Operating Practices**

¹⁰⁰ Control Techniques Guidelines Document – Control Techniques for Volatile Organic Emissions from Stationary Sources (EPA-450/R-78-022). Available at: http://www.epa.gov/airquality/ozonepollution/SIPToolkit/ctg_act/197805_voc_epa450_2-78-022_stationary_sources.pdf. Accessed January 28, 2015.

¹⁰¹ Control Techniques Guidelines Document – Control of Volatile Organic Emissions from Solvent Metal Cleaning (EPA-450/2-77-022). Available at: http://epa.gov/glo/SIPToolkit/ctg_act/197711_voc_epa450_2-77-022_solvent_metal_cleaning.pdf

Good operating practices for degreasers generally include practices that ensure that exposure of the solvent to the atmosphere is minimized and evaporation is reduced. Generally, this includes:

- 1) keeping the solvent in closed containers except when in use,
- 2) maintaining a cover on the degreaser and on waste solvents to prevent evaporation, and closing the cover when the degreaser is not in use
- 3) maintaining draining facilities to allow the solvent to drip thoroughly from cleaned parts and draining cleaned parts for at least 15 seconds,
- 4) cleaning spilled solvents as quickly as possible;
- 5) using a permanent, conspicuous label summarizing the operating requirements; and
- 6) recycling and/or transferring of solvent to another party or disposing of solvent waste such that no greater than 20% of the waste (by weight) evaporates.

The CTG documents provided additional controls for open-top vapor and conveyerized degreasers (e.g., incinerators, adsorbers, absorption), however, these controls were not deemed appropriate for the cold cleaner degreasers at Allegheny Ludlum.

Step 2 – Eliminate Technically Infeasible Control Options

This section presents the rationale explaining why each control option is, or is not, technically feasible.

(a) Use of Low-Volatility Solvents

The cleaners which are used by Allegheny Ludlum are low vapor pressure petroleum naptha based cleaning fluids and are used based upon their solvent capabilities. Therefore, although use of low-volatility solvents is considered technically feasible, no additional emissions reductions would be anticipated because the source is already using low vapor pressure solvents.

(b) Operating Practices

Although the requirements of §2105.15 do not apply to cold cleaning degreasers with an opening less than 10 square feet, Allegheny Ludlum currently operates the parts cleaning operations employing good operating practices, such as:

- 1) the use of low vapor pressure petroleum naptha based cleaning fluids,
- 2) utilizing lids or covers when parts cleaners are not in use,
- 3) allowing cleaning fluid to drain from parts,
- 4) proper handling and recycling of used cleaning fluids.

Therefore, although employing good operating practices is considered technically feasible, no additional emissions reductions would be anticipated.

Step 3 - Evaluate Control Options

Emissions and Emission Reductions

Although use of low-volatility solvents and operating practices are considered technically feasible for the parts cleaning operations, the facility is already performing these activities, therefore, no additional emission reductions are expected.

Economic Analysis

Because the source is currently using low-volatility solvents and performing operating practices, no additional costs are anticipated.

Step 4 – Select RACT

. As discussed in Step 3, Allegheny Ludlum is already using low-volatility solvents and performing operating practices which minimize emissions from the parts cleaning operations. Therefore, RACT for the miscellaneous cold cleaning operations is the continued use of low volatility solvents and the following good operating practices:

- 1) keeping the solvent in closed containers except when in use,
- 2) maintaining a cover on the degreaser and on waste solvents to prevent evaporation, and closing the cover when the degreaser is not in use
- 3) maintaining draining facilities to allow the solvent to drip thoroughly from cleaned parts, e.g., draining cleaned parts for at least 15 seconds,
- 4) cleaning spilled solvents as quickly as possible;
- 5) using a permanent, conspicuous label summarizing these operating practices; and
- 6) recycling and/or transferring of solvent to another party or disposing of solvent waste such that no greater than 20% of the waste (by weight) evaporates.



100 River Road
Brackenridge, PA 15014-1597 U.S.A.
www.ATImetals.com

RECEIVED

FEB 05 2014

**ALLEGHENY COUNTY HEALTH DEPT.
AIR QUALITY PROGRAM**

January 31, 2014

Mr. Carl Dettlinger
Document Manager
Allegheny County Health Department
Air Quality Division
301 39th Street
Pittsburgh, PA 15201

Certified Mail #9773-7158
Return Receipt Requested

Dear Mr. Dettlinger,

Subject: Allegheny Ludlum, LLC - Brackenridge Facility
Reasonably Available Control Technology (RACT) Reevaluation

On December 9, 2013, we received a request from Allegheny County Health Department to reevaluate our RACT Plan Approval Order and Agreement Upon Consent No. 260. According to the Department's correspondence, this reevaluation was requested because our July 15, 1994 RACT Proposal determined that many or all emission controls were technically infeasible or cost prohibitive.

Please be advised that many of the emission units which were previously subject to RACT have been permanently shut down and removed. Also, several emission units will be permanently shut down following the startup of the Hot Rolling Processing Facility (HRPF) replacement units. Please note that the emission units to be shut down following HRPF startup will be replaced by units that meet LAER for NO_x and/or BACT for VOC.

For your convenience, Attachment 1 contains our "red-lined" RACT Plan Approval Order and Agreement Upon Consent No. 260 and identifies RACT emission units which have been permanently shut down and/or are no longer subject to RACT.

The following RACT emission units are subject to the RACT "Top-Down Analysis" reevaluation. Potential emissions estimates and subsequent cost-effectiveness (\$/ton) are based on the most recent information which was submitted to ACHD in August 2013, as part of our updated Title V application.



Mr. Carl Dettlinger
Allegheny County Health Department

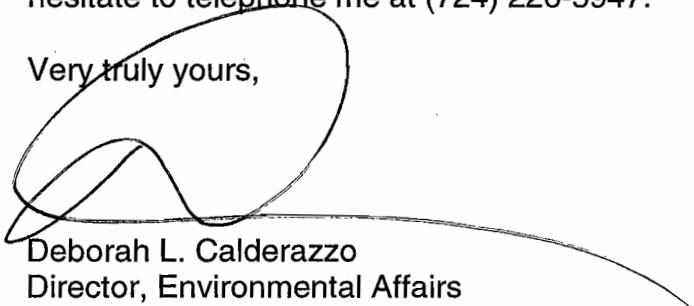
Certified Mail #9773-7158
Return Receipt Requested

RACT Emission Units Subject to RACT Reevaluation		
Emission Unit	VOC PTE (TPY)	NOx PTE (TPY)
S019 – AOD	36.0	7.2
S096 - Temper Mill	61.3	n/a
S088 - Hot Band Normalizer	de minimis	31.1

Our RACT reevaluation for these units is included as Attachment 2.

If you have any questions or require additional information, please do not hesitate to telephone me at (724) 226-5947.

Very truly yours,



Deborah L. Calderazzo
Director, Environmental Affairs

Attachments

ATTACHMENT 1

“RED-LINED” RACT PLAN APPROVAL ORDER AND AGREEMENT UPON CONSENT NO. 260

Allegheny County Health Department

COUNTY COMMISSIONERS

Larry Dunn
Chairman

Bob Cranmer

Mike Dawida

Bruce W. Dixon, M.D.
Director



BOARD OF HEALTH

Roy L. Titchworth, M.D.
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Susanne M. Gollin, Ph.D.
Azizi Powell

Msgr. Charles Owen Rice
Anthony D. Stagno, Sr.
Janet E. Summers, D.O.

301 Thirty-ninth Street - Building #7
Pittsburgh, Pennsylvania 15201-1891

December 20, 1996

Timothy J. Novack, P.E.
Air Pollution Engineer

(412)-578-8118
FAX: (412)-578-8144

Allegheny Ludlum, Corp.
Brackenridge Plant
River Road
Brackenridge, PA 15014
ATTN: Ms. Deborah Calderazzo

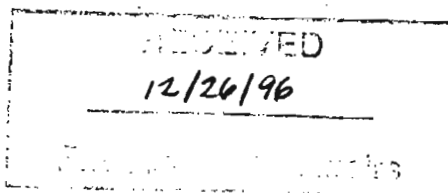
RE: Enforcement Order and Agreement Upon Consent 260
Reasonably Available Control Technology Approval

Dear Ms. Calderazzo:

Please find the above-referenced fully executed Order and Agreement.

As we have discussed, the executed documents will be submitted to the United States Environmental Protection Agency so that the Order portion of the documents can be incorporated into the County's portion of the Commonwealth's State Implementation Plan.

Thank you for your past cooperation in the negotiation and resolution of this matter. Should you have any further questions concerning this matter, please also contact me at the phone or fax numbers referenced above.



Very truly yours,

Timothy J. Novack
Timothy J. Novack, P.E.

TJN

ALLEGHENY COUNTY HEALTH DEPARTMENT

IN RE:

Allegheny Ludlum Corporation
100 River Road
Brackenridge, PA 15014
Allegheny County

) PLAN APPROVAL ORDER
) AND AGREEMENT NO.260
) UPON CONSENT

AND NOW, this 19th day of December, 1996,

WHEREAS, the Allegheny County Health Department, (hereafter referred to as "Department"), has determined that Allegheny Ludlum Corporation (hereafter referred to as "ALC"), 100 River Road, Brackenridge, Allegheny County, PA 15014, is the owner and operator of a steel production facility located at 100 River Road, Brackenridge, Allegheny County, PA 15014 (hereafter referred to as "the facility"), is a major stationary source of oxides of nitrogen and volatile organic compounds (hereafter referred to as "NO_x" and "VOCs") emissions as defined in Section 2101.20 of Article XXI, Rules and Regulations of the Allegheny County Health Department, Air Pollution Control (hereafter referred to as "Article XXI"); and

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

WHEREAS, The Department has determined that ALC has been in full compliance at all relevant times with all relevant requirements of Section 2105.06 of Article XXI; and

WHEREAS, ALC timely submitted to the Department all documents information and submittals required by Section 2105.06.b of Article XXI (hereafter referred to as "the proposal"); and

WHEREAS, the Department, after a review of the proposal, has determined it to be complete; and

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

WHEREAS, the Department shall submit the contents of the proposal to the U.S. EPA as a revision to the Commonwealth of Pennsylvania's State Implementation Plan (hereafter referred to as "SIP"); and

WHEREAS, the Department and ALC desire to make enforceable the details of the proposal by entry of a RACT Plan Approval Order and Agreement Upon Consent, (hereafter referred to as "Agreed Order"; and

WHEREAS, the Department has determined that this Agreed Order will aid in the administration of Article XXI, notwithstanding the absence of any violation of any provision of Article XXI.

NOW, THEREFORE, this day first written above, the Department, pursuant to Section 2109.03 of Article XXI, and upon agreement of the parties as hereinafter set forth, hereby enters into and issues this Agreed Order:

I. ORDER

1.1. ALC shall perform an annual adjustment or "tuneup" on the combustion process of the following equipment once every twelve (12) months, (hereafter referred to as "annual tune-up").

1. ~~Scrap preheaters No. 1 and No. 2~~ REMOVED
2. No. 2 A&P line; preheat furnace
3. No. 1 A&P line; preheat furnace and annealing furnace
4. Boilers No. 1 and No. 2
5. Loftus soaking pits No. 9 through No. 23
6. Hot-band normalizing furnace

Such annual tune-up shall include:

- a. Inspection, adjustment, cleaning, or necessary replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;

- b. Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NO_x, and to the extent practicable minimize emissions of carbon monoxide (hereafter referred as "CO"; and
- c. Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

1.2. ALC shall maintain the following records of the annual tune-up for the subject equipment:

- a. the date of the annual tune-up;
- b. the name of the service company and/or individuals performing the annual tune-up;
- c. the operating rate or load after the annual tune-up;
- d. the CO and NO_x emission rate after the annual tune-up; and
- e. the excess oxygen rate after the annual tune-up.

1.3. ALC shall maintain and operate the following

REMOVED
UNITS

equipment in accordance with good engineering and air pollution control practices.

1. ~~Basic oxygen furnace (BOF) No. 71 vessel and No. 72 vessel~~
2. ~~Electric arc furnaces No. 31 through No. 34~~
3. Argon Oxygen Decarburization (AOD) vessel
4. ~~Koppers BOF ladle preheater No. 1~~
5. ~~BOF vessel preheaters No. 1 and No. 2~~
6. ~~Cadre BOF ladle preheaters No. 1 through No. 3~~
7. ~~BOF mold preheaters No. 1 through No. 25~~
8. ~~Olsen radiant tube annealing furnace No. 1~~
9. ~~Slab warming furnaces No. 1 and No. 2~~
10. Bell annealing furnaces No. 1 through No. 5
11. No. 2 A&P line; kolene heater
12. No. 3 B&P line; coil heater
13. Tandem mill radiant preheater
14. Electric arc furnace vertical ladle preheaters No. 1 and No. 2, horizontal ladle preheater and scrap preheaters No. 1 and No. 2
15. ~~Argon-oxygen decarburization mold preheaters 1 through No. 23 and vessel preheater No. 1~~
16. Tundish preheaters No. 1 and No. 2
17. ~~Bloom horizontal ladle preheaters No. 1 and 2~~
18. American horizontal ladle preheaters No. 1

TO BE
SHUT DOWN
FOLLOWING
HRPF STARTUP
OF REPLACEMENT
UNITS.

Scrubber upgraded
in 1998 (BACT).
See ACHD permit
0059-I002.

through No. 3

19. Department No. 2; plate torch cutters No. 1 and 2
20. ~~Amsler-Morton soaking pits No. 35 through No. 42~~
21. ~~Loftus soaking pits No. 43 through No. 46~~
22. No. 1 A&P line; HN03/HF tubs No. 1 and No. 2 and H2SO4 tub No. 1
23. No. 2 A&P line; HN03/HF tubs No. 1 and No. 2
24. No. 3 B&P line; H2SO4 tubs No. 1 and No. 3

Combustion units
do not use
fuel oil.

- 1.4. ALC shall maintain records of fuel type and usage for each combustion unit including certifications from fuel suppliers for all types of liquid fuel. For each shipment of distillate oils number 1 or 2, a certification that the fuel complies with ASTM D396-78 "Standard Specifications for Fuel Oils" is required. For residual oils, minimum record keeping includes a certification from the fuel supplier of the nitrogen content of the fuel, and identification of the sampling method and sampling protocol.

- 1.5. At no time shall ALC allow emissions of NO_x from the Salem Reheat Furnace, and the Rust Reheat

TO BE
SHUT DOWN
FOLLOWING
HRPF STARTUP
OF REPLACEMENT
UNITS.

Furnace at this facility to exceed the following
NO_x emission limitations:

NO_x Emissions:

<u>Unit:</u>	<u>Lbs/MMBTU</u>	<u>Tons/Year</u>
Salem Furnace	0.15	175
Rust Furnace	0.15	60

- 1.6. ALC shall determine compliance of each furnace with the emission limitations referenced in paragraphs 1.5 above by NO_x emissions testing. ALC shall conduct such testing no less than once every five years for the Salem and Rust Reheat Furnaces. The emission testing shall be conducted according to applicable U.S. EPA approved test methods and Section 2108.02 of Article XXI. ALC shall complete initial emission testing of the furnaces by September 30, 1997.
- 1.7. ALC shall conduct emissions monitoring of NO_x from the Salem and Rust Reheat Furnaces. The emission monitoring shall continuously measure and record fuel flow rate, combustion air flow rate, furnace pressure and furnace temperature.

1.8. The Department reserves the right to evaluate the NO_x Lbs per MMBTU and Tons per Year emission limitations, for the Salem and Rust Reheat Furnaces, upon analysis of actual stack test data from the subject furnaces, and amend if appropriate. The amended NO_x emission limitations shall be submitted as a source specific revision to the Commonwealth of Pennsylvania State Implementation Plan.

1.9. ALC shall maintain all appropriate records to demonstrate compliance with the requirements of both Section 2105.06 Article XXI and the Agreed Order. Such records shall provide sufficient data to clearly demonstrate that all requirements of both Section 2105.06 of Article XXI and the Agreed Order are being met. Data and information required to determine compliance shall be recorded and maintained by ALC and shall include the following:

A.) Production and operating records for the ~~BOF~~
~~No. 71 and No. 72 vessels, EAFs No. 31~~
~~through No. 34, the 56 inch tandem mill,~~

NOT A SOURCE
OF VOC

NOT A SOURCE
OF VOC

Lewis temper and ~~United~~ and Hot strip rolling
mills.

TO BE SHUTDOWN ↑
FOLLOWING
HRPF STARTUP OF REPLACEMENT
UNITS.

- 1.10. ALC shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 7.0 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. ALC shall maintain records of the quantity used, the density, water content and weight percent of VOCs per gallon of the paints/coatings used at the facility.
- 1.11. ALC shall retain all records required by both Section 2105.06 of Article XXI and the Agreed Order for the facility for at least two (2) years and shall make the same available to the Department upon request.

ATTACHMENT 2

RACIAL REEVALUATION

ALLEGHENY LUDLUM - BRACKENRIDGE FACILITY

RACT TOP-DOWN ANALYSIS

SOURCE S019 - AOD

VOC RACT PROPOSAL

CONTROL OPTIONS:		
Control Technology	Typical Control Effectiveness	Technical Feasibility
Thermal Oxidation:		
Regenerative	95 - 98 %	Yes
Recuperative	95 - 98 %	Yes
Afterburner	95 - 98 %	Yes
Absorption (Scrubbing)	90 - 95 %	Yes
Carbon Adsorption	90 - 95 %	No - See Note 1
Catalytic Oxidation	90 - 95 %	No - See Note 2
Inertial Separation	60 - 80 %	No - See Note 3
Condensation	50 - 90 %	No - See Note 4
Notes: 1. Particulate in outlet gas will foul the carbon beds. 2. Particulate in outlet gas will foul the catalyst. 3. Applicable for removal of liquid droplets only. 4. Not feasible due to high VOC inlet loading requirements. Requires > 5,000 ppm.		

CONTROL OPTION COSTS:							
Control Technology	Estimated Control %	Emission Reduction (tons/yr)	Controlled Emissions (tons/yr)	Total Annualized Costs (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)	Potential for Adverse or Additional Environmental Impacts
Thermal Oxidation:							
Regenerative	96	35	1	\$9,829,346	\$284,414	NA	
Recuperative	96	35	1	\$18,031,972	\$521,758	NA	
Afterburner	96	35	1	\$42,829,763	\$1,239,287	NA	
Absorption	93	33	3	\$30,147,113	\$900,451	\$900,451	Requires disposal/reuse of captured VOCs
Baseline (No Control)	0	-	36.0	-	-	-	

CONTROL OPTIONS:		
Control Technology	Typical Control Effectiveness	Technical Feasibility
Selective Catalytic Reduction (SCR)	40 - 90 %	No (See Note 1)
Selective Non-Catalytic Reduction (SNCR)	25 - 70 %	No (See Note 2)
Flue Gas Recirculation (FGR)	10 - 50 %	No (See Note 3)
<p>Notes:</p> <p>1. SCR is infeasible for application at the AOD for the following reasons:</p> <p>a) the AOD exhaust gas is highly variable with regard to flow rate, temperature and concentration of pollutants. This is due to the violent nature of the process which results when process gases are blown into the hot metal;</p> <p>b) the temperature of the exhaust gas often exceeds the operating range of the catalyst;</p> <p>c) metals and other particulates present in the exhaust gas stream would blind the catalyst, making it ineffective for reduction of NOx.</p> <p>2. SNCR is infeasible for application at the AOD for many of the same reasons listed for SCR. Maintaining the near stable gas conditions necessary to affect NOx controlled by SNCR would be nearly impossible given the highly variable nature of the gas stream. In addition, the great variations in exhaust gas pollutant concentration would make it difficult to maintain the proper stoichiometric ratio of the reducing reagent, resulting in an undesirable level of ammonia slip and/or reduced efficiency.</p> <p>3. FGR is considered infeasible for application at the AOD because the AOD does not utilize a burner.</p>		

CONTROL OPTION COSTS:							
Control Technology	Estimated Control %	Emission Reduction (tons/yr)	Controlled Emissions (tons/yr)	Total Annualized Costs (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)	Potential for Adverse or Additional Environmental Impacts
NOT APPLICABLE							

ALLEGHENY LUDLUM - BRACKENRIDGE FACILITY

RACT TOP-DOWN ANALYSIS

SOURCE S088: HOT BAND NORMALIZER

NOx RACT PROPOSAL

CONTROL OPTIONS:		
Control Technology	Typical Control Effectiveness	Technical Feasibility
Selective Catalytic Reduction (SCR) + Low NOx Burners	95 - 97 %	Yes
Selective Catalytic Reduction (SCR)	50 - 95 %	Yes
Selective Non-Catalytic Reduction (SNCR)	30 - 60 %	No (See Note 1)
Low NOx Burners + Flue Gas Recirculation	30 - 60 %	Yes
Low NOx Burners	20 - 50 %	Yes
Notes: 1. Not demonstrated 2. Control option evaluation assumes process similar to annealing furnaces		

CONTROL OPTION COSTS:							
Control Technology	Estimated Control %	Emission Reduction (tons/yr)	Controlled Emissions (tons/yr)	Total Annualized Costs (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)	Potential for Adverse or Additional Environmental Impacts
SCR + Low NOx Burners	95	30	2	\$524,763	\$17,761	\$21,783	
SCR	85	26	5	\$457,019	\$17,288	\$9,455	
Low NOx Burners + Flue Gas Recirculation	50	16	16	\$354,105	\$22,772	\$69,543	
Low NOx Burners	40	12	19	\$137,825	\$11,079	\$11,079	
Baseline (No Control)	0	-	31.1	-	-	-	

ALLEGHENY LUDLUM - BRACKENRIDGE FACILITY

RACT TOP-DOWN ANALYSIS

SOURCE S096: TEMPER MILL

VOC RACT PROPOSAL

CONTROL OPTIONS:		
Control Technology	Typical Control Effectiveness	Technical Feasibility
Thermal Oxidation:		
Regenerative	95 - 98 %	Yes
Recuperative	95 - 98 %	Yes
Afterburner	95 - 98 %	Yes
Absorption (Scrubbing)	90 - 95 %	Yes
Carbon Adsorption	90 - 95 %	No - See Note 1
Catalytic Oxidation	90 - 95 %	No - See Note 2
Inertial Separation	60 - 80 %	Yes
Condensation	50 - 90 %	No - See Note 3
Notes:		
1. Possible particulate in outlet gas will foul the carbon beds.		
2. Possible particulate in outlet gas will foul the catalyst.		
3. Not feasible due to high VOC inlet loading requirements. Requires > 5,000 ppm.		

CONTROL OPTION COSTS:							
Control Technology	Estimated Control %	Emission Reduction (tons/yr)	Controlled Emissions (tons/yr)	Total Annualized Costs (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)	Potential for Adverse or Additional Environmental Impacts
Thermal Oxidation:							
Regenerative	96	59	2	\$1,360,818	\$23,124	N/A	Possible NOx source
Recuperative	96	59	2	\$1,104,165	\$18,763	N/A	Possible NOx source
Afterburner	96	59	2	\$888,681	\$15,101	N/A	Possible NOx source
Absorption	93	57	4	\$2,735,847	\$47,990	\$96,618	Requires disposal/reuse of captured VOCs
Inertial Separation	70	43	18	\$1,373,627	\$32,012	\$32,012	Requires disposal/reuse of captured VOCs
Baseline (No Control)	0	-	61.3	-	-	-	

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S019 - AOD

CONTROL OPTION - THERMAL OXIDATION - REGENERATIVE

CAPITAL COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Thermal Oxidizer	EC	\$6,348,151
Auxiliary Equipment	-	-
Instrumentation	0.1 EC	\$634,815
Sales Taxes	0.07 EC	\$444,371
Freight	0.05 EC	\$317,408
Total Purchased Equip. Cost (PEC)		\$7,744,744
Installation:		
Foundation and Supports	0.12 PEC	\$929,369
Handling and Erection	0.4 PEC	\$3,097,898
Electrical	0.01 PEC	\$77,447
Piping	0.02 PEC	\$154,895
Insulation for Ductwork	0.01 PEC	\$77,447
Painting	0.01 PEC	\$77,447
Total Installation Cost		\$4,414,504
Total Direct Costs (DC) =		\$12,159,249
INDIRECT COSTS:		
Engineering	0.1 PEC	\$774,474
Construction and Field Expenses	0.1 PEC	\$774,474
Contractor Fees	0.1 PEC	\$774,474
Start-up	0.01 PEC	\$77,447
Performance Test	0.01 PEC	\$77,447
Contingencies	0.03 PEC	\$232,342
Total Indirect Cost (IC)		\$2,710,661
TOTAL CAPITAL COST (TCC) =		\$14,869,909

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf at 1704 scfm	\$3,716,833
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$3,785,818
INDIRECT OPERATING COSTS:		
Overhead	80% of DOC	\$3,028,654
Property Tax	1% of TCC	\$148,699
Insurance	1% of TCC	\$148,699
Administration	2 % of TCC	\$297,398
Capital Recovery	0.16275	\$2,420,078
TOTAL ANNUALIZED COST =		\$9,629,346

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, January 2002

EQUIPMENT COST ESTIMATION
THERMAL OXIDATION - REGENERATIVE

Source ID No.	Source	Qe (scfm)	Te (F)	O2 (% v/v)	VOC (ppmv)	he (Btu/scf)	he (Btu/lb)	The (F)	Qf (scfm)	Qd (scfm)	Qtot (scfm)	EC (4/88 \$)	EC (1/96 \$)	EC (3/13 \$)
S019	AOD	335200	142	20	2	0.005	0.06	1527.1	1704.28	0	336904	4118383	4753867	6348151

Reference: USEPA, Handbook - Control Technologies for Hazardous Air Pollutants, EPA 625/6-91-014, June 1991

Qe = emission stream flow rate (scfm)

Te = emission stream temperature (F)

O2 = oxygen content of emission stream (% v/v)

VOC = VOC concentration of emission stream (ppmv)

he = heat content of emission steam = $0.01 \cdot y_i \cdot H_i$

where y_i = percent composition of VOC in emission stream

where H_i = heat content of VOC (as propane in Btu/scf) =

2274

Qf = supplementary fuel (methane) flow rate (scfm) = $D_e \cdot Q_e \cdot [C_{p-air} \cdot (1.1T_c - T_{he} - 0.1T_r) - h_e] / D_f \cdot [h_f - 1.1C_{p-air} \cdot (T_c - T_r)]$

where D_e = density of emission stream (lb/scf) =

0.0739

where C_{p-air} = heat capacity of air (Btu/lb-F) =

0.264

where D_f = density of fuel (lb/scf as methane) =

0.0408

where T_c = combustion temperature (F) =

1600

where T_{he} = emission stream temperature after heat recovery (F) = $(HR/100) \cdot T_c + [1 - (HR/100)] \cdot T_e$

where HR = heat recovery (%) =

95

where T_r = reference temperature (F) =

77

where h_f = LHV of supplementary fuel (methane) (Btu/lb) =

21600

Qd = dilution air flow rate (scfm) = $[(h_e/h_d) - 1] \cdot Q_e$

where h_d = desired heat content of emission stream (Btu/scf) =

13

Note: If emission stream heat content is less than or equal to 13 Btu/scf,
no dilution air is required.

Qtot = total exhaust gas flow rate (scfm) = $Q_e + Q_f + Q_d$

EC = thermal incinerator equipment cost (\$)

Note: EC based on OAQPS Cost Control Manual (USEPA, EPA 450/3-90/006, March 1990) as follows:

$$EC (4/88 \$) = 2.204E+05 + 11.57 \cdot Q_{tot}$$

Note: EC (4/88 \$) is escalated to 1/96 \$ using Chemical Engineering Equipment Indices.

Note: EC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Apr-88 369.4

Jan-96 426.4

Mar-13 569.4

EC Escalation Factor =

1.15

EC Escalation Factor '96-'13=

1.34

* = Estimate assumed that EC formula is still valid and applicable for flows outside of the 10,000 to 100,000 SCFM range.

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S019 - AOD

CONTROL OPTION - THERMAL OXIDATION - RECUPERATIVE

CAPITAL COST ESTIMATE			ANNUALIZED COST ESTIMATE		
Cost Item	Cost Factor	\$	Cost Item	Cost Factor	\$
DIRECT COSTS:			DIRECT OPERATING COSTS:		
Purchase Equipment Costs:			Operating Labor	0.5 hr/turn	\$21,900
Thermal Oxidizer	EC	\$794,179	Supervision	15% of labor	\$3,285
Auxiliary Equipment	-	-	Operating Materials	-	\$0
Instrumentation	0.1 EC	\$79,418	Maintenance Labor	0.5 hr/turn	\$21,900
Sales Taxes	0.07 EC	\$55,593	Materials	100% of labor	\$21,900
Freight	0.05 EC	\$39,709	Utilities - Natural Gas	\$4.15/mcf at 4465 scfm	\$9,739,237
Total Purchased Equip. Cost (PEC)		\$968,899	Waste Disposal	-	\$0
Installation:			Wastewater Treatment	-	\$0
Foundation and Supports	0.12 PEC	\$116,268	Total Direct Operating Costs (DOC) =		\$9,808,222
Handling and Erection	0.4 PEC	\$387,560	INDIRECT OPERATING COSTS:		
Electrical	0.01 PEC	\$9,689	Overhead	80% of DOC	\$7,846,577
Piping	0.02 PEC	\$19,378	Property Tax	1% of TCC	\$18,603
Insulation for Ductwork	0.01 PEC	\$9,689	Insurance	1% of TCC	\$18,603
Painting	0.01 PEC	\$9,689	Administration	2 % of TCC	\$37,206
Total Installation Cost		\$552,272	Capital Recovery	0.16275	\$302,761
Total Direct Costs (DC) =		\$1,521,171	TOTAL ANNUALIZED COST =		
INDIRECT COSTS:			\$18,031,972		
Engineering	0.1 PEC	\$96,890	Notes:		
Construction and Field Expenses	0.1 PEC	\$96,890	Maximum no. of turns/yr =	1095	
Contractor Fees	0.1 PEC	\$96,890	Operating labor cost (\$/hr) =	40	
Start-up	0.01 PEC	\$9,689	Maintenance labor cost (\$/hr) =	40	
Performance Test	0.01 PEC	\$9,689	Capital recovery assumes 10 year life (term) at 10% interest rate.		
Contingencies	0.03 PEC	\$29,067			
Total Indirect Cost (IC)		\$339,115			
TOTAL CAPITAL COST (TCC) =		\$1,860,286			

Reference: EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, January 2002

EQUIPMENT COST ESTIMATION
THERMAL OXIDATION - RECUPERATIVE

Source ID No.	Source	Qe (scfm)	Te (F)	O2 (% v/v)	VOC (ppmv)	he (Btu/scf)	he (Btu/lb)	The (F)	Qf (scfm)	Qd (scfm)	Qtot (scfm)	EC (4/88 \$)	EC (1/96 \$)	EC (3/13 \$)
S019	AOD	335200	142	20	2	0.005	0.06	1162.6	4465.63	0	339666	515226	594728	794179

Reference: USEPA, Handbook - Control Technologies for Hazardous Air Pollutants, EPA 625/6-91-014, June 1991

Qe = emission stream flow rate (scfm)

Te = emission stream temperature (F)

O2 = oxygen content of emission stream (% v/v)

VOC = VOC concentration of emission stream (ppmv)

he = heat content of emission stream = $0.01 \cdot y_i \cdot H_i$

where y_i = percent composition of VOC in emission stream

where H_i = heat content of VOC (as propane in Btu/scf) =

2274

Qf = supplementary fuel (methane) flow rate (scfm) = $De \cdot Qe \cdot [Cp\text{-air} \cdot (1.1T_c - The - 0.1Tr) - he] / Df \cdot [hf - 1.1Cp\text{-air} \cdot (T_c - Tr)]$

where De = density of emission stream (lb/scf) =

0.0739

where $Cp\text{-air}$ = heat capacity of air (Btu/lb-F) =

0.264

where Df = density of fuel (lb/scf as methane) =

0.0408

where T_c = combustion temperature (F) =

1600

where The = emission stream temperature after heat recovery (F) = $(HR/100) \cdot T_c + [1 - (HR/100)] \cdot Te$

where HR = heat recovery (%) =

70

where Tr = reference temperature (F) =

77

where hf = LHV of supplementary fuel (methane) (Btu/lb) =

21600

Qd = dilution air flow rate (scfm) = $[(he/hd) - 1] \cdot Qe$

where hd = desired heat content of emission stream (Btu/scf) =

13

Note: If emission stream heat content is less than or equal to 13 Btu/scf, no dilution air is required.

Qtot = total exhaust gas flow rate (scfm) = $Qe + Qf + Qd$

EC = thermal incinerator equipment cost (\$)

Note: EC based on OAQPS Cost Control Manual (USEPA, EPA 450/3-90/006, March 1990) as follows:

$$EC (4/88 \$) = 21342 \cdot Qtot^{0.2500}$$

Note: EC (4/88 \$) is escalated to 1/96 \$ using Chemical Engineering Equipment Indices.

Note: EC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Apr-88 369.4

Jan-96 426.4

Mar-13 569.4

EC Escalation Factor = 1.15

EC Escalation Factor '96-'13= 1.34

* = Estimate assumed that EC formula is still valid and applicable for flows outside of the 500 to 50,000 SCFM range.

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S019 - AOD

CONTROL OPTION - AFTERBURNER

CAPITAL COST ESTIMATE		
Cost Item	Cost Factor	\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Thermal Oxidizer	EC	\$320,162
Auxiliary Equipment	-	-
Instrumentation	0.1 EC	\$32,016
Sales Taxes	0.07 EC	\$22,411
Freight	0.05 EC	\$16,008
Total Purchased Equip. Cost (PEC)		\$390,597
Installation:		
Foundation and Supports	0.12 PEC	\$46,872
Handling and Erection	0.4 PEC	\$156,239
Electrical	0.01 PE	\$3,906
Piping	0.02 PEC	\$7,812
Insulation for Ductwork	0.01 PEC	\$3,906
Painting	0.01 PEC	\$3,906
Total Installation Cost		\$222,640
Total Direct Costs (DC) =		\$613,238
INDIRECT COSTS:		
Engineering	0.1 PEC	\$39,060
Construction and Field Expenses	0.1 PEC	\$39,060
Contractor Fees	0.1 PEC	\$39,060
Start-up	0.01 PEC	\$3,906
Performance Test	0.01 PEC	\$3,906
Contingencies	0.03 PEC	\$11,718
Total Indirect Cost (IC)		\$136,709
TOTAL CAPITAL COST (TCC) =		\$749,947

ANNUALIZED COST ESTIMATE		
Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf at 12197 scfm	\$26,604,584
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$26,673,569
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$16,004,142
Property Tax	1% of TCC	\$7,499
Insurance	1% of TCC	\$7,499
Administration	2 % of TCC	\$14,999
Capital Recovery	0.16275	\$122,054
TOTAL ANNUALIZED COST =		\$42,829,763
Notes:		
Maximum no. of turns/yr =	1095	
Operating labor cost (\$/hr) =	40	
Maintenance labor cost (\$/hr) =	40	
Capital recovery assumes 10 year life (term) at 10% interest rate.		

Reference: EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, January 2002

EQUIPMENT COST ESTIMATION
THERMAL OXIDATION - AFTERBURNER (NO HEAT RECOVERY)

Source ID No.	Source	Qe (scfm)	Te (F)	O2 (% v/v)	VOC (ppmv)	he (Btu/scf)	he (Btu/lb)	The (F)	Qf (scfm)	Qd (scfm)	Qtot (scfm)	EC (4/88 \$)	EC (1/96 \$)	EC (3/13 \$)
S019	AOD	335200	142	20	2	0.005	0.06	142	12197.40	0	347397	207706	239756	320162

Reference: USEPA, Handbook - Control Technologies for Hazardous Air Pollutants, EPA 625/6-91-014, June 1991

Qe = emission stream flow rate (scfm)

Te = emission stream temperature (F)

O2 = oxygen content of emission stream (% v/v)

VOC = VOC concentration of emission stream (ppmv)

he = heat content of emission stream = $0.01 \cdot y_i \cdot H_i$

where y_i = percent composition of VOC in emission stream

where H_i = heat content of VOC (as propane in Btu/scf) = 2274

Qf = supplementary fuel (methane) flow rate (scfm) = $De \cdot Qe \cdot [Cp\text{-air} \cdot (1.1T_c - The - 0.1Tr) - he] / Df \cdot [hf - 1.1Cp\text{-air} \cdot (T_c - Tr)]$

where De = density of emission stream (lb/scf) = 0.0739

where Cp-air = heat capacity of air (Btu/lb-F) = 0.264

where Df = density of fuel (lb/scf as methane) = 0.0408

where Tc = combustion temperature (F) = 1600

where The = emission stream temperature after heat recovery (F) = $(HR/100) \cdot T_c + [1 - (HR/100)] \cdot Te$

where HR = heat recovery (%) = 0

where Tr = reference temperature (F) = 77

where hf = LHV of supplementary fuel (methane) (Btu/lb) = 21600

Qd = dilution air flow rate (scfm) = $[(he/hd) - 1] \cdot Qe$

where hd = desired heat content of emission stream (Btu/scf) = 13

Note: If emission stream heat content is less than or equal to 13 Btu/scf, no dilution air is required.

Qtot = total exhaust gas flow rate (scfm) = Qe + Qf + Qd

EC = thermal incinerator equipment cost (\$)

Note: EC based on OAQPS Cost Control Manual (USEPA, EPA 450/3-90/006, March 1990) as follows:

$$EC (4/88 \$) = 10294 \cdot Qtot^{0.2355}$$

Note: EC (4/88 \$) is escalated to 1/96 \$ using Chemical Engineering Equipment Indices.

Note: EC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Apr-88 369.4

Jan-96 426.4

Mar-13 569.4

EC Escalation Factor = 1.15

EC Escalation Factor '96-'13= 1.34

* = Estimate assumed that EC formula is still valid and applicable for flows outside of the 500 to 50,000 SCFM range.

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S019 - AOD

CONTROL OPTION - ABSORPTION

CAPITAL COST ESTIMATE		
Cost Item	Cost Factor	\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Absorption	EC	\$634,639
Auxiliary Equipment	-	-
Instrumentation	0.1 EC	\$63,464
Sales Taxes	0.07 EC	\$44,425
Freight	0.05 EC	\$31,732
Total Purchased Equip. Cost (PEC)		\$774,259
Installation:		
Foundation and Supports	0.08 PEC	\$61,941
Handling and Erection	0.14 PEC	\$108,396
Electrical	0.04 PEC	\$30,970
Piping	0.02 PEC	\$15,485
Insulation for Ductwork	0.01 PEC	\$7,743
Painting	0.01 PEC	\$7,743
Total Installation Cost		\$232,278
Total Direct Costs (DC) =		\$1,006,537
INDIRECT COSTS:		
Engineering	0.1 PEC	\$77,426
Construction and Field Expenses	0.05 PEC	\$38,713
Contractor Fees	0.1 PEC	\$77,426
Start-up	0.02 PEC	\$15,485
Performance Test	0.01 PEC	\$7,743
Contingencies	0.03 PEC	\$23,228
Total Indirect Cost (IC)		\$240,020
TOTAL CAPITAL COST (TCC) =		\$1,246,558
Note - does not account for site preparation or buildings		

Reference: EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, January 2002

ANNUALIZED COST ESTIMATE		
Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Water	-	\$0
Waste Disposal	-	\$0
Wastewater Treatment	\$0.37/1000gal	\$16,539,000
Total Direct Operating Costs (DOC) =		\$16,607,985
INDIRECT OPERATING COSTS:		
Overhead	80% of DOC	\$13,286,388
Property Tax	1% of TCC	\$12,466
Insurance	1% of TCC	\$12,466
Administration	2 % of TCC	\$24,931
Capital Recovery	0.16275	\$202,877
TOTAL ANNUALIZED COST =		\$30,147,113
Notes:		
Maximum no. of turns/yr =	1095	
Operating labor cost (\$/hr) =	40	
Maintenance labor cost (\$/hr) =	40	
Capital recovery assumes 10 year life (term) at 10% interest rate.		

EQUIPMENT COST ESTIMATION
ABSORPTION

Source ID No.	Source	Qe (scfm)	Te (F)	VOC (ppmv)	Gmol (mol/hr)	Lmol (mol/hr)	Lgal (gal/min)	G (lb/hr)	L (lb/hr)	ABS	ORD	Garea ^f (lb/sec-ft ²)	Garea (lb/sec-ft ²)	Area (ft ²)	Dcol (in)	TC (\$/88 \$)	VOC-out (ppmv)	VOC-in (ppmv)	Nog	Hg (ft)	H' (ft)	Hog (ft)	Hpack (ft)	Ht (ft)	Vpack (ft ³)	PC (\$/88 \$)	EC (\$/88 \$)	EC (1/96 \$)	EC (3/13 \$)
S019	AOD	335200	142	2	51956	2360881	84992	1486333	3777409	0.09	0.11	0.49	0.36	1141	38	228998	0.14	14.29	5	1.84	1.45	2.54	12.70	24.24	14524	185178	414176	475255	634639

Reference: USEPA, Handbook - Control Technologies for Hazardous Air Pollutants, EPA 625/6-91-014, June 1991

Qe = emission stream flow rate (scfm)
Te = emission stream temperature (F)
O2 = oxygen content of emission stream (F₂ v/v)
VOC = VOC concentration of emission stream - uncontrolled (ppmv)
Lmol = solvent (water) flow rate (mol/hr) = AF * m * Gmol
where AF = absorption factor = 1.6
where m = slope of vapor-liquid equilibrium curve = 28.4 (Based on methane at 20 C and 1 atm)
where Gmol = emission stream flow rate (mol/hr) = 0.155 Qe
Lgal = solvent (water) flow rate (gal/hr) = 0.036 Lmol
ABS = abscissa of flooding curve (see Reference, Section 4.7, Figure 4.7-2) = (L/G) * (Dg/Dl)^{0.5}
where L = solvent (water) flow rate (lb/hr) = MW * Lmol where MW (lb/mol) = 18
where G = emission stream flow rate (lb/hr) = MW * Gmol where MW (lb/mol) = 28.6
where Dl = density of solvent (water) (lb/ft³) = 62.3
where Dg = density of emission stream (lb/ft³) = 0.0739
ORD = ordinate of flooding curve (see Reference, Section 4.7, Figure 4.7-2) = [Garea^f*2 * (a/e**3) * (u^f**0.2)/Dg * Dl * qc
where Garea^f = emission stream flow rate at flooding conditions (lb/ft² * sec)
where a = packing factor = 28 (Based on 2" ceramic Raschig rings)
where e = packing factor = 0.74 (Based on 2" ceramic Raschig rings)
where u^f = viscosity of solvent (water) (centipoises) = 1
where qc = gravitational constant (ft/sec²) = 32.2
Garea = emission stream flow rate (lb/ft² * sec) = Garea^f * f
where f = fraction of flooding = 0.75
Area = cross-section area of column (ft²) = G/(3600*Garea)
Dcolumn = column diameter (ft) = 1.13 * (Area)^{0.5}
Hpack = packing height (ft) = Nog * Hog
where Nog = no. of gas transfer units determined from Reference Section 4.7, Figure 4.7-3
where Hog = height of overall transfer unit (ft) = Hg + (1/AF)*Hl
Hl = height of liquid transfer unit (ft) = [b*(3600*Garea)^{0.5}]/(L**0.5)
where b = 3.82 (Based on 2" ceramic Raschig rings)
where c = 0.41 (Based on 2" ceramic Raschig rings)
where d = 0.45 (Based on 2" ceramic Raschig rings)
where Scq = Schmidt number for emission stream = 0.75
where L' = L/Area
Hl = height of liquid transfer unit (ft) = Y*(L'/u^f)**0.5
where Y = 0.0125 (Based on 2" ceramic Raschig rings)
where u^f = u^f*2.42
where Scd = Schmidt number for liquid stream = 2.42
where s = 558 (Based on 2" ceramic Raschig rings)
Ht = column height = Hpack + 2 * 0.25Dcolumn
Vpack = volume of packing = 0.785(Dcolumn)² * Ht
Packing Cost (PC) (\$/ft³) = 12.75
Plot = pressure drop = Pa * Ht
where Pa = (a * 1E-08)*(L'/Dl)*(3600 Garea)^{0.5}/Dg
where r = 0.00295 (Based on 2" ceramic Raschig rings)
where q = 11.13 (Based on 2" ceramic Raschig rings)
VOC-out = VOC concentration of emission stream - controlled (ppmv)
Assume removal efficiency = 93
Note: Tower Cost based on Reference, Section 4.7, Figure 4.7-4:
Assume Tower Cost (\$/inch-Dcolumn) = 500
EC (\$/88 \$) = Tower Cost * Packing Cost
Note: EC (\$/88 \$) is escalated to 1/96 \$ using Chemical Engineering Equipment Indices.
Note: EC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.
Jun-88 371.6
Jan-96 426.4
Mar-13 569.4
EC Escalation Factor = 1.15
EC Escalation Factor '96-'13= 1.34
Pd = fan power (kW/whr) = 1.81E-04 * Qe-scfm * Plot *8780
ASR = annual solvent (water) usage = 60 * Lgal *8780

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S088 - Hot Band Normalizer

CONTROL OPTION - Selective Catalytic Reduction + Low NOx Burners

CAPITAL COST ESTIMATE

Cost Item		\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Control Equipment	EC	\$732,600
Hoods & Ductwork		\$86,400
Piping		\$51,600
Electrical		\$22,900
Instrumentation & Controls		\$37,700
Foundations		\$3,600
Steelwork		\$13,000
Site Preparation		\$2,500
Buildings		\$0
Material Markup (10%)		\$9,729
Labor Markup (20%)		\$42,162
Equipment Markup (5%)		\$32,110
Sales Tax (7%)		\$51,764
Freight (FOB Jobsite)		\$29,580
Total Purchased Equip. Cost (PEC)		\$1,115,645
Installation:		
Engr & Const. Management		\$133,877
Const. Mobilization		\$39,048
Contractor Fees		\$89,252
Startup Testing		\$11,156
Performance Testing		\$30,000
Contingencies		\$111,564
Total Installation Cost		\$414,897
Total Direct Costs (DC) =		\$1,530,542

DC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4

EC Escalation Factor = 1.34

TOTAL CAPITAL COST (TCC) = \$2,043,834

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf at	\$0
*excludes cost of natural gas for worst case cost effectiveness (\$/ton)		
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$20,438
Insurance	1% of TCC	\$20,438
Administration	2 % of TCC	\$40,877
Capital Recovery	0.16275	\$332,634
TOTAL ANNUALIZED COST =		\$524,763

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: Construction Cost Estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S088 - Hot Band Normalizer

CONTROL OPTION - Selective Catalytic Reduction (SCR)

CAPITAL COST ESTIMATE

Cost Item		\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Control Equipment	EC	\$607,000
Hoods & Ductwork		\$86,400
Piping		\$44,500
Electrical		\$20,300
Instrumentation & Controls		\$26,500
Foundations		\$3,600
Steelwork		\$10,500
Site Preparation		\$2,500
Buildings		\$0
Material Markup (10%)		\$8,032
Labor Markup (20%)		\$36,197
Equipment Markup (5%)		\$27,000
Sales Tax (7%)		\$43,422
Freight (FOB Jobsite)		\$24,813
Total Purchased Equip. Cost (PEC)		\$940,764
Installation:		
Engr & Const. Management		\$112,892
Const. Mobilization		\$32,927
Contractor Fees		\$75,261
Startup Testing		\$9,408
Performance Testing		\$15,000
Contingencies		\$94,076
Total Installation Cost		\$339,564
Total Direct Costs (DC) =		\$1,280,328

DC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4
EC Escalation Factor =	1.34

TOTAL CAPITAL COST (TCC) = \$1,709,706

Reference: Construction Cost Estimate from SE Technologies, RACT Proposal, rev. 1996

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf at	\$0
*excludes cost of natural gas for worst case cost effectiveness (\$/ton)		
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$17,097
Insurance	1% of TCC	\$17,097
Administration	2 % of TCC	\$34,194
Capital Recovery	0.16275	\$278,255
TOTAL ANNUALIZED COST =		\$457,019

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S088 - Hot Band Normalizer

CONTROL OPTION - Low NOx Burners + Flue Gas Recirculation

CAPITAL COST ESTIMATE

Cost Item		\$
DIRECT COSTS:		
Purchase Equipment Costs:		
Control Equipment	EC	\$148,500
Hoods & Ductwork		\$252,600
Piping		\$81,300
Electrical		\$26,900
Instrumentation & Controls		\$24,800
Foundations		\$4,400
Steelwork		\$10,200
Site Preparation		\$2,400
Buildings		\$0
Material Markup (10%)		\$12,726
Labor Markup (20%)		\$62,568
Equipment Markup (5%)		\$5,550
Sales Tax (7%)		\$16,678
Freight (FOB Jobsite)		\$9,530
Total Purchased Equip. Cost (PEC)		\$658,152
Installation:		
Engr & Const. Management		\$78,978
Const. Mobilization		\$23,035
Contractor Fees		\$52,652
Startup Testing		\$6,582
Performance Testing		\$15,000
Contingencies		\$65,815
Total Installation Cost		\$242,062
Total Direct Costs (DC) =		\$900,214

DC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4

EC Escalation Factor = 1.34

TOTAL CAPITAL COST (TCC) = \$1,202,115

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf	\$0
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$12,021
Insurance	1% of TCC	\$12,021
Administration	2 % of TCC	\$24,042
Capital Recovery	0.16275	\$195,644
TOTAL ANNUALIZED COST =		\$354,105

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: Construction Cost Estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATE

SOURCE NO. S088 - Hot Band Normalizer

CONTROL OPTION - Low NOx Burners

CAPITAL COST ESTIMATE			ANNUALIZED COST ESTIMATE		
Cost Item		\$	Cost Item	Cost Factor	\$
DIRECT COSTS:			DIRECT OPERATING COSTS:		
Purchase Equipment Costs:			Operating Labor	0 hr/turn	\$0
Control Equipment	EC	\$125,600	Supervision	15% of labor	\$0
Hoods & Ductwork		\$0	Operating Materials	-	\$0
Piping		\$7,100	Maintenance Labor	0.5 hr/turn	\$21,900
Electrical		\$2,600	Materials	100% of labor	\$21,900
Instrumentation & Controls		\$11,200	Utilities - Natural Gas	\$4.15/mcf	\$0
Foundations		\$0	Waste Disposal	-	\$0
Steelwork		\$2,500	Wastewater Treatment	-	\$0
Site Preparation		\$0	Total Direct Operating Costs (DOC) =		\$43,800
Buildings		\$0	INDIRECT OPERATING COSTS:		
Material Markup (10%)		\$1,698	Overhead	60% of DOC	\$26,280
Labor Markup (20%)		\$5,965	Property Tax	1% of TCC	\$3,341
Equipment Markup (5%)		\$5,110	Insurance	1% of TCC	\$3,341
Sales Tax (7%)		\$8,342	Administration	2 % of TCC	\$6,683
Freight (FOB Jobsite)		\$4,767	Capital Recovery	0.16275	\$54,380
Total Purchased Equip. Cost (PEC)		\$174,882	TOTAL ANNUALIZED COST =		
Installation:			\$137,825		
Engr & Const. Management		\$20,986	Notes:		
Const. Mobilization		\$6,121	Maximum no. of turns/yr =	1095	
Contractor Fees		\$13,991	Operating labor cost (\$/hr) =	40	
Startup Testing		\$1,749	Maintenance labor cost (\$/hr) =	40	
Performance Testing		\$15,000	Capital recovery assumes 10 year life (term) at 10% interest rate.		
Contingencies		\$17,488			
Total Installation Cost		\$75,335			
Total Direct Costs (DC) =		\$250,217			
DC (1/96 \$) is escalated to 3/13 \$ using Chemical Engineering Equipment Indices.					
	Jan-96	426.4			
	Mar-13	569.4			
EC Escalation Factor =		1.34			
TOTAL CAPITAL COST (TCC) =					
\$334,131					

Reference: Construction Cost Estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATION

SOURCE NO. S096 - Temper Mill

CONTROL OPTION - Thermal Oxidation - Regenerative

CAPITAL COST ESTIMATE		ANNUALIZED COST ESTIMATE		
Cost Item	\$	Cost Item	Cost Factor	\$
DIRECT COSTS:		DIRECT OPERATING COSTS:		
Purchase Equipment Costs:		Operating Labor	0.5 hr/turn	\$21,900
Control Equipment (EC)	\$1,985,000	Supervision	15% of labor	\$3,285
Hoods & Ductwork	\$277,900	Operating Materials	-	\$0
Piping	\$40,311	Maintenance Labor	0.5 hr/turn	\$21,900
Electrical	\$116,046	Materials	100% of labor	\$21,900
Instrumentation & Controls	\$18,323	Utilities - Natural Gas	\$4.15/mcf	\$0
Foundations	\$119,100	*excludes cost of NG for best-case \$/ton cost effectiveness		
Steelwork	\$238,200	Waste Disposal	-	\$0
Site Preparation	\$101,388	Wastewater Treatment	-	\$0
Buildings	\$17,712	Total Direct Operating Costs (DOC) =		\$68,985
Material Markup (10%)	\$39,137			
Labor Markup (20%)	\$114,521	INDIRECT OPERATING COSTS:		
Equipment Markup (5%)	\$97,500	Overhead	60% of DOC	\$41,391
Sales Tax (7%)	\$163,896	Property Tax	1% of TCC	\$61,674
Freight (FOB Jobsite)	\$93,655	Insurance	1% of TCC	\$61,674
Total Purchased Equip. Cost (PEC)	\$3,422,689	Administration	2 % of TCC	\$123,348
		Capital Recovery	0.16275	\$1,003,746
Installation:		TOTAL ANNUALIZED COST =		
Engr & Const. Management	\$410,723			\$ 1,360,818
Const. Mobilization	\$119,794	Notes:		
Contractor Fees	\$273,815	Maximum no. of turns/yr =	1095	
Startup Testing	\$34,227	Operating labor cost (\$/hr) =	40	
Performance Testing	\$15,000	Maintenance labor cost (\$/hr) =	40	
Contingencies	\$342,269	Capital recovery assumes 10 year life (term) at 10% interest rate.		
Total Installation Cost	\$1,195,828			
Total Direct Costs (DC) =	\$4,618,517			
DC (1/96 \$) escalated to 3/13 \$ using Chemical Engineering Equipment Indices.				
	Jan-96	426.4		
	Mar-13	569.4		
EC Escalation Factor =	1.34			
TOTAL CAPITAL COST (TCC) =				
	\$6,167,410			

Reference: base construction cost estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATION

SOURCE NO. S096 - Temper Mill

CONTROL OPTION - Thermal Oxidation - Recuperative

CAPITAL COST ESTIMATE

Cost Item	\$
DIRECT COSTS:	
Purchase Equipment Costs:	
Control Equipment (EC)	\$1,435,000
Hoods & Ductwork	\$200,900
Piping	\$29,142
Electrical	\$83,892
Instrumentation & Controls	\$13,246
Foundations	\$86,100
Steelwork	\$172,200
Site Preparation	\$73,295
Buildings	\$12,805
Material Markup (10%)	\$28,432
Labor Markup (20%)	\$84,453
Equipment Markup (5%)	\$70,000
Sales Tax (7%)	\$117,902
Freight (FOB Jobsite)	\$67,373
Total Purchased Equip. Cost (PEC)	\$2,474,740
Installation:	
Engr & Const. Management	\$410,723
Const. Mobilization	\$119,794
Contractor Fees	\$273,815
Startup Testing	\$34,227
Performance Testing	\$15,000
Contingencies	\$342,269
Total Installation Cost	\$1,195,828
Total Direct Costs (DC) =	\$3,670,568

DC (1/96 \$) escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4
EC Escalation Factor =	1.34

TOTAL CAPITAL COST (TCC) = \$4,901,551

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf	\$0
*excludes cost of NG for best-case \$/ton cost effectiveness		
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$49,016
Insurance	1% of TCC	\$49,016
Administration	2 % of TCC	\$98,031
Capital Recovery	0.16275	\$797,727
TOTAL ANNUALIZED COST =		\$ 1,104,165

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: base construction cost estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATION

SOURCE NO. S096 - Temper Mill

CONTROL OPTION - Thermal Oxidation - Afterburner

CAPITAL COST ESTIMATE

Cost Item	\$
DIRECT COSTS:	
Purchase Equipment Costs:	
Control Equipment (EC)	\$973,500
Hoods & Ductwork	\$136,290
Piping	\$19,770
Electrical	\$56,912
Instrumentation & Controls	\$8,986
Foundations	\$58,410
Steelwork	\$116,820
Site Preparation	\$49,723
Buildings	\$8,687
Material Markup (10%)	\$19,299
Labor Markup (20%)	\$57,222
Equipment Markup (5%)	\$47,500
Sales Tax (7%)	\$80,009
Freight (FOB Jobsite)	\$45,720
Total Purchased Equip. Cost (PEC)	\$1,678,848
Installation:	
Engr & Const. Management	\$410,723
Const. Mobilization	\$119,794
Contractor Fees	\$273,815
Startup Testing	\$34,227
Performance Testing	\$15,000
Contingencies	\$342,269
Total Installation Cost	\$1,195,828
Total Direct Costs (DC) =	\$2,874,676

DC (1/96 \$) escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4
EC Escalation Factor =	1.34

TOTAL CAPITAL COST (TCC) = \$3,838,744

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Natural Gas	\$4.15/mcf	\$0
*excludes cost of NG for best-case \$/ton cost effectiveness		
Waste Disposal	-	\$0
Wastewater Treatment	-	\$0
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$38,387
Insurance	1% of TCC	\$38,387
Administration	2 % of TCC	\$76,775
Capital Recovery	0.16275	\$624,756
TOTAL ANNUALIZED COST =		\$ 888,681

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: base construction cost estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATION

SOURCE NO. S096 - Temper Mill

CONTROL OPTION - Absorption

CAPITAL COST ESTIMATE

Cost Item	\$
DIRECT COSTS:	
Purchase Equipment Costs:	
Control Equipment (EC)	\$4,240,000
Hoods & Ductwork	\$593,600
Piping	\$240,478
Electrical	\$363,429
Instrumentation & Controls	\$72,324
Foundations	\$504,461
Steelwork	\$537,006
Site Preparation	\$300,145
Buildings	\$361,620
Material Markup (10%)	\$130,887
Labor Markup (20%)	\$343,839
Equipment Markup (5%)	\$209,250
Sales Tax (7%)	\$384,571
Freight (FOB Jobsite)	\$219,755
Total Purchased Equip. Cost (PEC)	\$8,501,365
Installation:	
Engr & Const. Management	\$410,723
Const. Mobilization	\$119,794
Contractor Fees	\$273,815
Startup Testing	\$34,227
Performance Testing	\$15,000
Contingencies	\$342,269
Total Installation Cost	\$1,195,828
Total Direct Costs (DC) =	\$9,697,193

DC (1/96 \$) escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4

EC Escalation Factor = 1.34

TOTAL CAPITAL COST (TCC) = \$12,949,300

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Water	-	\$0
*excludes cost of water for best-case \$/ton cost effectiveness		
Waste Disposal	-	\$0
Wastewater Treatment	\$0.37/1000gal	\$0
*excludes cost of treatment for best-case \$/ton cost effectiveness		
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$129,493
Insurance	1% of TCC	\$129,493
Administration	2 % of TCC	\$258,986
Capital Recovery	0.16275	\$2,107,499
TOTAL ANNUALIZED COST =		\$ 2,735,847

Notes:

Maximum no. of turns/yr = 1095
Operating labor cost (\$/hr) = 40
Maintenance labor cost (\$/hr) = 40
Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: base construction cost estimate from SE Technologies, RACT Proposal, rev. 1996

CAPITAL AND ANNUALIZED COST ESTIMATION

SOURCE NO. S096 - Temper Mill

CONTROL OPTION - Inertial Separation

CAPITAL COST ESTIMATE

Cost Item	\$
DIRECT COSTS:	
Purchase Equipment Costs:	
Control Equipment (EC)	\$1,925,000
Hoods & Ductwork	\$269,500
Piping	\$67,941
Electrical	\$102,941
Instrumentation & Controls	\$36,029
Foundations	\$236,765
Steelwork	\$257,353
Site Preparation	\$24,706
Buildings	\$29,853
Material Markup (10%)	\$46,913
Labor Markup (20%)	\$122,192
Equipment Markup (5%)	\$93,500
Sales Tax (7%)	\$163,739
Freight (FOB Jobsite)	\$93,565
Total Purchased Equip. Cost (PEC)	\$3,469,997
Installation:	
Engr & Const. Management	\$410,723
Const. Mobilization	\$119,794
Contractor Fees	\$273,815
Startup Testing	\$34,227
Performance Testing	\$15,000
Contingencies	\$342,269
Total Installation Cost	\$1,195,828
Total Direct Costs (DC) =	\$4,665,825

DC (1/96 \$) escalated to 3/13 \$ using Chemical Engineering Equipment Indices.

Jan-96	426.4
Mar-13	569.4
EC Escalation Factor =	1.34

TOTAL CAPITAL COST (TCC) = \$6,230,583

ANNUALIZED COST ESTIMATE

Cost Item	Cost Factor	\$
DIRECT OPERATING COSTS:		
Operating Labor	0.5 hr/turn	\$21,900
Supervision	15% of labor	\$3,285
Operating Materials	-	\$0
Maintenance Labor	0.5 hr/turn	\$21,900
Materials	100% of labor	\$21,900
Utilities - Water	-	\$0
Waste Disposal	-	\$0
Wastewater Treatment	\$0.37/1000gal	\$0
*excludes cost of treatment for best-case \$/ton cost effectiveness		
Total Direct Operating Costs (DOC) =		\$68,985
INDIRECT OPERATING COSTS:		
Overhead	60% of DOC	\$41,391
Property Tax	1% of TCC	\$62,306
Insurance	1% of TCC	\$62,306
Administration	2 % of TCC	\$124,612
Capital Recovery	0.16275	\$1,014,027
TOTAL ANNUALIZED COST =		\$ 1,373,627

Notes:

Maximum no. of turns/yr = 1095
 Operating labor cost (\$/hr) = 40
 Maintenance labor cost (\$/hr) = 40
 Capital recovery assumes 10 year life (term) at 10% interest rate.

Reference: base construction cost estimate from SE Technologies, RACT Proposal, rev. 1996

From: [Sedlak, Mark](#)
To: [Dorman, Michael](#)
Cc: [Calderazzo, Deborah](#)
Subject: ATI Brack paint usage VOC estimated PTE
Date: Monday, December 16, 2019 1:54:47 PM

Warning! This email was sent from an external source. Please be sure you recognize the sender and use caution when clicking on links and/or opening attachments.

Mike, see below for VOC PTE estimate from paint usage. Does this work for you?

Misc. Paint Usage - Max. Usage and VOC PTE Estimation Approach
December
2019

MISCELLANEOUS PAINTS USAGE			
year	gallons purchased per year	VOC TPY	annual average - lb VOC per gal purchased
2018	666	0.5	1.6
2017	783	0.9	2.2
2016	1283	0.4	0.6
2015	861	0.6	1.4
2014	829	2.2	5.2
2013	993	2.1	4.2
2012	818	2.1	5.1
2011	1211	2.6	4.4
2010	3103	1.9	1.2
2009	827	1.3	3.1
2008	1538	1.8	2.4
2007	1819	1.6	1.7

max. actual gal/yr usage:	3,103	
max. actual + 20% safety factor:	3,724	
round up:	4,000	max annual paint usage estimate
max annual avg. VOC content:	5.2	lb/gal
VOC PTE (max. usage x lb/gal)	10.4	TPY

MISC. PAINT USAGE VOC PTE ESTIMATE		
DECEMBER 2019		
max. usage	4,000	gal/yr
VOC PTE	10.4	TPY



Mark D. Sedlak
Environmental Engineer
100 River Road
Brackenridge, PA 15014
P: 724.226.5418
F: 724.226.5292

ALLEGHENY COUNTY HEALTH DEPARTMENT

IN RE:

Allegheny Ludlum Corporation) PLAN APPROVAL ORDER
100 River Road) AND AGREEMENT NO.260
Brackenridge, PA 15014) <u>UPON CONSENT</u>
Allegheny County	

AND NOW, this 19th day of December, 1996,

WHEREAS, the Allegheny County Health Department, (hereafter referred to as "Department"), has determined that Allegheny Ludlum Corporation (hereafter referred to as "ALC"), 100 River Road, Brackenridge, Allegheny County, PA 15014, is the owner and operator of a steel production facility located at 100 River Road, Brackenridge, Allegheny County, PA 15014 (hereafter referred to as "the facility"), is a major stationary source of oxides of nitrogen and volatile organic compounds (hereafter referred to as "NO_x" and "VOCs") emissions as defined in Section 2101.20 of Article XXI, Rules and Regulations of the Allegheny County Health Department, Air Pollution Control (hereafter referred to as "Article XXI"); and

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

WHEREAS, The Department has determined that ALC has been in full compliance at all relevant times with all relevant requirements of Section 2105.06 of Article XXI; and

WHEREAS, ALC timely submitted to the Department all documents information and submittals required by Section 2105.06.b of Article XXI (hereafter referred to as "the proposal"); and

WHEREAS, the Department, after a review of the proposal, has determined it to be complete; and

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

WHEREAS, the Department shall submit the contents of the proposal to the U.S. EPA as a revision to the Commonwealth of Pennsylvania's State Implementation Plan (hereafter referred to as "SIP"); and

WHEREAS, the Department and ALC desire to make enforceable the details of the proposal by entry of a RACT Plan Approval Order and Agreement Upon Consent, (hereafter referred to as "Agreed Order"; and

WHEREAS, the Department has determined that this Agreed Order will aid in the administration of Article XXI, notwithstanding the absence of any violation of any provision of Article XXI.

NOW, THEREFORE, this day first written above, the Department, pursuant to Section 2109.03 of Article XXI, and upon agreement of the parties as hereinafter set forth, hereby enters into and issues this Agreed Order:

I. ORDER

- 1.1. ALC shall perform an annual adjustment or "tuneup" on the combustion process of the following equipment once every twelve (12) months, (hereafter referred to as "annual tune- up").
1. Scrap preheaters No. 1 and No. 2
 2. No. 2 A&P line; preheat furnace
 3. No. 1 A&P line; preheat furnace and annealing furnace
 4. Boilers No. 1 and No. 2
 5. Loftus soaking pits No. 9 through No. 23
 6. Hot-band normalizing furnace

Such annual tune-up shall include:

- a. Inspection, adjustment, cleaning, or necessary replacement of fuel-burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;

- b. Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NO_x , and to the extent practicable minimize emissions of carbon monoxide (hereafter referred as "CO"; and
- c. Inspection of the air-to-fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

1.2. ALC shall maintain the following records of the annual tune-up for the subject equipment:

- a. the date of the annual tune-up;
- b. the name of the service company and/or individuals performing the annual tune-up;
- c. the operating rate or load after the annual tune-up;
- d. the CO and NO_x emission rate after the annual tune-up; and
- e. the excess oxygen rate after the annual tune-up.

1.3. ALC shall maintain and operate the following

equipment in accordance with good engineering and air pollution control practices.

1. Basic oxygen furnace (BOF) No. 71 vessel and No. 72 vessel
2. Electric arc furnaces No. 31 through No. 34
3. Argon Oxygen Decarburization (AOD) vessel
4. Koppers BOF Ladle preheater No. 1
5. BOF vessel preheaters No. 1 and No. 2
6. Cadre BOF ladle preheaters No. 1 through No. 3
7. BOF mold preheaters No. 1 through No. 25
8. Olsen radiant tube annealing furnace No. 1
9. Slab warming furnaces No. 1 and No. 2
10. Bell annealing furnaces No. 1 through No. 5
11. No. 2 A&P line; kolene heater
12. No. 3 B&P line; coil heater
13. Tandem mill radiant preheater
14. Electric arc furnace vertical ladle preheaters No. 1 and No. 2, horizontal ladle preheater and scrap preheaters No. 1 and No. 2
15. Argon-oxygen decarburization mold preheaters 1 through No. 23 and vessel preheater No. 1
16. Tundish preheaters No. 1 and No. 2
17. Bloom horizontal ladle preheaters No. 1 and 2
18. American horizontal ladle preheaters No. 1

through No. 3

- 19. Department No. 2; plate torch cutters No. 1 and 2
- 20. Amsler-Morton soaking pits No. 35 through No. 42
- 21. Loftus soaking pits No. 43 through No. 46
- 22. No. 1 A&P line; HN03/HF tubs No. 1 and No. 2 and H2SO4 tub No. 1
- 23. No. 2 A&P line; HN03/HF tubs No. 1 and No. 2
- 24. No. 3 B&P line; H2SO4 tubs No. 1 and No. 3

1.4. ALC shall maintain records of fuel type and usage for each combustion unit including certifications from fuel suppliers for all types of liquid fuel. For each shipment of distillate oils number 1 or 2, a certification that the fuel complies with ASTM D396-78 "Standard Specifications for Fuel Oils" is required. For residual oils, minimum record keeping includes a certification from the fuel supplier of the nitrogen content of the fuel, and identification of the sampling method and sampling protocol.

1.5. At no time shall ALC allow emissions of NO_x from the Salem Reheat Furnace, and the Rust Reheat

Furnace at this facility to exceed the following
NO_x emission limitations:

NO_x Emissions:

<u>Unit:</u>	<u>Lbs/MMBTU</u>	<u>Tons/Year</u>
Salem Furnace	0.15	175
Rust Furnace	0.15	60

1.6. ALC shall determine compliance of each furnace with the emission limitations referenced in paragraphs 1.5 above by NO_x emissions testing. ALC shall conduct such testing no less than once every five years for the Salem and Rust Reheat Furnaces. The emission testing shall be conducted according to applicable U.S. EPA approved test methods and Section 2108.02 of Article XXI. ALC shall complete initial emission testing of the furnaces by September 30, 1997.

1.7. ALC shall conduct emissions monitoring of NO_x from the Salem and Rust Reheat Furnaces. The emission monitoring shall continuously measure and record fuel flow rate, combustion air flow rate, furnace pressure and furnace temperature.

NO
SIP

1.8. The Department reserves the right to evaluate the NO_x Lbs per MMBTU and Tons per Year emission limitations, for the Salem and Rust Reheat Furnaces, upon analysis of actual stack test data from the subject furnaces, and amend if appropriate. The amended NO_x emission limitations shall be submitted as a source specific revision to the Commonwealth of Pennsylvania State Implementation Plan.

1.9. ALC shall maintain all appropriate records to demonstrate compliance with the requirements of both Section 2105.06 Article XXI and the Agreed Order. Such records shall provide sufficient data to clearly demonstrate that all requirements of both Section 2105.06 of Article XXI and the Agreed Order are being met. Data and information required to determine compliance shall be recorded and maintained by ALC and shall include the following:

A.) Production and operating records for the BOF No. 71 and No. 72 vessels, EAFs No. 31 through No. 34, the 56 inch tandem mill,

Lewis temper and United and Hot strip rolling mills.

- 1.10. ALC shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 7.0 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. ALC shall maintain records of the quantity used, the density, water content and weight percent of VOCs per gallon of the paints/coatings used at the facility.
- 1.11. ALC shall retain all records required by both Section 2105.06 of Article XXI and the Agreed Order for the facility for at least two (2) years and shall make the same available to the Department upon request.

II. AGREEMENT

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

- 2.1. The contents of the Order portion of this Agreed Order shall be submitted to the U.S. EPA as a revision to the Allegheny County's portion of the Commonwealth of Pennsylvania's State Implementation Plan.
- 2.2. Failure to comply with any portion of this Order or Agreement is a violation of Article XXI that may subject ALC to civil proceedings, including injunctive relief, by the Department.
- 2.3. This Agreed Order does not, in any way, preclude, limit or otherwise affect any other remedies available to the Department for violations of this Agreed Order or of Article XXI, including, but not limited to, actions to require the installation of additional pollution control equipment and the implementation of additional corrective operating practices, nor does it, in any way, limit ALC's rights to appeal any acts or omissions of the

Department, except as set forth in paragraph 2.4 hereinbelow.

2.4. ALC hereby enters into this Agreed Order and hereby knowingly waives its rights to appeal said this Agreed Order, and the undersigned represents that he is authorized to consent to the Agreed Order and to enter into this Agreement on behalf of ALC. ALC hereby expressly reserves its rights to appeal pursuant to Article XXI, Rules and Regulations of the Department, Hearings and Appeals, any revisions made by the Department to this Agreed Order without ALC's express consent.

2.5. ALC and the Department understand that the purpose of this Agreed Order is to establish RACT for the control of emissions of NO_x and VOCs from this facility. The parties further acknowledge and understand the possibility that the U.S. EPA may decide to not accept the Agreement portion of the Agreed Order by Consent as a revision to the Allegheny County's portion of the Commonwealth of Pennsylvania's SIP.

NO SIP

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

ALLEGHENY LUDLUM CORPORATION

By: *D.A. Kittenbrink*
(signature)

Print or type Name: D. A. KITTENBRINK
Title: VICE PRESIDENT - ENGR.
AND INFORMATION TECH.
Date: 12-15-96

ALLEGHENY COUNTY HEALTH DEPARTMENT

By: *B. Dixon 12/19/96*

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

and By: *Thomas J. Puzniak*

Thomas J. Puzniak, Engineering Manager
Air Quality Program



AIR QUALITY PROGRAM
301 39th Street, Bldg. #7
Pittsburgh, PA 15201-1811

Minor Source/Minor Modification
INSTALLATION PERMIT


Issued To: **ATI Flat Rolled**
 Products Holdings, LLC
 100 River Road
 Brackenridge, PA 15014-1597

ACHD Permit #: **0059-I009**

Date of Issuance: April 16, 2020

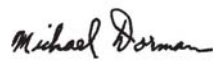
Expiration Date: (See Section III.12)

Issued By:


Digitally signed by JoAnn Truchan, PE
Date: 2020.04.16 13:39:53 -04'00'

JoAnn Truchan, P.E.
Section Chief, Engineering

Prepared By:


Digitally signed by Michael Dorman
Date: 2020.04.16 13:34:21 -04'00'

Michael Dorman
Air Quality Engineer

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AMENDMENTS:

<i>DATE</i>	<i>SECTION(S)</i>
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I. CONTACT INFORMATION

Facility Location: **ATI Flat Rolled Products Holdings, LLC**
100 River Road
Brackenridge, PA 15014-1597

Permittee/Owner: **ATI Flat Rolled Products Holdings, LLC**
100 River Road
Brackenridge, PA 15014-1597

Permittee/Operator:
(if not Owner)

Responsible Official: **Deborah Calderazzo**
Title: Director, Environmental Affairs
Company: ATI Flat Rolled Products Holdings, LLC
Address: 100 River Road
Brackenridge, PA 15014-1597

Telephone Number: 724-226-5947
Fax Number: 724-226-5292

Facility Contact: **Deborah Calderazzo**
Title: Director, Environmental Affairs
Telephone Number: 724-226-5947
Fax Number: 724-226-5292
E-mail Address: **Deborah.Calderazzo@ATIMetals.com**

AGENCY ADDRESSES:

ACHD Contact: **Section Chief, Engineering**
Allegheny County Health Department
Air Quality Program
301 39th Street, Building #7
Pittsburgh, PA 15201-1811

EPA Contact: **Enforcement Programs Section (3AP12)**
USEPA Region III
1650 Arch Street
Philadelphia, PA 19103-2029

II. FACILITY DESCRIPTION

FACILITY DESCRIPTION

The ATI Flat Rolled Products Holdings, LLC (ATI) Brackenridge Plant, located at 100 River Road, Brackenridge, Allegheny County, PA, is a producer of specialty products from scrap and other additives.

The facility is a minor source of lead (Pb), oxides of sulfur (SO_x), HAPs, sulfuric acid (H₂SO₄) and nitric acid (HNO₃). It is a major source of particulate matter (PM), particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM_{2.5}), oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs) and carbon dioxide (CO₂e) as defined in section 2101.20 of Article XXI.

INSTALLATION DESCRIPTION

This permit is an installation addressing the requirements for case-by-case RACT for this facility.

The emission units regulated by this permit are summarized in Table I-1:

Table I-1: RACT: Table of Requirements

Source	RACT II Requirement	Basis
V.A: EAF F1 F2	RACT consists of continued compliance with all applicable regulatory and permit requirements.	No feasible control technology available for NO _x or VOCs Meets BACT
V.B: Argon-Oxygen Decarburization Vessel (AOD)	RACT consists of continued compliance with all applicable regulatory and permit requirements.	No feasible control technology available for NO _x or VOCs
V.C: No.2 A & P Line, H ₂ SO ₄ -HNO ₃ /HF Pickling (NO _x only)	RACT consists of continued compliance with all applicable regulatory and permit requirements.	Source meets BACT
V.D: Lewis Temper Mill (VOCs only)	RACT consists of continued compliance with all applicable regulatory and permit requirements and Consent Decree No. 260.	§2105.06 of Article XXI and Consent Decree No. 260
V.E: Miscellaneous Paints (VOCs only)	<ol style="list-style-type: none"> 1. Store all VOC-containing coatings, thinners, coating-related waste materials, cleaning materials and used shop towels in closed containers. 2. Ensure that mixing and storage containers used for VOC-containing coatings, thinners, coating-related waste materials and cleaning materials are kept closed at all times except when depositing or removing these materials. 3. Minimize spills of VOC-containing coatings, thinners, coating-related waste materials and cleaning materials, cleaning up spills immediately. 4. Convey VOC-containing coatings, thinners, coating-related waste materials and cleaning materials from one location to another in closed containers. 	Revised ATI analysis of paint usage. No feasible control technology available for VOCs

DECLARATION OF POLICY

Pollution prevention is recognized as the preferred strategy (over pollution control) for reducing risk to air resources. Accordingly, pollution prevention measures should be integrated into air pollution control programs wherever possible, and the adoption by sources of cost-effective compliance strategies, incorporating pollution prevention, is encouraged. The Department will give expedited consideration to any permit modification request based on pollution prevention principles.

The permittee is subject to the terms and conditions set forth below. These terms and conditions constitute provisions of Allegheny County Health Department Rules and Regulations, Article XXI Air Pollution Control. The subject equipment has been conditionally approved for operation. The equipment shall be operated in conformity with the plans, specifications, conditions, and instructions which are part of your application, and may be periodically inspected for compliance by the Department. In the event that the terms and conditions of this permit or the applicable provisions of Article XXI conflict with the application for this permit, these terms and conditions and the applicable provisions of Article XXI shall prevail. Additionally, nothing in this permit relieves the permittee from the obligation to comply with all applicable Federal, State and Local laws and regulations.

III. GENERAL CONDITIONS**1. Prohibition of Air Pollution (§2101.11)**

It shall be a violation of this permit to fail to comply with, or to cause or assist in the violation of, any requirement of this permit, or any order or permit issued pursuant to authority granted by Article XXI. The permittee shall not willfully, negligently, or through the failure to provide and operate necessary control equipment or to take necessary precautions, operate any source of air contaminants in such manner that emissions from such source:

- a. Exceed the amounts permitted by this permit or by any order or permit issued pursuant to Article XXI;
- b. Cause an exceedance of the ambient air quality standards established by Article XXI §2101.10; or
- c. May reasonably be anticipated to endanger the public health, safety, or welfare.

2. Nuisances (§2101.13)

Any violation of any requirement of this Permit shall constitute a nuisance.

3. Definitions (§2101.20)

- a. Except as specifically provided in this permit, terms used retain the meaning accorded them under the applicable provisions and requirements of Article XXI or the applicable federal or state regulation. Whenever used in this permit, or in any action taken pursuant to this permit, the words and phrases shall have the meanings stated, unless the context clearly indicates otherwise.
- b. Unless specified otherwise in this permit or in the applicable regulation, the term “year” shall mean any twelve (12) consecutive months.

4. Certification (§2102.01)

Any report or compliance certification submitted under this permit shall contain written certification by a responsible official as to truth, accuracy, and completeness. This certification and any other certification required under this permit shall be signed by a responsible official of the source, and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

5. Operation and Maintenance (§2105.03)

All air pollution control equipment required by this permit or Article XXI, and all equivalent compliance techniques that have been approved by the Department, shall be properly installed, maintained, and operated consistent with good air pollution control practice.

6. Conditions (§2102.03.c)

It shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02, for any person to fail to comply with any terms or conditions set forth in this permit.

7. Transfers (§2102.03.e)

This permit shall not be transferable from one person to another, except in accordance with Article XXI §2102.03.e and in cases of change-in-ownership which are documented to the satisfaction of the Department, and shall be valid only for the specific sources and equipment for which this permit was issued. The transfer of permits in the case of change-in-ownership may be made consistent with the administrative permit amendment procedure of Article XXI §2103.14.b.

8. Effect (§2102.03.g)

Issuance of this permit shall not in any manner relieve any person of the duty to fully comply with the requirements of Article XXI or any other provision of law, nor shall it in any manner preclude or affect the right of the Department to initiate any enforcement action whatsoever for violations of Article XXI or this Permit, whether occurring before or after the issuance of such permit. Further, the issuance of this permit shall not be a defense to any nuisance action, nor shall such permit be construed as a certificate of compliance with the requirements of Article XXI or this Permit.

9. General Requirements (§2102.04.a)

It shall be a violation of this Permit giving rise to the remedies set forth in Article XXI §2109 for any person to install, modify, replace, reconstruct, or reactivate any source or air pollution control equipment to which this Permit applies unless either:

- a. The Department has first issued an Installation Permit for such source or equipment; or
- b. Such action is solely a reactivation of a source with a current Operating Permit, which is approved under §2103.13 of Article XXI.

10. Conditions (§2102.04.e)

Further, the initiation of installation, modification, replacement, reconstruction, or reactivation under this

Installation Permit and any reactivation plan shall be deemed acceptance by the source of all terms and conditions specified by the Department in this permit and plan.

11. Revocation (§2102.04.f)

- a. The Department may, at any time, revoke this Installation Permit if it finds that:
 - 1) Any statement made in the permit application is not true, or that material information has not been disclosed in the application;
 - 2) The source is not being installed, modified, replaced, reconstructed, or reactivated in the manner indicated by this permit or applicable reactivation plan;
 - 3) Air contaminants will not be controlled to the degree indicated by this permit;
 - 4) Any term or condition of this permit has not been complied with;
 - 5) The Department has been denied lawful access to the premises or records, charts, instruments and the like as authorized by this Permit; or
- b. Prior to the date on which construction of the proposed source has commenced the Department may, revoke this Installation Permit if a significantly better air pollution control technology has become available for such source, a more stringent regulation applicable to such source has been adopted, or any other change has occurred which requires a more stringent degree of control of air contaminants.

12. Term (§2102.04.g)

This Installation Permit shall expire in 18 months if construction has not commenced within such period or shall expire 18 months after such construction has been suspended, if construction is not resumed within such period. In any event, this Installation Permit shall expire upon completion of construction, except that this Installation Permit shall authorize temporary operation to facilitate shakedown of sources and air cleaning devices, to permit operations pending issuance of a related subsequent Operating Permit, or to permit the evaluation of the air contamination aspects of the source. Such temporary operation period shall be valid for a limited time, not to exceed 180 days, but may be extended for additional limited periods, each not to exceed 120 days, except that no temporary operation shall be authorized or extended which may circumvent the requirements of this Permit.

13. Annual Installation Permit Administrative Fee (§2102.10.c & e)

No later than 30 days after the date of issuance of this Installation Permit and on or before the last day of the month in which this permit was issued in each year thereafter, during the term of this permit until a subsequent corresponding Operating Permit or amended Operating Permit is properly applied for, the owner or operator of such source shall pay to the Department, in addition to all other applicable emission and administration fees, an Annual Installation Permit Administration Fee in an amount of \$750.

14. Severability Requirement (§2103.12.l)

The provisions of this permit are severable, and if any provision of this permit is determined to be by a court of competent jurisdiction to be invalid or unenforceable, such a determination will not affect the remaining provisions of this permit.

15. Reporting Requirements (§2103.12.k)

- a. The permittee shall submit reports of any required monitoring at least every six (6) months. All

instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by the Responsible Official.

- b. Prompt reporting of deviations from permit requirements is required, including those attributable to upset conditions as defined in this permit and Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.
- c. All reports submitted to the Department shall comply with the certification requirements of General Condition III.4 above.
- d. Semiannual reports required by this permit shall be submitted to the Department as follows:
 - 1) One semiannual report is due by July 31st of each year for the time period beginning January 1st and ending June 30th of the current year.
 - 2) One semiannual report is due by February 1st of each year for the time period beginning July 1st and ending December 31st of the previous year.
 - 3) The first semiannual report shall be due July 31, 2020 for the time period beginning on the issuance date of this permit through June 30, 2020.
- e. Reports may be emailed to the Department at aqreports@alleghenycounty.us in lieu of mailing a hard copy.

16. Minor Installation Permit Modifications (§2102.10.d)

Modifications to this Installation Permit may be applied for but only upon submission of an application with a fee in the amount of \$300 and where:

- a. No reassessment of any control technology determination is required; and
- b. No reassessment of any ambient air quality impact is required.

17. Violations (§2104.06)

The violation of any emission standard established by this Permit shall be a violation of this Permit giving rise to the remedies provided by Article §2109.02.

18. Other Requirements Not Affected (§2105.02)

Compliance with the requirements of this permit shall not in any manner relieve any person from the duty to fully comply with any other applicable federal, state, or county statute, rule, regulation, or the like, including, but not limited to, any applicable NSPSs, NESHAPs, MACTs, or Generally Achievable Control Technology standards now or hereafter established by the EPA, and any applicable requirement of BACT or LAER as provided by Article XXI, any condition contained in this Installation Permit and/or any additional or more stringent requirements contained in an order issued to such person pursuant to Part I of Article XXI.

19. Other Rights and Remedies Preserved (§2109.02.b)

Nothing in this permit shall be construed as impairing any right or remedy now existing or hereafter created in equity, common law or statutory law with respect to air pollution, nor shall any court be deprived of such jurisdiction for the reason that such air pollution constitutes a violation of this permit

20. Penalties, Fines, and Interest (§2109.07.a)

A source that fails to pay any fee required under this Permit or article XXI when due shall pay a civil penalty of 50% of the fee amount, plus interest on the fee amount computed in accordance with of Article XXI §2109.06.a.4 from the date the fee was required to be paid. In addition, the source may have its permit revoked.

21. Appeals (§2109.10)

In accordance with State Law and County regulations and ordinances, any person aggrieved by an order or other final action of the Department issued pursuant to Article XXI shall have the right to appeal the action to the Director in accordance with the applicable County regulations and ordinances.

IV. SITE LEVEL TERMS AND CONDITIONS

1. Reporting of Upset Conditions (§2103.12.k.2)

The permittee shall promptly report all deviations from permit requirements, including those attributable to upset conditions as defined in Article XXI §2108.01.c, the probable cause of such deviations, and any corrective actions or preventive measures taken.

2. Visible Emissions (§2104.01.a)

Except as provided for by Article XXI §2108.01.d pertaining to a cold start, no person shall operate, or allow to be operated, any source in such manner that the opacity of visible emissions from a flue or process fugitive emissions from such source, excluding uncombined water:

- a. Equal or exceed an opacity of 20% for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period; or,
- b. Equal or exceed an opacity of 60% at any time.

3. Odor Emissions (§2104.04) (County-only enforceable)

No person shall operate, or allow to be operated, any source in such manner that emissions of malodorous matter from such source are perceptible beyond the property line.

4. Materials Handling (§2104.05)

The permittee shall not conduct, or allow to be conducted, any materials handling operation in such manner that emissions from such operation are visible at or beyond the property line.

5. Operation and Maintenance (§2105.03)

All air pollution control equipment required by this permit or any order under Article XXI, and all equivalent compliance techniques approved by the Department, shall be properly installed, maintained, and operated consistently with good air pollution control practice.

6. Open Burning (§2105.50)

No person shall conduct, or allow to be conducted, the open burning of any material, except where the Department has issued an Open Burning Permit to such person in accordance with Article XXI §2105.50 or where the open burning is conducted solely for the purpose of non-commercial preparation of food for human consumption, recreation, light, ornament, or provision of warmth for outside workers, and in a manner which contributes a negligible amount of air contaminants.

7. Shutdown of Control Equipment (§2108.01.b)

- a. In the event any air pollution control equipment is shut down for reasons other than a breakdown, the person responsible for such equipment shall report, in writing, to the Department the intent to shut down such equipment at least 24 hours prior to the planned shutdown. Notwithstanding the submission of such report, the equipment shall not be shut down until the approval of the Department is obtained; provided, however, that no such report shall be required if the source(s) served by such air pollution control equipment is also shut down at all times that such equipment

is shut down.

- b. The Department shall act on all requested shutdowns as promptly as possible. If the Department does not take action on such requests within ten (10) calendar days of receipt of the notice, the request shall be deemed denied, and upon request, the owner or operator of the affected source shall have a right to appeal in accordance with the provisions of Article XI.
- c. The prior report required by Site Level Condition IV.7.a above shall include:
 - 1) Identification of the specific equipment to be shut down, its location and permit number (if permitted), together with an identification of the source(s) affected;
 - 2) The reasons for the shutdown;
 - 3) The expected length of time that the equipment will be out of service;
 - 4) Identification of the nature and quantity of emissions likely to occur during the shutdown;
 - 5) Measures, including extra labor and equipment, which will be taken to minimize the length of the shutdown, the amount of air contaminants emitted, or the ambient effects of the emissions;
 - 6) Measures which will be taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impracticable to shut down or curtail the affected source(s) during the shutdown; and
 - 7) Such other information as may be required by the Department.

8. Breakdowns (§2108.01.c)

- a. In the event that any air pollution control equipment, process equipment, or other source of air contaminants breaks down in such manner as to have a substantial likelihood of causing the emission of air contaminants in violation of this permit, or of causing the emission into the open air of potentially toxic or hazardous materials, the person responsible for such equipment or source shall immediately, but in no event later than sixty (60) minutes after the commencement of the breakdown, notify the Department of such breakdown and shall, as expeditiously as possible but in no event later than seven (7) days after the original notification, provide written notice to the Department.
- b. To the maximum extent possible, all oral and written notices required shall include all pertinent facts, including:
 - 1) Identification of the specific equipment which has broken down, its location and permit number (if permitted), together with an identification of all related devices, equipment, and other sources which will be affected.
 - 2) The nature and probable cause of the breakdown.
 - 3) The expected length of time that the equipment will be inoperable or that the emissions will continue.
 - 4) Identification of the specific material(s) which are being, or are likely to be emitted, together with a statement concerning its toxic qualities, including its qualities as an irritant, and its potential for causing illness, disability, or mortality.
 - 5) The estimated quantity of each material being or likely to be emitted.
 - 6) Measures, including extra labor and equipment, taken or to be taken to minimize the length of the breakdown, the amount of air contaminants emitted, or the ambient effects of the emissions, together with an implementation schedule.
 - 7) Measures being taken to shut down or curtail the affected source(s) or the reasons why it is impossible or impractical to shut down the source(s), or any part thereof, during the breakdown.

- c. Notices required shall be updated, in writing, as needed to advise the Department of changes in the information contained therein. In addition, any changes concerning potentially toxic or hazardous emissions shall be reported immediately. All additional information requested by the Department shall be submitted as expeditiously as practicable.
- d. Unless otherwise directed by the Department, the Department shall be notified whenever the condition causing the breakdown is corrected or the equipment or other source is placed back in operation by no later than 9:00 AM on the next County business day. Within seven (7) days thereafter, written notice shall be submitted pursuant to Paragraphs a and b above.
- e. Breakdown reporting shall not apply to breakdowns of air pollution control equipment which occur during the initial startup of said equipment, provided that emissions resulting from the breakdown are of the same nature and quantity as the emissions occurring prior to startup of the air pollution control equipment.
- f. In no case shall the reporting of a breakdown prevent prosecution for any violation of this permit or Article XXI.

9. Cold Start (§2108.01.d)

In the event of a cold start on any fuel-burning or combustion equipment, except stationary internal combustion engines and combustion turbines used by utilities to meet peak load demands, the person responsible for such equipment shall report in writing to the Department the intent to perform such cold start at least 24 hours prior to the planned cold start. Such report shall identify the equipment and fuel(s) involved and shall include the expected time and duration of the startup. Upon written application from the person responsible for fuel-burning or combustion equipment which is routinely used to meet peak load demands and which is shown by experience not to be excessively emissive during a cold start, the Department may waive these requirements and may instead require periodic reports listing all cold starts which occurred during the report period. The Department shall make such waiver in writing, specifying such terms and conditions as are appropriate to achieve the purposes of Article XXI. Such waiver may be terminated by the Department at any time by written notice to the applicant.

10. Monitoring of Malodorous Matter Beyond Facility Boundaries (§2104.04)

The permittee shall take all reasonable action as may be necessary to prevent malodorous matter from becoming perceptible beyond facility boundaries. Further, the permittee shall perform such observations as may be deemed necessary along facility boundaries to insure that malodorous matter beyond the facility boundary in accordance with Article XXI §2107.13 is not perceptible and record all findings and corrective action measures taken.

11. Emissions Inventory Statements (§2108.01.e & g)

- a. Emissions inventory statements in accordance with §2108.01.e shall be submitted to the Department by March 15 of each year for the preceding calendar year. The Department may require more frequent submittals if the Department determines that more frequent submissions are required by the EPA or that analysis of the data on a more frequent basis is necessary to implement the requirements of Article XXI or the Clean Air Act.
- b. The failure to submit any report or update within the time specified, the knowing submission of

false information, or the willful failure to submit a complete report shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

12. Orders (§2108.01.f)

In addition to meeting the requirements Site Level Conditions IV.7 through IV.11, inclusive, the person responsible for any source shall, upon order by the Department, report to the Department such information as the Department may require in order to assess the actual and potential contribution of the source to air quality. The order shall specify a reasonable time in which to make such a report.

13. Violations (§2108.01.g)

The failure to submit any report or update thereof required by Site Level Conditions IV.7 through IV.12 above, inclusive, within the time specified, the knowing submission of false information, or the willful failure to submit a complete report shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

14. Emissions Testing (§2108.02)

- a. **Orders:** No later than 60 days after achieving full production or 120 days after startup, whichever is earlier, the permittee shall conduct, or cause to be conducted, such emissions tests as are specified by the Department to demonstrate compliance with the applicable requirements of this permit and shall submit the results of such tests to the Department in writing. Upon written application setting forth all information necessary to evaluate the application, the Department may, for good cause shown, extend the time for conducting such tests beyond 120 days after startup but shall not extend the time beyond 60 days after achieving full production. Emissions testing shall comply with all applicable requirements of Article XXI, §2108.02.e.
- b. **Tests by the Department:** Notwithstanding any tests conducted pursuant to this permit, the Department or another entity designated by the Department may conduct emissions testing on any source or air pollution control equipment. At the request of the Department, the permittee shall provide adequate sampling ports, safe sampling platforms and adequate utilities for the performance of such tests.
- c. **Testing Requirements:** No later than 45 days prior to conducting any tests required by this permit, the person responsible for the affected source shall submit for the Department's approval a written test protocol explaining the intended testing plan, including any deviations from standard testing procedures, the proposed operating conditions of the source during the test, calibration data for specific test equipment and a demonstration that the tests will be conducted under the direct supervision of persons qualified by training and experience satisfactory to the Department to conduct such tests. In addition, at least 30 days prior to conducting such tests, the person responsible shall notify the Department in writing of the time(s) and date(s) on which the tests will be conducted and shall allow Department personnel to observe such tests, record data, provide pre-weighed filters, analyze samples in a County laboratory and to take samples for independent analysis. Test results shall be comprehensively and accurately reported in the units of measurement specified by the applicable emission limitations of this permit.
- d. Test methods and procedures shall conform to the applicable reference method set forth in this permit or Article XXI Part G, or where those methods are not applicable, to an alternative sampling and testing procedure approved by the Department consistent with Article XXI §2108.02.e.2.

- e. **Violations:** The failure to perform tests as required by this permit or an order of the Department, the failure to submit test results within the time specified, the knowing submission of false information, the willful failure to submit complete results, or the refusal to allow the Department, upon presentation of a search warrant, to conduct tests, shall be a violation of this permit giving rise to the remedies provided by Article XXI §2109.02.

15. Abrasive Blasting (§2105.51)

- a. Except where such blasting is a part of a process requiring an operating permit, no person shall conduct or allow to be conducted, abrasive blasting or power tool cleaning of any surface, structure, or part thereof, which has a total area greater than 1,000 square feet unless such abrasive blasting complies with all applicable requirements of Article XXI §2105.51.
- b. In addition to complying with all applicable provisions of §2105.51, no person shall conduct, or allow to be conducted, abrasive blasting of any surface unless such abrasive blasting also complies with all other applicable requirements of Article XXI unless such requirements are specifically addressed by §2105.51.

16. Asbestos Abatement (§2105.62, §2105.63)

In the event of removal, encasement, or encapsulation of Asbestos-Containing Material (ACM) at a facility or in the event of the demolition of any facility, the permittee shall comply with all applicable provisions of Article XXI §2105.62 and §2105.63.

17. Volatile Organic Compound Storage Tanks (§2105.12.a)

No person shall place or store, or allow to be placed or stored, a volatile organic compound having a vapor pressure of 1.5 psia or greater under actual storage conditions in any aboveground stationary storage tank having a capacity equal to or greater than 2,000 gallons but less than or equal to 40,000 gallons, unless there is in operation on such tank pressure relief valves which are set to release at the higher of 0.7 psig of pressure or 0.3 psig of vacuum or at the highest possible pressure and vacuum in accordance with State or local fire codes, National Fire Prevention Association guidelines, or other national consensus standard approved in writing by the Department. Petroleum liquid storage vessels that are used to store produced crude oil and condensate prior to lease custody transfer are exempt from these requirements.

18. Fugitive Emissions (§2105.49)

The person responsible for a source of fugitive emissions, in addition to complying with all other applicable provisions of this permit shall take all reasonable actions to prevent fugitive air contaminants from becoming airborne. Such actions may include, but are not limited to:

- a. The use of asphalt, oil, water, or suitable chemicals for dust control;
- b. The paving and maintenance of roadways, parking lots and the like;
- c. The prompt removal of earth or other material which has been deposited by leaks from transport, erosion or other means;
- d. The adoption of work or other practices to minimize emissions;
- e. Enclosure of the source; and
- f. The proper hooding, venting, and collection of fugitive emissions.

19. Episode Plans (§2106.02)

The permittee shall upon written request of the Department, submit a source curtailment plan, consistent with good industrial practice and safe operating procedures, designed to reduce emissions of air contaminants during air pollution episodes. Such plans shall meet the requirements of Article XXI §2106.02.

20. New Source Performance Standards (§2105.05)

- a. It shall be a violation of this permit giving rise to the remedies provided by §2109.02 of Article XXI for any person to operate, or allow to be operated, any source in a manner that does not comply with all requirements of any applicable NSPS now or hereafter established by the EPA, except if such person has obtained from EPA a waiver pursuant to Section 111 or Section 129 of the Clean Air Act or is otherwise lawfully temporarily relieved of the duty to comply with such requirements.
- b. Any person who operates, or allows to be operated, any source subject to any NSPS shall conduct, or cause to be conducted, such tests, measurements, monitoring and the like as is required by such standard. All notices, reports, test results and the like as are required by such standard shall be submitted to the Department in the manner and time specified by such standard. All information, data and the like which is required to be maintained by such standard shall be made available to the Department upon request for inspection and copying.

V. EMISSION UNIT LEVEL TERMS AND CONDITIONS

A. Electric Arc Furnaces (F1 and F2)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall at not conduct, or allow to be conducted, F1 or F2 process operations unless the furnace pollution control equipment is on line and properly maintained and operated according to the following conditions: (2102.04.b.5, 25 Pa. Code §129.99)
 - 1) F1 and F2 shall be equipped with a direct evacuation control (DEC) system with water cooled ductwork;
 - 2) The fugitive emissions capture equipment shall consist of segmented canopy hood systems exhausting to baghouses C002B and C006, cross-draft partitions, a scavenger duct and closed roofs. The scavenger duct systems shall be installed in the exhaust duct work between each canopy where it will be most effective, based on the canopy and duct configuration and design;
 - 3) The F1 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to C001 baghouse;
 - 4) The F2 DEC system shall be in place and operating at all times during furnace operations and shall be exhausted to the C002A baghouse
 - 5) F1 and F2 shall be equipped with canopy hoods for collection of process fugitive emissions. Such hoods shall be in operation at all times during process steel making operations and emissions shall be exhausted to the C002B (F2 canopy) baghouse and C006 (F1 canopy) baghouse, respectively;
 - 6) The differential pressure drop across each baghouse compartment shall not exceed 15 in. w.c.;
 - 7) The differential pressure drop across each compartment in the F1 and F2 DEC and canopy baghouses, shall be recorded once perweek, during furnace operations.
 - 8) Should the differential pressure across a baghouse exceed 15 in. w.c., the permittee shall promptly investigate the cause of the deviation. The permittee shall record and maintain records of the following information for each investigation:
 - a) The date and time the deviation was observed;
 - b) The magnitude of the deviation observed;
 - c) The date(s) the investigation was conducted;
 - d) The findings, recommendations and corrective actions for the investigation; and
 - e) The pressure drop reading after the deviation was corrected.
 - 9) The permittee shall take prompt action to correct any deviation and bring the control equipment back to normal operating parameters.
- c. The permittee shall maintain compliance with 40 CFR Part 63 Subpart YYYYYY. (2102.04.b.5, 25 Pa. Code §129.99)

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall check and record the fan motor amperes and damper positions for the F1 and F2 emission control systems on a once-per-shift basis. (§2103.12.i, 40 CFR 60.274a(b), 25 Pa. Code §129.100)
- b. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouses for F1 and F2. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d) , 25 Pa. Code §129.100)
- c. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the F1 and F2 DEC and Canopy baghouses during operation of F1 and F2. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2103.12.a.2.D, 25 Pa. Code §129.100)
- d. The permittee shall inspect F1 and F2, the C001 and C002A DEC baghouses, and the C002B canopy and C006 canopy baghouses weekly for to insure proper operation and compliance with permit conditions. (§2103.12.i, 2102.04.b.5, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the F1 and F2 and associated control equipment: (2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685, 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Fan motor amp and damper position data;
 - 3) Monthly and 12-month production for each furnace; and
 - 4) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1, 25 Pa. Code §129.100)
- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a), 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information to the Department in its semiannual report. The reports shall contain all required information for the time period of the report: (§2103.12.k, 40 CFR §60.276a, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month summaries of data required to be recorded by Condition V.A.4.a above. Monthly fan motor amperes data shall consist of the monthly maximum and minimum values observed for each fan; and
 - 2) Non-compliance information required to be recorded by Condition V.A.4.b above.

- b. Reporting instances of non-compliance in accordance with Condition V.A.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. EAFs F1 and F2 shall be: (§210.04.b.5, RACT Order No. 260, Condition 1.3, 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices to include but are not limited to; and
 - a) Controlling exhaust flows to reduce the input of outside air; and
 - b) Minimizing opening of the slag door.
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

B. Argon-Oxygen Decarburization Vessel (AOD)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall not conduct, or allow to be conducted, AOD process operations unless the pollution control system is on-line, properly maintained and operated according to the following conditions: (2102.04.b.5, 40 CFR §60.272a(a), 40 CFR §63.10686(b)(1), 25 Pa. Code §129.99)
 - 1) Emissions from the AOD during process operations shall be exhausted to baghouse C006; and
 - 2) The differential pressure across the baghouse shall not exceed 15 inches w.c.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall perform monthly operational status inspections of the equipment that is important to the performance of the total capture system and baghouse C006 for the AOD. These inspections shall include observations of the physical appearance of the equipment. Any deficiencies shall be noted, and proper maintenance performed. (§2103.12.i, 2102.04.b.5, 40 CFR 60.274a(d), 25 Pa. Code §129.100)
- b. The permittee shall have instrumentation to continuously monitor the differential pressure drop across each compartment of the C006 Canopy baghouse during operation of the AOD. Said instrumentation shall be properly operated, calibrated and maintained according to manufacturer's specifications. (§2103.12.i, §2102.04.b.5, 25 Pa. Code §129.100)
- c. The permittee shall monitor production on a monthly and 12-month basis. (§2103.12.i, 2102.04.b.5, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for the AOD and associated control equipment: (§2102.04.b.5, §2103.12.j, 40 CFR §60.276a, 40 CFR 63.10685, 25 Pa. Code §129.100)
 - 1) Monthly operational status inspections;
 - 2) Monthly and 12-month production for the AOD; and
 - 3) Records of operation, maintenance and inspections.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.j, §2103.12.h.1, 25 Pa. Code §129.100)

- c. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 40 CFR §60.276(a), 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded for Condition V.B.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.B.4.b above.
- b. Reporting instances of non-compliance in accordance, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above if appropriate. (§2103.12.k)
- c. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)

6. Work Practice Standards:

- a. The AOD shall be: (§2102.04.b.5, 25 Pa. Code §129.99, RACT Order No. 260, Condition 1.3)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

C. No.2 A & P Line, H₂SO₄–HNO₃/HF Pickling (NO_x only)

1. Restrictions:

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall at no time, conduct or allow to be conducted pickling operations in the No.2 A and P Pickling Tubs No.1, No.2 and No.3 unless all emissions from HNO₃/HF pickling are processed through the wet chemical packed tower scrubber D-019. The scrubber shall be properly maintained and operated according to the following conditions: (§210.04.b.5, Permit No. 0059-I002, Condition Nos. 26, 27 and 28, 25 Pa. Code §129.99)
 - 1) The pH shall be between 8.0 and 12.5;
 - 2) The scrubbing solution shall be NaOH and NaHS in water;
 - 3) The minimum scrubbing liquid flow-rate shall be 450 gallons per minute;
 - 4) The maximum differential pressure drop across the scrubber shall be 3.0" w.c. The exhaust flow-rate through the scrubber shall be no less than 6,000 acfm at all times;
 - 5) The scrubber shall be equipped with instrumentation that shall at all times continuously monitor pH, scrubbing liquid flow-rate to within 1 gallon per minute of actual and differential pressure drop to within ½" w.c. of the actual pressure drop at all times.
- c. The throughput for No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed 148,920 tons of steel in any consecutive twelve-month period. (§210.04.b.5, 25 Pa. Code §129.99)
- d. Emissions from No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 and No.3 shall not exceed the emissions limitations in Table V-C-1 below. (§210.04.b.5, 25 Pa. Code §129.99)

TABLE V-C-1: No. 2 A and P Line H₂SO₄ – HNO₃/HF Pickling, Tubs No.1, No.2 & No.3 Emission Limitations

POLLUTANT	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Nitrogen Oxides	11.07	48.49

*A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall inspect the subject scrubber D019, weekly to ensure compliance with Condition V.C.1.b above. (§2103.12.i, 25 Pa. Code §129.100)

- b. The packed bed scrubbers shall be provided with monitoring instrumentation that shall at all times, continuously monitor the following parameters of the scrubbing liquid in the scrubber. The monitoring instrumentation shall be inspected for proper operation weekly. Calibration shall be conducted as required by manufacturer's instructions to ensure accurate measurements. (§2102.04.b.5, §2103.12.i, 25 Pa. Code §129.100)
 - 1) The pressure drop across the scrubber;
 - 2) The scrubbing liquid flow rate;
 - 3) The scrubbing liquid pH within 5%; and
 - 4) The scrubbing liquid ORP.
- c. The permittee shall perform daily visual inspection of emissions while the affected source is operating under normal conditions and weekly inspections of the scrubber for proper operation and to ensure that there is no evidence of chemical attack on its structural integrity. (§2102.04.b.5, §2103.12.i, 25 Pa. Code §129.100).
- d. The permittee shall monitor: (§2103.12.i, 25 Pa. Code §129.100)
 - 1) Steel throughput (monthly, and 12-month); and
 - 2) Operation, maintenance, inspection and calibration and/or replacement of process or pollution control equipment.

4. Record Keeping Requirements:

- a. The permittee shall keep and maintain the following data for the No.2 A and P Pickling Tubs No.1, No.2 and No.3 S092C and D: (§2102.04.b.5, §2103.12.j, Permit No. 0059-I002, Condition No. 29, 25 Pa. Code §129.100)
 - 1) The throughput in tons of steel (monthly and 12-month);
 - 2) The scrubbing liquid flow-rate (daily, monthly, and 12-month);
 - 3) Differential pressure drop to within ½" w.c. of the actual pressure drop (daily, monthly, average and 12-month);
 - 4) Chemical usage (daily, monthly, and 12-month);
 - 5) Oxidation Reduction Potential (daily, monthly, and 12-month);
 - 6) pH accurate to 5%, (daily, monthly, average and 12-month);
 - 7) Weekly records of the ORP and pH monitoring instrumentation inspection results; and
 - 8) Records of operation, maintenance, inspection, calibration and/or replacement of process or control equipment.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j, 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Monthly and 12-month data required to be recorded by Condition V.C.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.C.4.b above.
- b. Reporting instances of non-compliance in accordance with Condition V.C.5.a above does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. The No.2 A & P Line, H₂SO₄-HNO₃/HF Pickling shall be: (§210.04.b.5, 25 Pa. Code §129.99, RACT Order No. 260, Condition 1.3)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

D. Lewis Temper Mill (VOCs only)**1. Restrictions:**

- a. Continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The production of the Lewis temper mill shall not exceed 219,000 tons of steel in any consecutive twelve-month period. (§2102.04.b.5, 25 Pa. Code §129.99)
- c. The permittee shall not use more than 10,000 gallons of kerosene on the Lewis Temper Mill in any consecutive twelve-month period. (§2102.04.b.5, 25 Pa. Code §129.99)
- d. Maintain production and operating records in compliance with §1.9.A of Consent Decree No. 260 and §2105.06 of Article XXI. (§2105.06, Consent Decree No. 260, 25 Pa. Code §129.100)
- e. Fugitive emissions from the Lewis temper mill shall not exceed the emissions limitations in Table V-D-1 below. (§2102.04.b.5, 25 Pa. Code §129.99)

TABLE V-D-1: Lewis Temper Mill Emission Limitations

POLLUTANTS	HOURLY EMISSION LIMIT (lb/hr)	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	14.00	61.32

* A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall monitor production on a monthly and a rolling 12-month basis. (2103.12.i, 25 Pa. Code §129.100)
- b. The permittee shall monitor kerosene on a monthly and a rolling 12-month basis. (2103.12.i, 25 Pa. Code §129.100)

4. Record Keeping Requirements:

- a. The permittee shall record and maintain the following data for Lewis temper mill: (§2102.04.b.5, §2103.12.j., 25 Pa. Code §129.100, RACT Order No. 260, Condition 1.9)
 - 1) Production (monthly, and 12-month);
 - 2) Kerosene usage (monthly, and 12-month); and

- 3) Records of operation, maintenance, inspection and calibration and/or replacement of process equipment.
- b. The permittee shall record all instances of non-compliance with the conditions of this permit upon occurrence along with corrective action taken to restore compliance. (§2103.12.h.1, §2103.12.j, 25 Pa. Code §129.100)
- c. All records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100,)
 - 1) Monthly and 12-month data required to be recorded by Condition V.D.4.a above; and
 - 2) Non-compliance information required to be recorded by Condition V.D.4.b above.
- b. Reporting instances of non-compliance in accordance with Condition V.D.5.a above, does not relieve the permittee of the requirement to report breakdowns in accordance with Site Level Condition IV.8 above, if appropriate. (§2103.12.k)

6. Work Practice Standards:

- a. The Lewis Temper Mill shall be: (§2102.04.b.5, 25 Pa. Code §129.99)
 - 1) Operated in such a manner as not to cause air pollution that exceeds the permitted limits;
 - 2) Operated and maintained in a manner consistent with good operating and maintenance practices; and
 - 3) Operated and maintained in accordance with the manufacturer's specifications and the applicable terms and conditions of this permit.

E. Miscellaneous Paints (VOCs only)

1. Restrictions:

- a. The permittee shall continue to comply with all regulatory and Permit requirements. (2102.04.b.5)
- b. The permittee shall perform miscellaneous painting/coating activities utilizing paints/coatings with a maximum VOC content equal to or less than 5.2 pounds per gallon, less water and exempt solvents, after adjustment to a standard solvent density of 7.36 pounds per gallon and a solids basis. (RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.99)
- c. Emissions from Miscellaneous Paints, based on an annual usage of 4,000 gallons per 12-month period, shall not exceed the emissions limitations in Table V-E-1 below (§2103.12.a.2.B, 25 Pa. Code §129.99)

TABLE V-E-1: Miscellaneous Paints Emission Limitations

POLLUTANT	ANNUAL EMISSION LIMIT (tons/year)*
Volatile Organic Compounds	10.4

*A year is defined as any consecutive 12-month period.

2. Testing Requirements:

The Department reserves the right to require emissions testing sufficient to assure compliance with the terms and conditions of this permit. Such testing shall be performed in accordance with Site Level Condition IV.14 above entitled "Emissions Testing." (§2103.12.h.1, §2108.02)

3. Monitoring Requirements:

- a. The permittee shall monitor the following data for miscellaneous paints: (§2102.04.b.5, §2103.12.i, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.100)
 - 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

4. Record Keeping Requirements:

- a. The permittee shall record the following data for miscellaneous paints: (§2102.04.b.5, §2103.12.j, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.100)
 - 1) Quantity of paints/coatings used at the facility (monthly, 12-month);
 - 2) Density of paints/coatings used at the facility (monthly, 12-month);
 - 3) Water content of paints/coatings used at the facility (monthly, 12-month); and
 - 4) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

- b. Records shall be retained by the facility for at least five (5) years. These records shall be made available to the Department upon request for inspection and/or copying. (§2103.12.j, 25 Pa. Code §129.100)

5. Reporting Requirements:

- a. The permittee shall report the following information semiannually to the Department in accordance with General Condition III.15 above. The reports shall contain all required information for the time period of the report: (§2103.12.k, 25 Pa. Code §129.100)
 - 1) Quantity of paint and coatings used at the facility in gallons (monthly, 12-month); and
 - 2) Weight percent of VOCs per gallon of paints/coatings used at the facility. (monthly, 12-month).

6. Work Practice Standards:

- a. The permittee shall apply paint and coatings in a manner that minimizes VOC emissions. (§2102.04.b.5, 25 Pa. Code §129.99)
- b. This shall be accomplished by: (§2102.04.b.5, RACT Order No. 260, Condition 1.10, 25 Pa. Code §129.63a)
 - 1) Storing all VOC-containing industrial cleaning solvents and paints, paint brushes, used shop towels and related waste materials in closed and sealed containers.;
 - 2) Ensuring that mixing and storage containers used for VOC-containing industrial cleaning solvents, paints and related waste materials are kept closed at all times except when depositing or removing these materials;
 - 3) Minimizing spills of VOC-containing industrial cleaning solvents, paints and related waste materials and cleaning up spills immediately; and
 - 4) Minimizing air circulation around painting operations to the extent possible.

VI. ALTERNATIVE OPERATING SCENARIOS

There are no alternative operating scenarios for this permit