

Middletown Cogeneration Project

DOE Project Title:
Recovery Act: Waste Energy Project
at AK Steel Corp. Middletown Works

DOE Assistance Agreement
DE-EE0002736

FINAL REPORT

For the period
15 January 2010 – 30 September 2012

Principal Investigator: Jeffrey R. Joyce
DOE Project Officer: Aaron D. Yocum

September 2012

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Executive Summary

In 2008, Air Products and Chemicals, Inc. ("Air Products") began development of a project to beneficially utilize waste blast furnace "topgas" generated in the course of the iron-making process at AK Steel Corporation's Middletown, Ohio works. In early 2010, Air Products was awarded DOE Assistance Agreement DE-EE002736 to further develop and build the combined-cycle power generation facility. In June 2012, Air Products and AK Steel Corporation terminated work when it was determined that the project would not be economically viable at that time nor in the foreseeable future.

The project would have achieved the FOA-0000044 Statement of Project Objectives by demonstrating, at a commercial scale, the technology to capture, treat, and convert blast furnace topgas into electric power and thermal energy.

Introduction

The goal of the Middletown Cogeneration Project was to create the first North American facility to utilize a gas turbine combined cycle to produce electricity and steam from steel mill off-gases. Currently, the mill produces and vents byproduct topgas. Intending to benefit from the topgas' lost energy and eliminate its atmospheric release, this project aimed to determine the feasibility and cost effectiveness of capturing this stream and, if the commercial arrangement proved satisfactory, build a facility to produce both power and process steam. The project was intended to produce an annual average of 110 MW of electrical power, as well as process-related steam, from the recovered gas.

This project progressed through Task 1 of two tasks:

Task 1 - FEED

Task 2 - Procurement, Construction, Start-up, Performance Acceptance

Design Approach

The project was divided into two tasks. Task 1 was to identify the technical feasibility and commercial viability of the project. Task 2, contingent upon the successful completion of Task 1, was to take the project from concept into reality. This required commitment from both Air Products and AK Steel to proceed. Ultimately, such commitment did not materialize.

Task 1

Commencing upon execution of the DOE agreement, Task 1 provided an economic basis for Air Products to generate a "firm bid" to deliver steam and power to AK Steel Corporation. Anticipating a challenging project, Air Products used broad technical development activities to lay the foundation for the commercial agreement negotiated between the parties to commence operations. To ensure the facility could meet its scheduled on-stream target date, agreements were acquired for engineering labor and major equipment likely to affect either the plant design or capital cost estimate. When Task 1 was nearly complete, commercial and regulatory considerations put the project on hold. Air Products and AK Steel subsequently terminated further development on the project. The completed Task 1 activities are described below.

Environmental and Regulatory Compliance

Air Products prepared a comprehensive plan to secure all necessary approvals and incorporated it into the overall project plan. Analysis of pertinent regulations revealed no obstacles to obtaining all authorizations required to construct and operate the proposed facility. Air Products hired URS Corporation to assist with developing an environmental permitting strategy, which identified three significant environmental permits that were required. These permits and Air Products' efforts to obtain them are described in the following sections.

Air Permit

Air Products and URS performed the required technology reviews of potential controls. These reviews considered impacts and options for compliance for NO_x, VOC, SO₂ and particulate matter. After Air Products and URS completed the air permit application requirements, a draft air permit was issued to the public for comment on 18 March 2011 followed by a public hearing on 27 April 2011. In May 2011, a Permit to Install was issued by the Division of Air Pollution Control of the Ohio EPA (OEPA), and limited construction activities commenced. A copy of the permit is in Attachment A.

Electrical Interconnection Application

Air Products filed an application for an interconnection study with the Midwest Independent Transmission System Operator (MISO). MISO was enlisted to prepare 1) a detailed electrical interconnection feasibility study; 2) a system study; 3) a facilities design/estimate, and 4) the Generator Interconnect Agreement. MISO began the study and eventually transferred the work to the PJM operator (regional transmission organization that coordinates the movement of wholesale electricity in all or part of 13 states and the District of Columbia) The study was nearly complete when the project was suspended.

Ohio Power Siting Board Application

A Certificate of Environmental Compatibility and Public Need was requested from the Ohio Power Siting Board (OPSB). Air Products submitted the formal application to the OPSB during Q1FY10. The Ohio Public Utility Commission (PUC) conducted reviews of the project, which included a site visit. The process was on schedule for the issuance of the certificate in May 2011. In April 2012, the OPSB requested that Air Products issue a Motion for Temporary Suspension of the proceedings due to the uncertain status of the project. Air Products issued the motion, and further OPSB progress was placed on hold. The scheduled public hearing was not conducted because the review was incomplete at the time the project was suspended.

National Environmental Policy Act (NEPA) Assessment

The Department of Energy completed the necessary NEPA environmental assessment and issued the Finding of No Significant Impact (FONSI) in July 2010. A copy of the FONSI can be found in Attachment B.

Engineering and Procurement

Burns & McDonnell of Kansas City Missouri was hired to augment the Air Products engineering team in conduct the engineering activities.

Engineering

The following engineering activities were completed:

- Defined interface conditions with AK Steel
- Developed the plot plan
- Awarded the geotechnical studies and completed the borings
- Developed the building layouts were developed

- Prepared P&IDs
- Conducted hazard reviews
- Completed the operability review
- Conducted a construction labor survey
- Developed and optimized the overall project schedule
- Conducted value engineering/constructability activities
- Prepared mechanical and other estimate basis documents for all major equipment and systems, including:
 - Control System Architectural Drawings
 - Duct Bank Routing and Details
 - Area Classification Drawings
 - Raceway Routings and Details
 - Piping Service Index
 - Electrical One-Lines (Re-issued w/ revised Critical Service Plan)
 - Equipment List
 - Water Balances
 - Site Arrangement
- Prepared civil construction basis for estimating:
 - Developed site sketches and quantities for site-related work
 - Determined soil stripping and general fill quantities
 - Performed site runoff calculations used resulting quantities to develop a runoff plan
- Prepared electrical and instrument basis for estimating:
 - Issued overall one-line for estimate
 - Completed Major Electrical Equipment bid tab
 - Evaluated DCS price and supporting documentation
 - Issued instrument MTOs to estimating.

Capital Cost Estimate

Air Products and its subcontractor(s) completed the engineering activities required to develop a capital cost estimate.

Major Equipment Procurement (for Task 1)

Air Products and Burns and McDonald (BMcD) prepared a preliminary design for major equipment having a material impact on the plant design and/or capital cost estimate. Air Products worked closely with all major equipment suppliers to fully understand the equipment availability. Supplier commitments were obtained for the following items:

Gas turbine generator
Auxiliary steam boilers
Fuel gas compressors

Steam turbine generator
Field-erected tank

Heat recovery steam generators
Wet electrostatic precipitators

Task 2

Task 2, representing the remaining tasks of Procurement, Construction, Commissioning, Start-up, and Performance Acceptance, did not receive the necessary permissions to proceed. No Task 2 work was conducted and no costs were accrued.

Conclusion

After completing Task 1, project execution was placed on hold pending resolution of commercial arrangements and regulatory impacts. Failure to overcome these obstacles led to the June 27, 2012 announcement by Air Products and AK Steel Corporation to terminate the AK Steel Middletown, Ohio Works project.

Attachment A

Permit to Install

Ohio

**Environmental
Protection Agency**

FINAL

**Division of Air Pollution Control
Permit-to-Install**

for

Air Products and Chemicals, Inc. - Middletown CoGen

Facility ID:	1409001091
Permit Number:	P0106675
Permit Type:	Initial Installation
Issued:	5/17/2011
Effective:	5/17/2011

Division of Air Pollution Control
Permit-to-Install
for
Air Products and Chemicals, Inc. - Middletown CoGen

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Authorization

Facility ID: 1409001091
Facility Description: Air Products CoGen facility within the AK Steel Middletown Works
Application Number(s): A0039982, A0039998, A0041493
Permit Number: P0106675
Permit Description: Installation of new Cogeneration facility, including combined cycle blast furnace gas and natural gas fired turbine, two blast furnace gas and natural gas fired boilers, a waste gas flare, a blast furnace gas management system, and a cooling tower.
Permit Type: Initial Installation
Permit Fee: \$11,900.00
Issue Date: 5/17/2011
Effective Date: 5/17/2011

This document constitutes issuance to:

Air Products and Chemicals, Inc. - Middletown CoGen
1801 Crawford St
Middletown, OH 45044

of a Permit-to-Install for the emissions unit(s) identified on the following page.

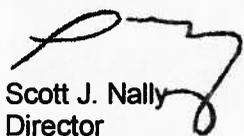
Ohio EPA District Office or local air agency responsible for processing and administering your permit:

Hamilton County Dept. of Environmental Services
250 William Howard Taft Pkwy.
Cincinnati, OH 45219-2660
(513)946-7777

The above named entity is hereby granted a Permit-to-Install for the emissions unit(s) listed in this section pursuant to Chapter 3745-31 of the Ohio Administrative Code. Issuance of this permit does not constitute expressed or implied approval or agreement that, if constructed or modified in accordance with the plans included in the application, the emissions unit(s) of environmental pollutants will operate in compliance with applicable State and Federal laws and regulations, and does not constitute expressed or implied assurance that if constructed or modified in accordance with those plans and specifications, the above described emissions unit(s) of pollutants will be granted the necessary permits to operate (air) or NPDES permits as applicable.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency



Scott J. Nally
Director



Authorization (continued)

Permit Number: P0106675

Permit Description: Installation of new Cogeneration facility, including combined cycle blast furnace gas and natural gas fired turbine, two blast furnace gas and natural gas fired boilers, a waste gas flare, a blast furnace gas management system, and a cooling tower.

Permits for the following Emissions Unit(s) or groups of Emissions Units are in this document as indicated below:

- Emissions Unit ID:** P001
- Company Equipment ID: GT/HRSG
- Superseded Permit Number:
- General Permit Category and Type: Not Applicable
- Emissions Unit ID:** P002
- Company Equipment ID: Cooling Tower
- Superseded Permit Number:
- General Permit Category and Type: Not Applicable
- Emissions Unit ID:** P003
- Company Equipment ID: Flare
- Superseded Permit Number:
- General Permit Category and Type: Not Applicable
- Emissions Unit ID:** P801
- Company Equipment ID: Fugitive CO
- Superseded Permit Number:
- General Permit Category and Type: Not Applicable

Group Name: Boilers

Emissions Unit ID:	B001
Company Equipment ID:	Boiler 01
Superseded Permit Number:	
General Permit Category and Type:	Not Applicable
Emissions Unit ID:	B002
Company Equipment ID:	Boiler 02
Superseded Permit Number:	
General Permit Category and Type:	Not Applicable

A. Standard Terms and Conditions

1. Federally Enforceable Standard Terms and Conditions

- a) All Standard Terms and Conditions are federally enforceable, with the exception of those listed below which are enforceable under State law only:
- (1) Standard Term and Condition A.2.a), Severability Clause
 - (2) Standard Term and Condition A.3.c) through A. 3.e)General Requirements
 - (3) Standard Term and Condition A.6.c) and A. 6.d), Compliance Requirements
 - (4) Standard Term and Condition A.9., Reporting Requirements
 - (5) Standard Term and Condition A.10., Applicability
 - (6) Standard Term and Condition A.11.b) through A.11.e), Construction of New Source(s) and Authorization to Install
 - (7) Standard Term and Condition A.14., Public Disclosure
 - (8) Standard Term and Condition A.15., Additional Reporting Requirements When There Are No Deviations of Federally Enforceable Emission Limitations, Operational Restrictions, or Control Device Operating Parameter Limitations
 - (9) Standard Term and Condition A.16., Fees
 - (10) Standard Term and Condition A.17., Permit Transfers

2. Severability Clause

- a) A determination that any term or condition of this permit is invalid shall not invalidate the force or effect of any other term or condition thereof, except to the extent that any other term or condition depends in whole or in part for its operation or implementation upon the term or condition declared invalid.
- b) All terms and conditions designated in parts B and C of this permit are federally enforceable as a practical matter, if they are required under the Act, or any of its applicable requirements, including relevant provisions designed to limit the potential to emit of a source, are enforceable by the Administrator of the U.S. EPA and the State and by citizens (to the extent allowed by section 304 of the Act) under the Act. Terms and conditions in parts B and C of this permit shall not be federally enforceable and shall be enforceable under State law only, only if specifically identified in this permit as such.

3. General Requirements

- a) The permittee must comply with all terms and conditions of this permit. Any noncompliance with the federally enforceable terms and conditions of this permit constitutes a violation of the Act, and is grounds for enforcement action or for permit revocation, revocation and re-issuance, or modification.

- b) It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the federally enforceable terms and conditions of this permit.
- c) This permit may be modified, revoked, or revoked and reissued, for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or revocation, or of a notification of planned changes or anticipated noncompliance does not stay any term and condition of this permit.
- d) This permit does not convey any property rights of any sort, or any exclusive privilege.
- e) The permittee shall furnish to the Director of the Ohio EPA, or an authorized representative of the Director, upon receipt of a written request and within a reasonable time, any information that may be requested to determine whether cause exists for modifying or revoking this permit or to determine compliance with this permit. Upon request, the permittee shall also furnish to the Director or an authorized representative of the Director, copies of records required to be kept by this permit. For information claimed to be confidential in the submittal to the Director, if the Administrator of the U.S. EPA requests such information, the permittee may furnish such records directly to the Administrator along with a claim of confidentiality.

4. Monitoring and Related Record Keeping and Reporting Requirements

- a) Except as may otherwise be provided in the terms and conditions for a specific emissions unit, the permittee shall maintain records that include the following, where applicable, for any required monitoring under this permit:
 - (1) The date, place (as defined in the permit), and time of sampling or measurements.
 - (2) The date(s) analyses were performed.
 - (3) The company or entity that performed the analyses.
 - (4) The analytical techniques or methods used.
 - (5) The results of such analyses.
 - (6) The operating conditions existing at the time of sampling or measurement.
- b) Each record of any monitoring data, testing data, and support information required pursuant to this permit shall be retained for a period of five years from the date the record was created. Support information shall include, but not be limited to all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. Such records may be maintained in computerized form.
- c) Except as may otherwise be provided in the terms and conditions for a specific emissions unit, the permittee shall submit required reports in the following manner:
 - (1) Reports of any required monitoring and/or recordkeeping of federally enforceable information shall be submitted to the Hamilton County Dept. of Environmental Services.

- (2) Quarterly written reports of (i) any deviations from federally enforceable emission limitations, operational restrictions, and control device operating parameter limitations, excluding deviations resulting from malfunctions reported in accordance with OAC rule 3745-15-06, that have been detected by the testing, monitoring and recordkeeping requirements specified in this permit, (ii) the probable cause of such deviations, and (iii) any corrective actions or preventive measures taken, shall be made to the Hamilton County Dept. of Environmental Services. The written reports shall be submitted (i.e., postmarked) quarterly, by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters. See A.15. below if no deviations occurred during the quarter.
 - (3) Written reports, which identify any deviations from the federally enforceable monitoring, recordkeeping, and reporting requirements contained in this permit shall be submitted (i.e., postmarked) to the Hamilton County Dept. of Environmental Services every six months, by January 31 and July 31 of each year for the previous six calendar months. If no deviations occurred during a six-month period, the permittee shall submit a semi-annual report, which states that no deviations occurred during that period.
 - (4) This permit is for an emissions unit located at a Title V facility. Each written report shall be signed by a responsible official certifying that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
- d) The permittee shall report actual emissions pursuant to OAC Chapter 3745-78 for the purpose of collecting Air Pollution Control Fees.

5. Scheduled Maintenance/Malfunction Reporting

Any scheduled maintenance of air pollution control equipment shall be performed in accordance with paragraph (A) of OAC rule 3745-15-06. The malfunction, i.e., upset, of any emissions units or any associated air pollution control system(s) shall be reported to the Hamilton County Dept. of Environmental Services in accordance with paragraph (B) of OAC rule 3745-15-06. (The definition of an upset condition shall be the same as that used in OAC rule 3745-15-06(B)(1) for a malfunction.) The verbal and written reports shall be submitted pursuant to OAC rule 3745-15-06.

Except as provided in that rule, any scheduled maintenance or malfunction necessitating the shutdown or bypassing of any air pollution control system(s) shall be accompanied by the shutdown of the emission unit(s) that is (are) served by such control system(s).

6. Compliance Requirements

- a) The emissions unit(s) identified in this Permit shall remain in full compliance with all applicable State laws and regulations and the terms and conditions of this permit.
- b) Any document (including reports) required to be submitted and required by a federally applicable requirement in this permit shall include a certification by a responsible official that, based on information and belief formed after reasonable inquiry, the statements in the document are true, accurate, and complete.

- c) Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the Director of the Ohio EPA or an authorized representative of the Director to:
- (1) At reasonable times, enter upon the permittee's premises where a source is located or the emissions-related activity is conducted, or where records must be kept under the conditions of this permit.
 - (2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit, subject to the protection from disclosure to the public of confidential information consistent with ORC section 3704.08.
 - (3) Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit.
 - (4) As authorized by the Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit and applicable requirements.
- d) The permittee shall submit progress reports to the Hamilton County Dept. of Environmental Services concerning any schedule of compliance for meeting an applicable requirement. Progress reports shall be submitted semiannually or more frequently if specified in the applicable requirement or by the Director of the Ohio EPA. Progress reports shall contain the following:
- (1) Dates for achieving the activities, milestones, or compliance required in any schedule of compliance, and dates when such activities, milestones, or compliance were achieved.
 - (2) An explanation of why any dates in any schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.

7. Best Available Technology

As specified in OAC Rule 3745-31-05, new sources that must employ Best Available Technology (BAT) shall comply with the Applicable Emission Limitations/Control Measures identified as BAT for each subject emissions unit.

8. Air Pollution Nuisance

The air contaminants emitted by the emissions units covered by this permit shall not cause a public nuisance, in violation of OAC rule 3745-15-07.

9. Reporting Requirements

The permittee shall submit required reports in the following manner:

- a) Reports of any required monitoring and/or recordkeeping of state-only enforceable information shall be submitted to the Hamilton County Dept. of Environmental Services.
- b) Except as otherwise may be provided in the terms and conditions for a specific emissions unit, quarterly written reports of (a) any deviations (excursions) from state-only required emission

limitations, operational restrictions, and control device operating parameter limitations that have been detected by the testing, monitoring, and recordkeeping requirements specified in this permit, (b) the probable cause of such deviations, and (c) any corrective actions or preventive measures which have been or will be taken, shall be submitted to the Hamilton County Dept. of Environmental Services. If no deviations occurred during a calendar quarter, the permittee shall submit a quarterly report, which states that no deviations occurred during that quarter. The reports shall be submitted (i.e., postmarked) quarterly, by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters. (These quarterly reports shall exclude deviations resulting from malfunctions reported in accordance with OAC rule 3745-15-06.)

10. Applicability

This Permit-to-Install is applicable only to the emissions unit(s) identified in the Permit-to-Install. Separate application must be made to the Director for the installation or modification of any other emissions unit(s).

11. Construction of New Sources(s) and Authorization to Install

- a) This permit does not constitute an assurance that the proposed source will operate in compliance with all Ohio laws and regulations. This permit does not constitute expressed or implied assurance that the proposed facility has been constructed in accordance with the application and terms and conditions of this permit. The action of beginning and/or completing construction prior to obtaining the Director's approval constitutes a violation of OAC rule 3745-31-02. Furthermore, issuance of this permit does not constitute an assurance that the proposed source will operate in compliance with all Ohio laws and regulations. Issuance of this permit is not to be construed as a waiver of any rights that the Ohio Environmental Protection Agency (or other persons) may have against the applicant for starting construction prior to the effective date of the permit. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed facilities cannot meet the requirements of this permit or cannot meet applicable standards.
- b) If applicable, authorization to install any new emissions unit included in this permit shall terminate within eighteen months of the effective date of the permit if the owner or operator has not undertaken a continuing program of installation or has not entered into a binding contractual obligation to undertake and complete within a reasonable time a continuing program of installation. This deadline may be extended by up to 12 months if application is made to the Director within a reasonable time before the termination date and the party shows good cause for any such extension.
- c) The permittee may notify Ohio EPA of any emissions unit that is permanently shut down (i.e., the emissions unit has been physically removed from service or has been altered in such a way that it can no longer operate without a subsequent "modification" or "installation" as defined in OAC Chapter 3745-31) by submitting a certification from the authorized official that identifies the date on which the emissions unit was permanently shut down. Authorization to operate the affected emissions unit shall cease upon the date certified by the authorized official that the emissions unit was permanently shut down. At a minimum, notification of permanent shut down shall be made or confirmed by marking the affected emissions unit(s) as "permanently shut down" in Ohio EPA's "Air Services" along with the date the emissions unit(s) was permanently

removed and/or disabled. Submitting the facility profile update will constitute notifying of the permanent shutdown of the affected emissions unit(s).

- d) The provisions of this permit shall cease to be enforceable for each affected emissions unit after the date on which an emissions unit is permanently shut down (i.e., emissions unit has been physically removed from service or has been altered in such a way that it can no longer operate without a subsequent "modification" or "installation" as defined in OAC Chapter 3745-31). All records relating to any permanently shutdown emissions unit, generated while the emissions unit was in operation, must be maintained in accordance with law. All reports required by this permit must be submitted for any period an affected emissions unit operated prior to permanent shut down. At a minimum, the permit requirements must be evaluated as part of the reporting requirements identified in this permit covering the last period the emissions unit operated.

No emissions unit certified by the authorized official as being permanently shut down may resume operation without first applying for and obtaining a permit pursuant to OAC Chapter 3745-31.

- e) The permittee shall comply with any residual requirements related to this permit, such as the requirement to submit a deviation report, air fee emission report, or other any reporting required by this permit for the period the operating provisions of this permit were enforceable, or as required by regulation or law. All reports shall be submitted in a form and manner prescribed by the Director. All records relating to this permit must be maintained in accordance with law.

12. Permit-To-Operate Application

The permittee is required to apply for a Title V permit pursuant to OAC Chapter 3745-77. The permittee shall submit a complete Title V permit application or a complete Title V permit modification application within twelve (12) months after commencing operation of the emissions units covered by this permit. However, if the proposed new or modified source(s) would be prohibited by the terms and conditions of an existing Title V permit, a Title V permit modification must be obtained before the operation of such new or modified source(s) pursuant to OAC rule 3745-77-04(D) and OAC rule 3745-77-08(C)(3)(d).

13. Construction Compliance Certification

The applicant shall identify the following dates in the online facility profile for each new emissions unit identified in this permit.

- a) Completion of initial installation date shall be entered upon completion of construction and prior to start-up.
- b) Commence operation after installation or latest modification date shall be entered within 90 days after commencing operation of the applicable emissions unit.

14. Public Disclosure

The facility is hereby notified that this permit, and all agency records concerning the operation of this permitted source, are subject to public disclosure in accordance with OAC rule 3745-49-03.

15. Additional Reporting Requirements When There Are No Deviations of Federally Enforceable Emission Limitations, Operational Restrictions, or Control Device Operating Parameter Limitations

If no deviations occurred during a calendar quarter, the permittee shall submit a quarterly report, which states that no deviations occurred during that quarter. The reports shall be submitted quarterly (i.e., postmarked), by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters.

16. Fees

The permittee shall pay fees to the Director of the Ohio EPA in accordance with ORC section 3745.11 and OAC Chapter 3745-78. The permittee shall pay all applicable permit-to-install fees within 30 days after the issuance of any permit-to-install. The permittee shall pay all applicable permit-to-operate fees within thirty days of the issuance of the invoice.

17. Permit Transfers

Any transferee of this permit shall assume the responsibilities of the prior permit holder. The new owner must update and submit the ownership information via the "Owner/Contact Change" functionality in Air Services once the transfer is legally completed. The change must be submitted through Air Services within thirty days of the ownership transfer date.

18. Risk Management Plans

If the permittee is required to develop and register a risk management plan pursuant to section 112(r) of the Clean Air Act, as amended, 42 U.S.C. 7401 et seq. ("Act"), the permittee shall comply with the requirement to register such a plan.

19. Title IV Provisions

If the permittee is subject to the requirements of 40 CFR Part 72 concerning acid rain, the permittee shall ensure that any affected emissions unit complies with those requirements. Emissions exceeding any allowances that are lawfully held under Title IV of the Act, or any regulations adopted thereunder, are prohibited.

B. Facility-Wide Terms and Conditions

1. All the following facility-wide terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only:

a) None.

2. The following emissions units contained in this permit are subject to 40 CFR Part 60, Subpart Db, Standards of Performance for New Stationary Sources (NSPS) Industrial, Commercial, and Institutional Steam Generating Units: B001 and B002. The complete NSPS requirements, including the NSPS General Provisions may be accessed via the internet from the Electronic Code of Federal Regulations (e-CFR) website <http://ecfr.gpoaccess.gov> or by contacting the appropriate Ohio EPA District office or local air agency.

The permittee shall comply with all applicable requirements of 40 CFR Part 60, Subpart Db. The permittee shall also comply with all the applicable requirements of 40 CFR Part 60, Subpart A (General Provisions).

3. The following emissions unit contained in this permit is subject to 40 CFR Part 60, Subpart KKKK, Standards of Performance for New Stationary Sources (NSPS) Stationary Combustion Turbines: P001. The complete NSPS requirements, including the NSPS General Provisions may be accessed via the internet from the Electronic Code of Federal Regulations (e-CFR) website <http://ecfr.gpoaccess.gov> or by contacting the appropriate Ohio EPA District office or local air agency.

The permittee shall comply with all applicable requirements of 40 CFR Part 60, Subpart KKKK. The permittee shall also comply with all the applicable requirements of 40 CFR Part 60, Subpart A (General Provisions).

4. Air Products and Chemicals, Inc. - Middletown Cogeneration (facility ID 1409001091) and AK Steel Corporation – Middletown Works (facility ID 1409010006) have been determined to be one facility for permitting purposes under 40 CFR Part 52.21, OAC Chapter 3745-31, and OAC Chapter 3745-77. All blast furnace gas (BFG) will be produced by the AK Steel Blast Furnace No. 3 in Middletown, Ohio (Emissions Unit P925, 1409010006).

5. Operating Restrictions

a) None.

6. Monitoring and/or Recordkeeping Requirements

a) For a period of 5 years following completion of this project, the permittee shall maintain a record of the pre-change baseline actual emissions for PE, PM₁₀, PM_{2.5}, SO₂, CO, and VOC, in tons per year, for the following sources combined: AK Steel Blast Furnace No. 3, Stoves, and Flare (P925, 1409010006, from blast furnace gas combustion only), AK Steel Wilputte Battery (B918, 1409010006, from blast furnace gas combustion only), and the AK Steel No. 2 Boilerhouse (B007-B010, 1409010006). The purpose of this record is to demonstrate that pre-change emissions from these emissions units, combined, did not trigger major New Source Review (NSR) upon completion of the project as provided in the application for the Air Products and Chemicals, Inc. - Middletown Cogeneration air permit to install P0106675. The permittee's application indicated that these pollutants equaled or exceeded fifty (50) percent of the applicable NSR significance level, as defined in OAC rule 3745-31-01(MMMMM)(effective date

12/14/2007), for that pollutant when emissions are included in the projected actual emissions for independent factors unrelated to the project.

- b) For a period of 5 years following completion of this project, the permittee shall calculate and maintain a record of post-change actual annual emissions for VOC, in tons per year, for the following sources combined: Air Products and Chemicals, Inc. - Middletown Cogeneration [Emission Units B001, B002, P001, P002, P003, P801, and all de minimus and permit exempt emission units (i.e. roadways, storage tanks), 1409001091], AK Steel Blast Furnace No. 3, Stoves, and Flare (P925, 1409010006, from blast furnace gas combustion only), the AK Steel Wilputte Battery (B918, 1409010006, from blast furnace gas combustion only), and the AK Steel No. 2 Boilerhouse (B007-B010, 1409010006). The purpose of this record is to demonstrate that post-change emissions of VOC from these emissions units, combined, did not trigger major New Source Review (NSR) upon completion of the project as provided in the application for the Air Products and Chemicals, Inc. - Middletown Cogeneration air permit to install P0106675. The permittee's application indicated that this pollutant equaled or exceeded fifty (50) percent of the applicable NSR significance level, as defined in OAC rule 3745-31-01(MMMMM)(effective date 12/14/2007), for that pollutant when emissions are excluded from projected actual emissions for independent factors unrelated to the project.

7. Reporting Requirements

- a) For a period of 5 years following completion of this project, the permittee shall submit a report if the actual annual emissions of VOC, in tons per year, from Air Products and Chemicals, Inc. - Middletown Cogeneration [Emissions Units B001, B002, P001, P002, P003, P801, and all de minimus and permit exempt emissions units (i.e. roadways, storage tanks), 1409001091], the AK Steel Blast Furnace No. 3, Stoves, and Flare (P925, 1409010006, from blast furnace gas combustion only), the AK Steel Wilputte Battery (B918, 1409010006, from blast furnace gas combustion only), and the AK Steel No. 2 Boilerhouse (B007-B010, 1409010006) exceed the baseline actual emissions for VOC [as documented and maintained in 6.a)] by a significant amount for that pollutant, as defined in OAC rule 3745-31-01(MMMMM), and if such emissions differ from the preconstruction projection as documented and maintained pursuant to OAC rule 3745-31-10(A)(1)(c). The report shall contain the following:
- (1) The name, address and telephone number of the major stationary source;
 - (2) The actual annual emissions of VOC; and
 - (3) Any other information that the permittee wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection).

The report shall be submitted within 60 days after the end of each year during which an exceedance occurs.

C. Emissions Unit Terms and Conditions

1. P001, GT/HRSG

Operations, Property and/or Equipment Description:

Stationary combined cycle turbine (nominally rated at 1,100 mmBtu/hour) fired with blast furnace gas and/or natural gas, with steam injection, blast furnace gas pretreatment, and vented to a heat recovery steam generator controlled with selective catalytic reduction.

b) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) d)(8), d)(9), d)(10), d)(11), e)(5)d.

c) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T) Best Available Technology (BAT)	<u>When combusting blast furnace gas, natural gas, or a blend of blast furnace gas and natural gas:</u> Carbon monoxide (CO) emissions shall not exceed 25 ppmvd at 15% oxygen. Nitrogen oxides (NOx) emissions shall not exceed 12.0 ppmvd at 15% oxygen. Sulfur dioxide (SO ₂) emissions shall not exceed 0.32 pound per mmBtu. See b)(2)h. and b)(2)i. Volatile organic compound (VOC) emissions shall not exceed 1.6 ppmvd. <u>When combusting only blast furnace gas or a blend of blast furnace gas and natural gas:</u> Particulate emissions (PE) shall not exceed 21.2 pounds per hour. [PE is assumed to be equivalent to PM ₁₀ and PM _{2.5}]

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
		<p><u>When combusting only natural gas:</u></p> <p>Particulate emissions (PE) shall not exceed 0.005 pound per mmBtu. [PE is assumed to be equivalent to PM₁₀ and PM_{2.5}]</p> <p><u>Emission Limitation during Bypass of SCR for Routine SCR Preventive Maintenance:</u></p> <p>Nitrogen oxides (NOx) emissions shall not exceed 1.72 TPY as a rolling, 12-month summation. See b)(2)a. and c)(3).</p> <p><u>Start-Up and Shutdown Emission Limitations:</u></p> <p>Nitrogen oxides (NOx) emissions shall not exceed 10.3 TPY as a rolling, 12-month summation*.</p> <p>Carbon monoxide (CO) emissions shall not exceed 7.2 TPY as a rolling 12-month summation*.</p> <p>*These limitations do not apply during the initial startup period of this emissions unit.</p> <p>See b)(2)a., b)(2)b., and c)(2).</p>
b.	OAC rule 3745-31-05(F) Voluntary Limits on Allowable Emissions	See c)(1).
c.	OAC rule 3745-31-10 NSR Projects involving New and Existing Emissions Units at a Major Stationary Source	See Section B. Facility-Wide Terms and Conditions for NSR Project Requirements.
d.	OAC rule 3745-17-07(A)	Visible particulate emissions from any stack shall not exceed 20% opacity, as a 6-minute average, except as specified by rule.

e.	OAC rule 3745-17-11(B)(4)	The particulate emission limitation specified by this rule is less stringent than the particulate emission limitations established pursuant to BAT under ORC 3704.03(T).
f.	OAC rule 3745-18-06(F)	The emission limitation specified by this rule is less stringent than the emission limitations established pursuant to BAT under ORC 3704.03(T).
g.	OAC Chapter 3745-103 Acid Rain Permits and Compliance	Exempt. See b)(2)c.
h.	OAC rule 3745-110-03(E)(2)(d) NOx - Reasonably Available Control Technology (RACT)	The emission limitation specified by this rule is less stringent than the emission limitation established pursuant to BAT under ORC 3704.03(T).
i.	40 CFR Part 60, Subpart KKKK (40 CFR 60.4300 – 60.4420) Standards of Performance for New Stationary Sources (NSPS), Stationary Combustion Turbines. In accordance with 40 CFR 60.4305, this emissions unit is a stationary combustion turbine with a heat input greater than 10 mmBtu constructed after February 18, 2005. The emissions from the heat recovery steam generator are also subject to this Subpart.	<p>NOx: The NOx emission limitations specified by this rule are less stringent than the NOx emission limitation established pursuant to BAT under ORC 3704.03(T).</p> <p>SO₂: See b)(2)d.</p> <p>See b)(2)e. and c)(4).</p>
j.	40 CFR Part 63, Subpart YYYY [40 CFR 63.6080-63.6175] National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Combustion Turbines. In accordance with 40 CFR 63.6085, this emissions unit is a new diffusion flame gas-fired stationary combustion turbine subject to limited requirements pursuant to 63.6095(d).	See b)(2)f.

(2) **Additional Terms and Conditions**

- a. The BAT determination pursuant to ORC 3704.03(T) for this emissions unit includes:
- i. use of only blast furnace gas and/or natural gas as fuel;
 - ii. employ a Selective Catalytic Reduction (SCR) emissions control device to reduce NOx emissions to no greater than 12.0 ppmvd (at 15% O₂), when firing only blast furnace gas or a blend of blast furnace gas and natural gas;
 - iii. except during startup or shutdown, employ steam injection in the combustion turbine in combination with the SCR emissions control device to reduce NOx emissions to no greater than 12.0 ppmvd (at 15% O₂), when firing only natural gas, unless the permittee demonstrates and receives approval in writing from the Director (the appropriate Ohio EPA District Office or local air agency) that the addition of steam injection is not required for compliance with this limitation when firing only natural gas;
 - iv. employ good combustion practices to reduce CO emissions to 25 ppmvd (at 15% O₂) and to reduce VOC emissions to 1.6 ppmvd;
 - v. limit the total annual hours of start-up and shutdown operating periods, combined, to minimize annual NOx and CO emissions from start-up and shutdown operations; and,
 - vi. limit the total annual operating hours during bypass of the SCR to minimize annual NOx emissions from routine SCR preventive maintenance.
- b. "Start-up" shall be defined as the operating period from initial fuel combustion in the gas turbine through the period to attain 40% of the maximum rated load and stable combustion. "Shutdown" shall be defined as the operating period where the combustion turbine is reduced to 40% of maximum rated load for purposes of shutdown, and ends when combustion has ceased. "Initial startup period" shall be defined as the period following construction where the emissions unit undergoes certain pre-startup procedures and commissioning in order to ready the emissions unit for service. Such commissioning activities during the initial startup period shall not be considered as achieving the maximum production operating rate of the emissions unit for the purposes of the 60-day compliance testing deadline specified in f)(2)a.
- c. This emissions unit is exempt from the acid rain program requirements in OAC Chapter 3745-103 pursuant to the gross electric sales exemption threshold for a cogeneration facility specified in OAC rule 3745-103-02(B)(4)(b). The permittee shall maintain records as specified in d)(2) to demonstrate compliance with the following exemption threshold:

- i. average annual electric sales to the utility power distribution system shall not exceed more than one-third of potential electrical output capacity; or
 - ii. actual electric output (on a gross basis) shall not exceed 219,000 MWe-hours.
- d. This emissions unit is subject to the Standards of Performance for New Stationary Sources (NSPS), Stationary Combustion Turbines, Subpart KKKK, and the emission limitations for sulfur dioxide (SO₂) specified in 60.4330(a). Pursuant to 60.4330(a), the permittee is subject to either of the following emission limitations for SO₂:
- i. The permittee must not cause to be discharged into the atmosphere from the stationary combustion turbine any gases which contain SO₂ in excess of 110 nanograms per Joule (ng/J) (0.90 pound per megawatt-hour (lb/MWh)) gross output; or
 - ii. The permittee shall not combust any fuel in the stationary combustion turbine which contains total potential sulfur dioxide emissions in excess of 26 ng/J (0.060 pound per mmBtu) heat input. If the stationary combustion turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

The permittee states that the Subpart KKKK rulemaking did not anticipate or consider the combustion of blast furnace gas in stationary combustion turbines when it was promulgated in 2006 since this emissions unit is expected to be the first deployment of turbine technology and engineering design to combust blast furnace gas. At the time of this permit action, the permittee has requested US EPA amend the NSPS to bring the emission standards up to date with source combustion of blast furnace gas. Nothing in these terms shall prohibit the permittee from complying with alternative SO₂ emission limitations specified in Subpart KKKK, including any future rule amendments promulgated by US EPA, as applicable.

- e. The application and enforcement of the provisions of the New Source Performance Standards (NSPS), as promulgated by the United States Environmental Protection Agency, 40 CFR Part 60, are delegated to the Ohio Environmental Protection Agency. The requirements of 40 CFR Part 60 are also federally enforceable.
- f. This emissions unit is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Combustion Turbines, 40 CFR Part 63, Subpart YYYY. U.S. EPA initially promulgated these standards under CAA Section 112 on March 5, 2004. On August 18, 2004, the U.S. EPA stayed the effectiveness of these standards for new diffusion flame gas-fired stationary combustion turbines. New affected sources that meet this definition in 63.6095(d) are subject only to the Initial Notification requirements set forth in 63.6145, and specified in e)(4) of this permit, until U.S. EPA takes final action to require compliance and publishes a document in the Federal Register.

- g. On July 6, 2010, US EPA announced the proposed CAIR replacement rule, the "Transport Rule" as required by the original court vacatur of the federal CAIR program in July 2008. The permittee shall comply with any applicable federally mandated programs that may replace the CAIR program affecting electric generating facilities.
- h. The BAT requirement for SO₂ under ORC 3704.03(T) has been applied to all emissions units combusting blast furnace gas at the Air Products and Chemicals, Inc. - Middletown Cogeneration facility (B001, B002, P001, and P003). In the event that during the course of operation of this emissions unit it is discovered that SO₂ emission rates from blast furnace gas combustion vary above 0.32 pound per mmBtu during representative normal operations, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise this BAT determination to have the emission limitation adjusted consistent with the best available information on blast furnace gas sulfur content variability.
- i. The SO₂ emission limitation established pursuant to BAT requirements under ORC 3703.04(T) may be less stringent than the SO₂ emissions discharge standard specified in 40 CFR Part 60, Subpart KKKK. Upon start-up of this emissions unit, the permittee shall comply with the more stringent SO₂ emissions limitation.

d) **Operational Restrictions**

- (1) The maximum amount of blast furnace gas combusted in emissions units B001, B002, and P001, combined, shall not exceed 12,702,000 million Btu per year of actual heat input, as a rolling 12-month summation.

To ensure enforceability during the first 12 calendar months of operation or the first 12 calendar months following the issuance of this permit, the permittee shall not exceed the heat input levels specified in the following table:

Month	Maximum Allowable Blast Furnace Gas Cumulative Heat Input (in mmBtu)
1	1,500,000
1-2	3,000,000
1-3	4,500,000
1-4	6,000,000
1-5	7,500,000
1-6	9,000,000
1-7	10,500,000
1-8	12,000,000

1-9	12,702,000
1-10	12,702,000
1-11	12,702,000
1-12	12,702,000

After the first 12 calendar months of operation or the first 12 calendar months following the issuance of this permit, compliance with the annual blast furnace gas heat input limitation shall be based upon a rolling, 12-month summation of the actual blast furnace gas heat input rates

- (2) The maximum annual start-up and shutdown hours of operation, combined, for this emissions unit shall not exceed 137.4 hours based upon a rolling, 12-month summation. This limitation excludes the initial startup period of this emissions unit, as defined in b)(2)b.
- (3) The emissions from this emissions unit shall be vented to a selective catalytic reduction (SCR) device at all times when the emissions unit is in operation, except during routine SCR preventive maintenance which may require bypass of the SCR while the emissions unit is in operation. The maximum annual hours of operation for this emissions unit when bypassing the SCR shall not exceed 24 hours based upon a rolling, 12-month summation.
- (4) The permittee shall comply with the applicable operational requirements under 40 CFR Part 60, Subpart KKKK (40 CFR 60.4300-4420).

e) **Monitoring and/or Recordkeeping Requirements**

- (1) See 40 CFR Part 60, Subpart KKKK (40 CFR 60.4300-4420).
- (2) The permittee shall maintain annual records, on a calendar year basis, of the following information to demonstrate that this emissions unit is not an affected unit under the acid rain program:
 - a. the potential electrical output capacity of this emissions unit;
 - b. the average electric sales to the utility power distribution system;
 - c. the percentage of average electric sales as compared to the potential electrical output capacity; and
 - d. the total actual electric output (on a gross basis), in MWe-hours.
- (3) The permittee shall install, operate, and maintain equipment to monitor and record the natural gas and blast furnace gas fuel flow rates to this emissions unit, in standard cubic feet per hour (scfh). The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the

anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The flow monitoring equipment shall have an accuracy of within plus or minus five percent (5%). The monitoring device and any recorder shall be maintained in continuous operation when the emissions unit is in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for this emissions unit.

- (4) The permittee shall determine the heat content of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in accordance with either Alternative 1 or Alternative 2 described below:

a. Alternative 1:

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Higher (Gross) Heating Value (HHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per standard cubic foot (Btu/scf). The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

b. Alternative 2:

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Lower (Net) Heating Value (LHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per standard cubic foot (Btu/scf). The equipment shall be capable of calculating and recording the HHV of the blast furnace gas based upon the measured LHV multiplied by the appropriate conversion factor for blast furnace gas. The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

The permittee has provided a conversion factor of 1.059 based on blast furnace gas composition analyses provided with the application for permit P0106675. Under this Alternative, the permittee shall collect and analyze monthly samples of the blast furnace gas vented to emissions units B001, B002, P001, and P003, for composition and heat content to confirm the conversion factor as provided. Upon collecting and analyzing 12 consecutive months of blast furnace gas samples, the permittee may submit a written request to the Director of OhioEPA for approval of a reduced blast furnace gas sampling schedule. Such a request shall include copies of the blast furnace gas analyses and sufficient documentation to support a reduced sampling schedule.

- (5) The permittee shall maintain monthly records of the following information for this emissions unit:
- a. the total quantity of blast furnace gas burned each month, in mmscf;
 - b. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total quantity of blast furnace gas burned, in mmscf;
 - c. the average heat content of the blast furnace gas burned each month, in Btu/scf, based upon the data collected in d)(4);
 - d. beginning after the first 12 calendar months of operation, the rolling, 12-month average heat content the blast furnace gas burned, in Btu/scf;
 - e. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total blast furnace gas heat input rate, in million Btu;
 - f. the total quantity of natural gas burned each month, in mmscf;
 - g. the total PE, SO₂, CO, NO_x, and VOC emissions for each month, in tons, calculated in accordance with the equations in d)(6) for emissions units B001, B002, and P001, combined; and
 - h. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total PE, SO₂, CO, NO_x, and VOC emissions, in tons, for emissions units B001, B002, and P001, combined.
- (6) The monthly PE, SO₂, CO, NO_x, and VOC emissions for emissions units B001, B002, and P001, combined, are calculated based on the following equations and the records collected above in d)(5):

a.
$$B001_{ER} = [(C_{BFG} \text{mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{lb/mmBtu}) + (C_{NG} \text{mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$B001_{ER}$ = pollutant emission rate, in tons, from emissions unit B001;

C_{BFG} = total blast furnace gas usage in emissions unit B001 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{Pollutant}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit B001 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{Pollutant}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

b.
$$B002_{ER} = [(C_{BFG} \text{mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu}) + (C_{NG} \text{mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$B002_{ER}$ = pollutant emission rate, in tons, from emissions unit B002;

C_{BFG} = total blast furnace gas usage in emissions unit B002 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{Pollutant}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit B002 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{Pollutant}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

c.
$$P001_{ER} = [(C_{BFG} \text{mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu}) + (C_{NG} \text{mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$P001_{ER}$ = pollutant emission rate, in tons, from emissions unit P001;

C_{BFG} = total blast furnace gas usage in emissions unit P001 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{Pollutant}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit P001 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{\text{Pollutant}}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

- d. $Total_{ER} = B001_{ER}$, for each pollutant + $B002_{ER}$, for each pollutant + $P001_{ER}$ for each pollutant

Where:

$Total_{ER}$ = monthly emission rate, in tons, of each pollutant for emissions units B001, B002, and P001, combined.

- (7) The permittee shall maintain monthly records of the following information for this emissions unit:
- a. the number of start-ups, type of start-up (cold or warm), and the duration, in minutes or hours, of each start-up;
 - b. the number of shutdowns, and the duration, in minutes or hours, of each shutdown;
 - c. the total duration, in hours, of all start-up and shutdown operating periods, combined;
 - d. the total duration, in minutes or hours, of all operating periods when bypassing the SCR for routine SCR preventive maintenance;
 - e. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total duration, in hours, of all start-up and shutdown operating periods, combined;
 - f. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total duration, in hours, of all operating periods when bypassing the SCR for routine SCR preventive maintenance;
 - g. the total emissions, in tons, of NO_x^* and CO^* for all start-up and shutdown operating periods, combined;
 - h. the total emissions, in tons, of NO_x^{**} for all operating periods when bypassing the SCR for routine SCR preventive maintenance;
 - i. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total emissions, in tons, of NO_x^* and CO^* for all start-up and shutdown hours of operation, combined; and
 - j. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total emissions, in tons, of NO_x^{**} for all operating periods when bypassing the SCR for routine SCR preventive maintenance.

*The total NOx and CO emissions for all start-up and shutdown periods shall be calculated using the emission factors for start-up and shutdown [See f)(1)c.]. These requirements do not apply during the initial startup period of this emissions unit.

**The total NOx emissions for all operating period when bypassing the SCR for routine SCR preventive maintenance shall be calculated using the uncontrolled NOx emission factor for this emissions unit [See f)(1)d.].

- (8) The PTI application for this emissions unit, P001, was evaluated based on the actual materials and the design parameters of the emissions unit's exhaust system, as specified by the permittee. The "Toxic Air Contaminant Statute", ORC 3704.03(F), was applied to this emissions unit for each toxic air contaminant listed in OAC rule 3745-114-01, using data from the permit application; and modeling was performed for each toxic air contaminant(s) emitted at over one ton per year using an air dispersion model such as SCREEN3, AERMOD, or ISCST3, or other Ohio EPA approved model. The predicted 1-hour maximum ground-level concentration result(s) from the approved air dispersion model, was compared to the Maximum Acceptable Ground-Level Concentration (MAGLC), calculated as described in the Ohio EPA guidance document entitled "Review of New Sources of Air Toxic Emissions, Option A", as follows:
- a. the exposure limit, expressed as a time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, for each toxic compound(s) emitted from the emissions unit(s), (as determined from the raw materials processed and/or coatings or other materials applied) has been documented from one of the following sources and in the following order of preference (TLV was and shall be used, if the chemical is listed):
 - i. threshold limit value (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH) "Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices"; or
 - ii. STEL (short term exposure limit) or the ceiling value from the American Conference of Governmental Industrial Hygienists (ACGIH) "Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices"; the STEL or ceiling value is multiplied by 0.737 to convert the 15-minute exposure limit to an equivalent 8-hour TLV.
 - b. The TLV is divided by ten to adjust the standard from the working population to the general public (TLV/10).
 - c. This standard is/was then adjusted to account for the duration of the exposure or the operating hours of the emissions unit(s), i.e., "24" hours per day and "7" days per week, from that of 8 hours per day and 5 days per week. The resulting calculation was (and shall be) used to determine the Maximum Acceptable Ground-Level Concentration (MAGLC):

$$TLV/10 \times 8/X \times 5/Y = 4 TLV/XY = MAGLC$$

- d. The following summarizes the results of dispersion modeling for the significant toxic contaminants (emitted at 1 or more tons/year) or [worst case] toxic contaminant(s):

Toxic Contaminant: Ammonia

TLV (mg/m³): 17

Maximum Hourly Emission Rate (lbs/hr): 11

Predicted 1-Hour Maximum Ground-Level Concentration (ug/m³): 3.086

MAGLC (ug/m³): 405

The permittee has demonstrated that emissions of ammonia from emissions unit P001 is calculated to be less than eighty per cent of the maximum acceptable ground level concentration (MAGLC); any new raw material or processing agent shall not be applied without evaluating each component toxic air contaminant in accordance with the [Toxic Air Contaminant Statute], ORC 3704.03(F).

- (9) Prior to making any physical changes to or changes in the method of operation of the emissions unit(s), that could impact the parameters or values that were used in the predicted 1-hour maximum ground-level concentration[], the permittee shall re-model the change(s) to demonstrate that the MAGLC has not been exceeded. Changes that can affect the parameters/values used in determining the 1-hour maximum ground-level concentration include, but are not limited to, the following:
- a. changes in the composition of the materials used or the use of new materials, that would result in the emission of a new toxic air contaminant with a lower Threshold Limit Value (TLV) than the lowest TLV previously modeled;
 - b. changes in the composition of the materials, or use of new materials, that would result in an increase in emissions of any toxic air contaminant listed in OAC rule 3745-114-01, that was modeled from the initial (or last) application; and
 - c. physical changes to the emissions unit(s) or its/their exhaust parameters (e.g., increased/ decreased exhaust flow, changes in stack height, changes in stack diameter, etc.).

If the permittee determines that the [Toxic Air Contaminant Statute] will be satisfied for the above changes, the Ohio EPA will not consider the change(s) to be a "modification" under OAC rule 3745-31-01 solely due to a non-restrictive change to a parameter or process operation, where compliance with the [Toxic Air Contaminant Statute], ORC 3704.03(F), has been documented. If the change(s) meet(s) the definition of a "modification", the permittee shall apply for and obtain a final PTI prior to the change. The Director may consider any significant departure from the operations of the emissions unit, described in the permit application, as a modification that results in greater emissions than the emissions rate modeled to determine the ground level

concentration; and he/she may require the permittee to submit a permit application for the increased emissions.

- (10) The permittee shall collect, record, and retain the following information for each toxic evaluation conducted to determine compliance with the "Toxic Air Contaminant Statute", ORC 3704.03(F):
- a. a description of the parameters/values used in each compliance demonstration and the parameters or values changed for any re-evaluation of the toxic(s) modeled (the composition of materials, new toxic contaminants emitted, change in stack/exhaust parameters, etc.);
 - b. the Maximum Acceptable Ground-Level Concentration (MAGLC) for each significant toxic contaminant or worst-case contaminant, calculated in accordance with the "Toxic Air Contaminant Statute", ORC 3704.03(F);
 - c. a copy of the computer model run(s), that established the predicted 1-hour maximum ground-level concentration that demonstrated the emissions unit(s) to be in compliance with the "Toxic Air Contaminant Statute", ORC 3704.03(F), initially and for each change that requires re-evaluation of the toxic air contaminant emissions; and
 - d. the documentation of the initial evaluation of compliance with the "Toxic Air Contaminant Statute", ORC 3704.03(F), and documentation of any determination that was conducted to re-evaluate compliance due to a change made to the emissions unit(s) or the materials applied.
- (11) The permittee shall maintain a record of any change made to a parameter or value used in the dispersion model, used to demonstrate compliance with the "Toxic Air Contaminant Statute", ORC 3704.03(F), through the predicted 1-hour maximum ground-level concentration. The record shall include the date and reason(s) for the change and if the change would increase the ground-level concentration.

f) Reporting Requirements

- (1) Unless other arrangements have been approved by the Director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.
- (2) Pursuant to 40 CFR Part 60.7, the permittee shall submit to the Hamilton County Department of Environmental Services notification of:
 - a. the date construction or reconstruction of the emissions unit is commenced, no later than 30 days after such date; and
 - b. the actual date of initial startup, submitted within 15 days after such date.
- (3) See 40 CFR Part 60, Subpart KKKK (40 CFR 60.4300-4420).

- (4) The permittee shall submit reports and other such notifications to the Hamilton County Department of Environmental Services pursuant to 40 CFR Part 63, Subpart Yyyy, as outlined in the following sections:

63.6145(a) – (d)	Notification requirements for sources otherwise not subject to the emission limitation requirements.
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- (5) The permittee shall submit quarterly deviation (excursion) reports that identify the following:
- a. each exceedance of the start-up and shutdown restriction in c)(2) and the start-up and shutdown emission limitations in b)(1)a.;
 - b. each exceedance of the SCR maintenance restriction in c)(3) and the SCR maintenance emission limitations in b)(1)a.;
 - c. each exceedances of the rolling, 12-month restriction on the blast furnace gas actual heat input specified in c)(1); and
 - d. any changes made to a parameter or value used in the dispersion model, that was used to demonstrate compliance with the [Toxic Air Contaminant Statute], ORC 3704.03(F), through the predicted 1-hour maximum ground-level concentration; or if no changes to the emissions, emissions unit(s), or the exhaust stack have been made, a statement to this effect.

The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.

g) Testing Requirements

- (1) Compliance with the emission limitations in b)(1) and b)(2) of these terms and conditions shall be determined in accordance with the following methods:
- a. **Emission Limitations:**

When combusting blast furnace gas, natural gas, or a blend of blast furnace gas and natural gas:

CO emissions shall not exceed 25 ppmvd at 15% oxygen.

NOx emissions shall not exceed 12.0 ppmvd at 15% oxygen.

SO₂ emissions shall not exceed 0.32 pound per mmBtu.

VOC emissions shall not exceed 1.6 ppmvd.

Applicable Compliance Methods:

The CO, NO_x, and VOC emission limitations above are based upon the manufacturer's performance guarantee emission factors at the maximum design specification of this emissions unit as provided in the application for PTI number P0106675. Compliance with the NO_x, CO, and VOC emission limitations shall be demonstrated by the emission testing required in f)(2) below and any other applicable compliance demonstrations for NO_x emissions required pursuant to 40 CFR Part 60, Subpart KKKK [See 60.4400 and 60.4405].

The SO₂ emission limitation above has been applied to all emissions units combusting blast furnace gas at the Air Products and Chemicals, Inc. - Middletown Cogeneration facility. Compliance with the SO₂ emission limitation shall be demonstrated by the emission testing required in f)(2) below, information obtained during blast furnace gas emission tests and/or fuel sampling for emissions units B001 and B002, and any other applicable compliance demonstrations for SO₂ emissions required pursuant to 40 CFR Part 60, Subpart KKKK [See 60.4415].

b. Emission Limitations:

When combusting only blast furnace gas or a blend of blast furnace gas and natural gas:

PE shall not exceed 21.2 pounds per hour.

When combusting only natural gas:

PE shall not exceed 0.005 pound per mmBtu.

Applicable Compliance Methods:

The PE emission limitations above are based upon the manufacturer's performance guarantee emission factors at the maximum design specification of this emissions unit as provided in the application for PTI number P0106675. Compliance with the PE limitation when combusting blast furnace gas shall be demonstrated by the emission testing required in f)(2) below. If required, the permittee shall demonstrate compliance with the PE limitation when combusting only natural gas through emission tests performed in accordance with 40 CFR Part 60, Appendix A, Methods 1 through 4, and 5.

c. Emission Limitations:

Start-Up and Shutdown:

Nitrogen oxides (NO_x) emissions shall not exceed 10.3 TPY as a rolling, 12-month summation*.

Carbon monoxide (CO) emissions shall not exceed 7.2 TPY as a rolling, 12-month summation*.

*These limitations do not apply during the initial startup period of this emissions unit.

Applicable Compliance Methods:

The NOx and CO emission limitations during start-up and shutdown operating periods are based upon permittee-supplied emission factors at the maximum design specification of this emissions unit, as provided in the application for PTI number P0106675, and the annual operational restriction in c)(2). The emission factors for the various conditions of start-up and shutdown are listed below:

NOx: 150 lbs/hour*

CO: 105 lbs/hour*

*The emission factors above reflect limited equipment-specific data since this is the first deployment of turbine technology for blast furnace gas combustion. In the event that during the course of operation of this emissions unit it is discovered that the emission factors listed above are not representative of startup and shutdown operating periods, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise the emission factors based upon the best available information.

Compliance with the NOx and CO emission limitations shall be demonstrated by the record keeping requirements in d)(7).

d. Emission Limitation:

Bypass of SCR for Routine SCR Preventive Maintenance:

Nitrogen oxides (NOx) emissions shall not exceed 1.72 TPY as a rolling, 12-month summation.

Applicable Compliance Method:

The NOx emission limitation during operating periods when the SCR is bypassed for routine SCR preventive maintenance is based upon the permittee-supplied uncontrolled NOx emission factor of 25 ppmvd, as provided in the application for PTI number P0106675, and the annual operational restriction in c)(3).

Compliance with the NOx emission limitation shall be demonstrated by the record keeping requirements in d)(7).

e. Emission Limitation:

Visible particulate emissions from any stack shall not exceed 20% opacity, as a 6-minute average, except as specified by rule.

Applicable Compliance Method:

If required, compliance with the stack visible particulate emissions limitation shall be determined through visible emissions observations performed in accordance with U.S. EPA Method 9.

- (2) The permittee shall conduct, or have conducted, emission testing for this emissions unit in accordance with the following requirements:
- a. the emission testing shall be conducted within 60 days after achieving the maximum production rate at which the emissions unit will be operated, but not later than 180 days after initial startup of the emissions unit;
 - b. emission testing shall be conducted to demonstrate compliance with the allowable mass emission rates for PE, NO_x, CO, SO₂, and VOC, when combusting 100 percent blast furnace gas in this emissions unit, as specified in b)(1)a.;
 - c. the following test methods shall be employed to demonstrate compliance with the allowable mass emission rates:
 - i. 40 CFR Part 60, Appendix A, Methods 1 through 4; and
 - ii. 40 CFR Part 60, Appendix A, Method 5 and the procedures specified in OAC rule 3745-17-03(B)(9) for PE;
 - iii. 40 CFR Part 60, Appendix A, Method 7 for NO_x;
 - iv. 40 CFR Part 60, Appendix A, Method 10 for CO;
 - v. 40 CFR Part 60, Appendix A, Method 6 or 6C for SO₂;
 - vi. 40 CFR Part 60, Appendix A, Method 25 for VOC.

Alternative U.S. EPA approved test methods may be used with prior approval from the Ohio EPA.
 - d. The test(s) shall be conducted while the emissions unit is operating at or near its maximum capacity, unless otherwise specified or approved by the Hamilton County Department of Environmental Services or the Director of OhioEPA.
 - e. Not later than 30 days prior to the proposed test date(s), the permittee shall submit an "Intent to Test" notification to the Hamilton County Department of Environmental Services. The "Intent to Test" notification shall describe in detail the proposed test methods and procedures, the emissions unit operating parameters, the time(s) and date(s) of the test(s), and the person(s) who will be conducting the test(s). Failure to submit such notification for review and approval prior to the test(s) may result in the Hamilton County Department of Environmental Services' refusal to accept the results of the emission test(s).
 - f. Personnel from the Hamilton County Department of Environmental Services shall be permitted to witness the test(s), examine the testing equipment, and acquire data and information necessary to ensure that the operation of the emissions unit and the testing procedures provide a valid characterization of the emissions from the emissions unit and/or the performance of the control equipment.

- g. A comprehensive written report on the results of the emissions test(s) shall be signed by the person or persons responsible for the tests and submitted to the Hamilton County Department of Environmental Services within 30 days following completion of the test(s). The permittee may request additional time for the submittal of the written report, where warranted, with prior approval from the Hamilton County Department of Environmental Services.
- (3) Pursuant to 40 CFR Part 60.8(e), the permittee shall provide, or cause to be provided, emission testing facilities for this emissions unit as follows:
- a. Sampling ports adequate for test methods applicable to this emissions unit. This includes:
 - i. constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures; and,
 - ii. providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.
 - b. Safe sampling platform(s).
 - c. Safe access to sampling platform(s).
 - d. Utilities for sampling and testing equipment.
- (4) The record keeping requirements for this emissions unit in d)(5) and d)(6) may utilize the following annual average emission factors in Table 1 derived from permittee-supplied engineering estimates and/or manufacturer performance guarantees provided in the application for PTI number P0106675. In the event that during the course of operation of this emissions unit it is discovered that the emission factors listed below are not representative of normal operations, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise the annual average emission factors based upon the best available information.

Table 1. Emission Factors for 12-Month Rolling Average Emission Calculations

Pollutant	Blast Furnace Gas Combustion (in pound per mmBtu, HHV dry)	Natural Gas Combustion (in pound per mmBtu, HHV dry)
NOx	0.069	0.054
CO	0.069	0.073
SO ₂	0.127	0.0006
PE/PM10/PM2.5 - filterable	0.021	0.005
VOC	0.002	0.002

h) **Miscellaneous Requirements**

- (1) None.

2. P002, Cooling Tower

Operations, Property and/or Equipment Description:

Induced draft counterflow cooling tower equipped with high efficiency drift eliminators.

a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	<p>Particulate emissions (PE) shall not exceed 0.59 pound per hour*, and 2.6 tons per year* (TPY). [PE is assumed to be equivalent to PM₁₀ and PM_{2.5}]</p> <p>*The emission limitations outlined above are based upon the emissions unit's potential to emit. Therefore, no hourly or annual record keeping is required to demonstrate compliance with these limitations.</p> <p>See b)(2)d.</p> <p>Visible particulate emissions from this emissions unit shall not exceed 20 percent opacity as a six-minute average, except as provided by rule. The presence of condensed water vapor shall not be deemed a violation for failure of emissions meeting this requirement.</p> <p>See b)(2)a.</p>
b.	OAC rule 3745-31-05(A)(3), as effective 12/01/06	See b)(2)b.

c.	OAC rule 3745-31-10 NSR Projects involving New and Existing Emission Units at a Major Stationary Source	See Section B. Facility-Wide Terms and Conditions for NSR Project Requirements.
d.	OAC rule 3745-17-07(A)	Visible particulate emissions from this emissions unit shall not exceed 20 percent opacity as a six-minute average, except as provided by rule. The presence of condensed water vapor shall not be deemed a violation for failure of emissions meeting this requirement.
e.	OAC rule 3745-17-11(B) (Table I)	The emission limitation specified by this rule is less stringent than the emission limitation established pursuant to OAC rule 3745-31-05(A)(3), as effective 11/30/01, and greater than the emissions unit's potential to emit. Therefore, no record keeping is required to demonstrate compliance with this limitation.
f.	OAC rule 3745-17-11(B) (Table I)	PE shall not exceed 122 pounds per hour* once U.S. EPA approves the December 1, 2006 version of 3745-31-05. *The emission limitation outlined above is greater than the emission unit's potential to emit. Therefore, no hourly record keeping is required to demonstrate compliance with this limitation once U.S. EPA approves the December 1, 2006 version of 3745-31-05.

(2) Additional Terms and Conditions

- a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC paragraph 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulations for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.

- b. This rule paragraph applies once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the SIP.

The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the particulate emissions (PE) from this air contaminant source since the uncontrolled potential to emit for PE is less than ten tons per year.

- c. The provisions of 40 CFR Part 63, Subpart Q, apply to all new and existing industrial process cooling towers that are operated with chromium-based water treatment chemicals and are either major sources or are integral parts of facilities that are major sources as defined in 40 CFR 63.401. Since chromium-based water treatment chemicals will not be used in this emissions unit, the provisions of this subpart do not apply to this emissions unit.
- d. The permittee shall employ mist eliminators designed for 0.0005% drift from the cooling tower.

c) **Operational Restrictions**

- (1) The permittee shall not use chromium-based water treatment chemicals in this emissions unit.

d) **Monitoring and/or Recordkeeping Requirements**

- (1) None.

e) **Reporting Requirements**

- (1) Unless other arrangements have been approved by the Director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.

f) **Testing Requirements**

- (1) Compliance with the emission limitation(s) in b)(1) of these terms and conditions shall be determined in accordance with the following method(s):

- a. **Emission Limitation:**

Particulate emissions (PE) shall not exceed 0.59 pound per hour, and 2.6 tons per year.

Applicable Compliance Methods:

The hourly and annual emission limitations are based upon the emissions unit's potential to emit and the maximum operating parameters of the emissions unit as provided by the permittee in the application for PTI P0106675. Compliance with the hourly emission limitation above shall be demonstrated by the following calculation:

E_{PE} in pound/hour = (TDS/ 10^6 ppm) x (Drift/100) x Q x (Density) x (60 min/hr).

Where,

E_{PE} = particulate emission rate;

TDS = the maximum TDS concentration in the circulating cooling tower water (3,300 ppm by weight);

Drift = the maximum drift loss per manufacturer design specifications (0.0005%);

Q = maximum cooling tower circulating water flow rate (71,800 gallons/min); and,

Density = density of water (8.34 pounds/gallon).

Compliance with the annual emission limitation shall be demonstrated by multiplying the hourly emission rate calculated above by the maximum annual hours of operation (8,760 hours per year) and dividing by 2000 pounds per ton.

PE is assumed to be equivalent to PM_{10} and $PM_{2.5}$.

Within 180 days of startup, the permittee shall conduct testing to demonstrate that the TDS concentration of the circulating cooling water does not exceed 3,300 ppm by weight. The permittee shall submit a test proposal to Hamilton County Department of Environmental Services not later than 30 days prior to the proposed test date(s), which describes the proposed water test methods and procedures, emissions unit operating parameters, the persons who will be conducting the test(s), and the time(s) and date(s) of the test(s). A written report of the water testing shall be submitted to Hamilton County Department of Environmental Services within 30 days following completion of the test(s). If required, the permittee shall conduct subsequent periodic testing of the TDS concentration of the circulating cooling water upon request from OhioEPA.

b. Emission Limitation:

Visible particulate emissions from the stack serving this emissions unit shall not exceed 20 percent opacity as a six-minute average, except as provided by rule.

Applicable Compliance Method:

If required, compliance with the stack visible particulate emissions limitation shall be determined through visible emissions observations performed in accordance with U.S. EPA Method 9.

g) Miscellaneous Requirements

- (1) None.

3. P003, Flare

Operations, Property and/or Equipment Description:

Non-assisted smokeless flare for the combustion of vent gas (blast furnace gas) during non-routine operations of the cogeneration system.

- a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) g)(1).

- b) Applicable Emissions Limitations and/or Control Requirements

- (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T) Best Available Technology (BAT)	<u>Flaring Operation (blast furnace gas):</u> PE shall not exceed 0.033 pound per mmBtu*. [PE is assumed to be equivalent to PM ₁₀ and PM _{2.5}] Carbon monoxide (CO) emissions shall not exceed 0.156 pound per mmBtu*. Nitrogen oxides (NOx) emissions shall not exceed 0.261 pound per mmBtu*. VOC emissions shall not exceed 0.0024 pound per mmBtu*. *The emission limitations outlined above are based upon the emissions unit's potential to emit. Therefore, no record keeping is required to demonstrate compliance with these limitations. Sulfur dioxide (SO ₂) emissions shall not exceed 0.32 pound per mmBtu. See b)(2)h. See b)(2)b., b)(2)f., and c)(1).

b.	OAC rule 3745-31-05(A)(3), as effective 11/30/01 Best Available Technology (BAT)	<u>Flare Pilot Flame (natural gas):</u> Particulate emissions (PE) shall not exceed 0.0019 pound per mmBtu* and 0.018 ton per year* (TPY). [PE is assumed to be equivalent to PM ₁₀ and PM _{2.5}] Sulfur dioxide (SO ₂) emissions shall not exceed 0.0006 pound per mmBtu* and 0.005 TPY*. Carbon monoxide (CO) emissions shall not exceed 0.37 pound per mmBtu* and 3.47 TPY*. Nitrogen oxides (NO _x) emissions shall not exceed 0.068 pound per mmBtu* and 0.64 TPY*. Volatile organic compound (VOC) emissions shall not exceed 0.005 pound per mmBtu* and 0.05 TPY*. *The emission limitations outlined above are based upon the emissions unit's potential to emit. Therefore, no hourly or annual record keeping is required to demonstrate compliance with these limitations. See b)(2)c., and b)(2)d.
c.	OAC rule 3745-31-05(A)(3), as effective 12/01/06	See b)(2)e. and c)(1).
d.	OAC rule 3745-31-10 NSR Projects involving New and Existing Emissions Units at a Major Stationary Source	See Section B. Facility-Wide Terms and Conditions for NSR Project Requirements.
e.	OAC rule 3745-17-07(A)	Exempt. See b)(2)g.

(2) Additional Terms and Conditions

- a. No blast furnace gas (vent gas) shall be combusted in this emissions unit except during emergencies, shutdowns, startups, scheduled maintenance, or essential operational needs of the Air Products and Chemicals, Inc. - Middletown Cogeneration facility [Emissions Units B001, B002, P001, 1409001091], AK Steel

Blast Furnace No. 3, Stoves, and Flare (P925, 1409010006), and/or the AK Steel Wilputte Battery (B918, 1409010006).

- b. The BAT determination pursuant to ORC 3704.03(T) for this emissions unit includes:
 - i. blast furnace gas is the only vent gas combusted;
 - ii. employ an efficient flare design to ensure no visible emissions;
 - iii. employ good combustion practices and efficient flare design to limit CO emissions to 0.156 pound per mmBtu, NOx emissions to 0.261 pound per mmBtu, and VOC to 0.0024 pound per mmBtu when flaring blast furnace gas.
- c. The BAT determination pursuant to OAC rule 3745-31-05(A)(3), as effective 11/30/01, for this emissions unit includes:
 - i. use of only natural gas in the flare pilot flame.
- d. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC paragraph 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulations for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.
- e. This rule paragraph applies once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the SIP.

The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the PE, SO₂, CO, NO_x, and VOC emissions from the combustion of natural gas in this air contaminant source since the uncontrolled potential to emit for PE, CO, NO_x, SO₂, and VOC is less than 10 tons/year.
- f. The flare shall be designed for and operated with no visible emissions, as determined by Method 22 of Appendix A of 40 CFR Part 60, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.
- g. This emissions unit is exempt from the visible particulate emissions limitations specified in OAC rule 3745-17-07(A), pursuant to OAC rule 3745-17-07(A)(3)(h), because the emissions unit is not subject to the requirements of OAC rule 3745-17-10 or OAC rule 3745-17-11.

h. The BAT requirement for SO₂ under ORC 3704.03(T) has been applied to all emissions units combusting blast furnace gas at the Air Products and Chemicals, Inc. - Middletown Cogeneration facility (B001, B002, P001, and P003). In the event that during the course of operation of this emissions unit it is discovered that SO₂ emission rates from blast furnace gas combustion vary above 0.32 pound per mmBtu during representative normal operations, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise this BAT determination to have the emission limitation adjusted consistent with the best available information on blast furnace gas sulfur content variability.

c) **Operational Restrictions**

(1) A pilot flame shall be maintained at all times in the flare's pilot light burner during operation of the Air Products and Chemicals, Inc. - Middletown Cogeneration Blast Furnace Gas Management System which serves emissions units B001, B002, P001, and P003.

d) **Monitoring and/or Recordkeeping Requirements**

(1) The permittee shall properly install, operate, and maintain a thermocouple, or any other equivalent device, to detect the presence of the pilot flame. The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices. The permittee shall record all periods of time during which there was no pilot flame or the flare was inoperable.

(2) The permittee shall install, operate, and maintain equipment to monitor and record the blast furnace gas fuel flow rate to this emissions unit, in standard cubic feet per hour (scfh). The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The flow monitoring equipment shall have an accuracy of within plus or minus five percent (5%). The monitoring device and any recorder shall be maintained in continuous operation when the emissions unit is in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee.

(3) The permittee shall determine the heat content of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in accordance with either Alternative 1 or Alternative 2 described below:

a. **Alternative 1:**

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Higher (Gross) Heating Value (HHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per

standard cubic foot (Btu/scf). The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

b. **Alternative 2:**

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Lower (Net) Heating Value (LHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per standard cubic foot (Btu/scf). The equipment shall be capable of calculating and recording the HHV of the blast furnace gas based upon the measured LHV multiplied by the appropriate conversion factor for blast furnace gas. The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

The permittee has provided a conversion factor of 1.059 based on blast furnace gas composition analyses provided with the application for permit P0106675. Under this Alternative, the permittee shall collect and analyze monthly samples of the blast furnace gas vented to emissions units B001, B002, P001, and P003, for composition and heat content to confirm the conversion factor as provided. Upon collecting and analyzing 12 consecutive months of blast furnace gas samples, the permittee may submit a written request to the Director of OhioEPA for approval of a reduced blast furnace gas sampling schedule. Such a request shall include copies of the blast furnace gas analyses and sufficient documentation to support a reduced sampling schedule.

- (4) The permittee shall maintain monthly records of the following information for this emissions unit:
- a. the total quantity of blast furnace gas burned each month, in mmscf;

- b. the average heat content of the blast furnace gas burned each month, in Btu/scf, based upon the data collected in d)(3);
 - c. the total blast furnace gas heat input rate each month, in million Btu, calculated by multiplying the values from d)(4)a. times d)(4)b.;
 - d. the total PE, PM₁₀, PM_{2.5}, SO₂, CO, NO_x, and VOC emissions, in tons, for each month from blast furnace gas combustion, calculated in accordance with the equations in d)(5); and
 - e. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total PE, PM₁₀, PM_{2.5}, SO₂, CO, NO_x, and VOC emissions, in tons, from blast furnace gas combustion.
- (5) The monthly PE, PM₁₀, PM_{2.5}, SO₂, CO, NO_x, and VOC emissions from blast furnace gas combustion in this emissions unit are calculated based upon the following equations and the records collected above in d)(4):

a. E_{PE} , in tons = $C_{BFG} \times (2.9 \text{ lbs PE/mmscf} / H_{BFG}) / 2000 \text{ lbs/ton}$

Where:

E_{PE} = particulate emissions (PE);

C_{BFG} = total blast furnace gas combusted, in mmscf;

H_{BFG} = average heat content of the blast furnace gas, in Btu/scf [from monitoring requirements in d)(3)]; and,

2.9 lbs PE/mmscf = PE factor for blast furnace gas combustion from US EPA Factor Information Retrieval System (Web FIRE).

PE is assumed to be equivalent to PM₁₀ and PM_{2.5}.

b. E_{SO_2} , in tons = ER_{SO_2} , in lb/mmBtu x $TH_{BFG} / 2000 \text{ lbs/ton}$

Where:

E_{SO_2} = SO₂ emissions;

TH_{BFG} = total heat input of the blast furnace gas combusted, in mmBtu [from record keeping requirements in d)(4)c.]; and,

ER_{SO_2} = SO₂ emission rate, in lb/mmBtu, from the SO₂ emission monitoring data collected on emissions units P001, B001, and/or B002 as representative of this emissions unit. In the application for PTI number P0106675, the permittee supplied an annual average emission factor of 0.127 lb SO₂/mmBtu for blast furnace gas combustion in emissions units B001, B002, and P001.

c. E_{CO} , in tons = $C_{BFG} \times (13.7 \text{ lbs CO/mmscf} / H_{BFG}) / 2000 \text{ lbs/ton}$

Where:

E_{CO} = CO emissions;

C_{BFG} = total blast furnace gas combusted, in mmscf;

H_{BFG} = average heat content of the blast furnace gas, in Btu/scf [from monitoring requirements in d)(3)]; and,

13.7 lbs CO/mmscf = CO emission factor for blast furnace gas combustion from US EPA Factor Information Retrieval System (Web FIRE).

d. E_{NOx} , in tons = $C_{BFG} \times (23 \text{ lbsNOx/mmscf} / H_{BFG}) / 2000 \text{ lbs/ton}$

Where:

E_{NOx} = NOx emissions;

C_{BFG} = total blast furnace gas combusted, in mmscf;

H_{BFG} = average heat content of the blast furnace gas, in Btu/scf [from monitoring requirements in d)(3)]; and,

23 lbsNOx/mmscf = NOx emission factor for blast furnace gas combustion from US EPA Factor Information Retrieval System (Web FIRE).

e. E_{VOC} , in tons = $C_{BFG} \times (0.21 \text{ lbs VOC/mmscf} / H_{BFG}) / 2000 \text{ lbs/ton}$

Where:

E_{VOC} = VOC emissions;

C_{BFG} = total blast furnace gas combusted, in mmscf;

H_{BFG} = average heat content of the blast furnace gas, in Btu/scf [from monitoring requirements in d)(3)]; and,

0.21 lbs VOC/mmscf = conservative VOC emission factor for blast furnace gas combustion based upon a maximum VOC content of 5 ppmvd (as methane) from gas speciation formula. The US EPA Factor Information Retrieval System (Web FIRE) lists zero (0) VOC emissions from blast furnace gas combustion.

e) Reporting Requirements

- (1) Unless other arrangements have been approved by the Director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.
- (2) The permittee shall submit quarterly deviation (excursion) reports that identify the following:

- a. all periods of time during which the pilot flame was not functioning properly or the flare was not maintained as required in this permit.

The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.

f) **Testing Requirements**

- (1) Compliance with the emission limitations in b)(1) and b)(2) of these terms and conditions shall be determined in accordance with the following methods:

- a. **Emission Limitations:**

For the flare pilot flame (natural gas combustion):

PE shall not exceed 0.0019 pound per mmBtu and 0.018 TPY.

SO₂ emissions shall not exceed 0.0006 pound per mmBtu and 0.005 TPY.

CO emissions shall not exceed 0.37 pound per mmBtu and 3.47 TPY.

NO_x emissions shall not exceed 0.068 pound per mmBtu and 0.64 TPY.

VOC emissions shall not exceed 0.005 pound per mmBtu and 0.05 TPY.

Applicable Compliance Methods:

The above emission limitations are based upon the emissions unit's potential to emit, operating 8,760 hours per year, and the maximum capacity of the flare pilot flame at 2.14 mmBtu per hour. The PE, VOC, and SO₂ emission rates were calculated based upon the emission factors for natural gas combustion found in AP-42 Section 1.4, Table 1.4-2, and the HHV of natural gas at 1,020 Btu/scf. Due to the differences in burner combustion principles, the CO and NO_x emission rates for natural gas combustion in the open flare were based on the emission factors found in AP-42 Section 13.5, Table 13.5-1, for industrial flares.

- b. **Emission Limitations:**

During flaring operations (blast furnace gas combustion):

CO emissions shall not exceed 0.156 pound per mmBtu.

NO_x emissions shall not exceed 0.261 pound per mmBtu.

SO₂ emissions shall not exceed 0.32 pound per mmBtu.

PE shall not exceed 0.033 pound per mmBtu.

VOC emissions shall not exceed 0.0024 pound per mmBtu.

Applicable Compliance Methods:

The PE, CO, and NO_x emission limitations are based upon the emissions unit's potential to emit and the emission factors for blast furnace gas combustion from the US EPA Factor Information Retrieval System (Web FIRE) using the following calculations:

$$E_{PE}, \text{ in lb/mmBtu} = 2.9 \text{ lbs PE/mmscf} / H_{BFG};$$

$$E_{CO}, \text{ in lb/mmBtu} = 13.7 \text{ lbs CO/mmscf} / H_{BFG}; \text{ and}$$

$$E_{NOx}, \text{ in lb/mmBtu} = 23 \text{ lbsNOx/mmscf} / H_{BFG};$$

Where:

E = emission rate; and

H_{BFG} = 88 Btu/scf, as worst case heat content of the blast furnace gas.

Compliance with the PE, CO, and NO_x emission limitations above may be demonstrated by the equations above and the actual heat content of the blast furnace gas from the record keeping in d)(3). PE is assumed to be equivalent to PM₁₀ and PM_{2.5}.

The SO₂ emission limitation above has been applied to all emissions units combusting blast furnace gas at the Air Products and Chemicals, Inc. - Middletown Cogeneration facility. Since stack testing of the flare is not feasible, compliance with the SO₂ emission limitation for blast furnace gas combustion may be demonstrated by the permittee-supplied emission factor for SO₂ in d)(5)b. and any subsequent SO₂ emission monitoring and data collected on emissions units P001, B001, and/or B002, as representative of this emissions unit.

The VOC emission limitation is based upon the emissions unit's potential to emit and a permittee-supplied emission factor for blast furnace gas combustion based upon a maximum blast furnace gas VOC content of 5 ppmvd (as methane). The US EPA Factor Information Retrieval System (Web FIRE) lists zero (0) VOC emissions from blast furnace gas combustion; therefore this value is expected to be conservative.

$$E_{VOC}, \text{ in lb/mmBtu} = 0.21 \text{ lbs VOC/mmscf} / H_{BFG};$$

Where:

E = emission rate; and

H_{BFG} = 88 Btu/scf, as worst case heat content of the blast furnace gas.

Compliance with the VOC emission limitations above may be demonstrated by the equation above and the actual heat content of the blast furnace gas from the record keeping in d)(3).

c. **Emission Limitation:**

The flare shall be designed for and operated with no visible emissions, as determined by Method 22 of Appendix A of 40 CFR Part 60, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours

Applicable Compliance Method:

If required, compliance shall be demonstrated through visible emission observations performed in accordance to Method 22 of Appendix A of 40 CFR Part 60. The observation period shall be 2 hours.

g) **Miscellaneous Requirements**

- (1) Modeling to demonstrate compliance with, the "Toxic Air Contaminant Statute", ORC 3704.03(F)(4)(b), was not necessary because the emissions unit's maximum annual emissions for each toxic air contaminant, as defined in OAC rule 3745-114-01, will be less than 1.0 ton per year. OAC Chapter 3745-31 requires permittees to apply for and obtain a new or modified PTI prior to making a "modification" as defined by OAC rule 3745-31-01. The permittee is hereby advised that changes in the composition of the materials, or use of new materials, that would cause the emissions of any toxic air contaminant to increase to above 1.0 ton per year may require the permittee to apply for and obtain a new PTI.

4. P801, Fugitive Process Emissions

Operations, Property and/or Equipment Description:

Equipment leaks from valves, connections, flanges, and other components of the Blast Furnace Gas Management System.

- a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

- (1) None.

- b) **Applicable Emissions Limitations and/or Control Requirements**

- (1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T) Best Available Technology (BAT)	Carbon monoxide (CO) emissions shall not exceed 12.7 tons per year (TPY) as a rolling, 12-month summation. See b)(2)a. and c)(1).
b.	OAC rule 3745-31-10 NSR Projects involving New and Existing Emission Units at a Major Stationary Source	See Section B. Facility-Wide Terms and Conditions for NSR Project Requirements.

- (2) **Additional Terms and Conditions**

- a. The BAT determination pursuant to ORC 3704.03(T) for this emissions unit includes compliance with the CO emission limitation based on the emissions unit's potential to emit at the maximum capacity of the Blast Furnace Gas Management System and the work practices specified in c)(1).

- c) **Operational Restrictions**

- (1) The valves, connections, flanges, and other components of the Blast Furnace Gas Management System shall be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions.

d) **Monitoring and/or Recordkeeping Requirements**

- (1) The permittee shall develop, implement, and maintain an Operations & Maintenance (O&M) Plan to minimize fugitive CO emissions during operation of the Blast Furnace Gas Management System. The O&M Plan and related records must be kept onsite and available for inspection during regular office hours.

e) **Reporting Requirements**

- (1) Unless other arrangements have been approved by the Director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.

f) **Testing Requirements**

- (1) Compliance with the emission limitation in b)(1) of these terms and conditions shall be determined in accordance with the following method:

a. **Emission Limitation:**

CO emissions shall not exceed 12.7 tons per year (TPY) as a rolling, 12-month summation.

Applicable Compliance Methods:

The emission limitation is based upon the emissions unit's potential to emit, operating 8,760 hours per year, and the maximum design capacity and proposed equipment components of the Blast Furnace Gas Management System that serves emissions units B001, B002, P001, and P003, as provided by the permittee in the application for PTI P0106675. Compliance with the emission limitation above shall be demonstrated by the following calculation using emission factors in Table 1 of the *Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives*, TCEQ, revised January 2005, for non-ethylene gas/vapor processing which are derived from Table 2-2 of EPA's Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017), the vendor-provided blast furnace gas (BFG) loss factor of 118 scfh:

$$E_{CO} \text{ in pound/hour} = \sum(\text{No. of Components} \times EF_{\text{Component}} \times Wf_{CO}) + [(118 \text{ scfh} \times 22.18 \text{ mole\% of CO} \times 28 \text{ Mol. Wt.}) / (385.5 \text{ of scf/lbmole} \times 100)]$$

Where,

E_{CO} = carbon monoxide (CO) emission rate;

EF_{CO} = the component-specific emission factor;

Wf_{CO} = the wt. fraction of CO within BFG, assumed to be 23.45%;

and,

E_{CO_2} in pounds/hour x 8,760 maximum operating hours/year x 1 ton/2000 pounds
= E_{CO_2} in tons per year (TPY).

g) Miscellaneous Requirements

(1) None.

5. Emissions Unit Group -Boilers: B001, B002

EU ID	Operations, Property and/or Equipment Description
B001	Blast furnace gas and/or natural gas-fired boiler (nominally rated at 370 mmBtu/hour), with low NOx burners
B002	Blast furnace gas and/or natural gas-fired boiler (nominally rated at 370 mmBtu/hour), with low NOx burners

a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only:

(1) g)(1).

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T) Best Available Technology (BAT)	<u>When combusting blast furnace gas or a combination of blast furnace gas and natural gas:</u> Particulate emissions (PE) shall not exceed 0.015 pound per mmBtu. [PE is assumed to be equivalent to PM ₁₀ and PM _{2.5}] Carbon monoxide (CO) emissions shall not exceed 0.110 pound per mmBtu. Nitrogen oxides (NOx) emissions shall not exceed 0.10 pound per mmBtu. <u>When combusting blast furnace gas, natural gas, or a combination of blast furnace gas and natural gas:</u> Sulfur dioxide (SO ₂) emissions shall not exceed 0.32 pound per mmBtu. See b)(2)g. and b)(2)k.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
		<p><u>When combusting only natural gas:</u></p> <p>Particulate emissions (PE) shall not exceed 0.005 pound per mmBtu. [PE is assumed to be equivalent to PM₁₀ and PM_{2.5}]</p> <p>Carbon monoxide (CO) emissions shall not exceed 0.085 pound per mmBtu.</p> <p>Nitrogen oxides (NO_x) emissions shall not exceed 0.10 pound per mmBtu.</p> <p>See b)(2)a.</p>
b.	<p>OAC rule 3745-31-05(A)(3), as effective 11/30/01</p> <p>Best Available Technology (BAT)</p>	<p><u>When combusting blast furnace gas, natural gas, or a combination of blast furnace gas and natural gas:</u></p> <p>Volatile organic compound (VOC) emissions shall not exceed 0.005 pound per mmBtu.</p> <p>See b)(2)b. and b)(2)c.</p>
c.	<p>OAC rule 3745-31-05(A)(3), as effective 12/01/06</p>	<p>See b)(2)d.</p>
d.	<p>OAC rule 3745-31-05(F)</p> <p>Voluntary Limits on Allowable Emissions</p>	<p>See c)(1).</p>
e.	<p>OAC rule 3745-31-10</p> <p>NSR Projects involving New and Existing Emissions Units at a Major Stationary Source</p>	<p>See Section B. Facility-Wide Terms and Conditions for NSR Project Requirements.</p>
f.	<p>OAC rule 3745-17-07(A)</p>	<p>Visible particulate emissions from any stack shall not exceed 20% opacity, as a 6-minute average, except as specified by rule.</p>
g.	<p>OAC rule 3745-17-10(B)(1)</p>	<p>The particulate emission limitation specified by this rule is less stringent than the emission limitation established pursuant to BAT under ORC 3704.03(T).</p>

h.	OAC Chapter 3745-103 Acid Rain Permits and Compliance	Exempt. See b)(2)e.
i.	OAC rule 3745-110-03(D) NOx - Reasonably Available Control Technology (RACT) [In accordance with the definitions in OAC rule 3745-110-01, this emissions unit is a very large gas-only boiler subject to the emission limitations and applicable requirements specified in this section.]	The emission limitation specified by this rule is equivalent to the emission limitation established pursuant to BAT under ORC 3704.03(T).
j.	40 CFR Part 60, Subpart Db (40 CFR 60.40b – 60.49b) Standards of Performance for New Stationary Sources (NSPS), Industrial, Commercial, and Institutional Steam Generating Units	<p>Exempt from SO₂ emission limitation based on low sulfur gaseous fuel exemption pursuant to 40 CFR 60.42b(k)(2).</p> <p>Exempt from NOx emission limitation based on annual capacity factor limitation for natural gas pursuant to 40 CFR 60.44b(l)(1).</p> <p>The particulate matter (PM) standards specified by this rule are not applicable to emission units firing only gaseous fuels pursuant to 40 CFR Part 60.43b.</p> <p>See b)(2)f., b)(2)g., b)(2)h., and c)(2).</p>
k.	40 CFR Part 63, Subpart DDDDD National Emission Standards for Hazardous Air Pollutants (NESHAP) for Industrial, Commercial, and Institutional Boilers and Process Heaters.	See b)(2)i.

(2) Additional Terms and Conditions

- a. The BAT determination pursuant to ORC 3704.03(T) for this emissions unit includes:
 - i. use of only blast furnace gas or natural gas, as low sulfur fuels;

- ii. employ low-NOx burners in the emissions unit to reduce NOx emissions to 0.10 pound per mmBtu, when firing blast furnace gas and/or natural gas; and
 - iii. employ good combustion practices to reduce CO emissions to 0.110 pound per mmBtu when firing a blend of blast furnace gas and natural gas, and 0.085 pound per mmBtu when firing only natural gas.
- b. The BAT determination pursuant to OAC rule 3745-31-05(A)(3), as effective 11/30/01, for this emissions unit includes:
- i. employ good combustion practices to reduce VOC emissions to 0.005 pound per mmBtu.
- c. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to OAC paragraph 3745-31-05(A)(3), as effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 31-05 was revised to conform to ORC changes effective August 3, 2006 (S.B. 265 changes), such that BAT is no longer required by State regulations for NAAQS pollutant less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of 3745-31-05, then these emission limits/control measures no longer apply.
- d. This rule paragraph applies once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the SIP.
- The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the VOC emissions from the combustion of blast furnace gas and/or natural gas in this air contaminant source since the uncontrolled potential to emit for VOC is less than 10 tons/year for each emissions unit.
- e. This emissions unit is exempt from the acid rain program requirements in OAC Chapter 3745-103 pursuant to the gross electric sales exemption threshold for a cogeneration facility specified in OAC rule 3745-103-02(B)(4)(b). The permittee shall maintain records as specified in d)(2) to demonstrate compliance with the following exemption threshold:
- i. average annual electric sales to the utility power distribution system shall not exceed more than one-third of potential electrical output capacity; or
 - ii. actual electric output (on a gross basis) shall not exceed 219,000 MWe-hours.
- f. The application and enforcement of the provisions of the New Source Performance Standards (NSPS), as promulgated by the United States Environmental Protection Agency, 40 CFR Part 60, are delegated to the Ohio

Environmental Protection Agency. The requirements of 40 CFR Part 60 are also federally enforceable.

- g. This emissions unit is exempt from the SO₂ emission standards specified in 40 CFR 60.42b(k)(1) pursuant to the low sulfur gaseous fuel exemption specified in 40 CFR 60.42b(k)(2) which states gaseous fuels fired by this emissions unit shall not exceed 0.32 pound of SO₂ per mmBtu of actual heat input. This fuel limitation is equivalent to the SO₂ emission limitation established for blast furnace gas and/or natural gas combustion pursuant to BAT under ORC 3704.03(T). The permittee shall comply with the fuel analysis requirements as specified in 40 CFR 60.45b(k) and 40 CFR Part 60.49b(r) to demonstrate compliance with the low sulfur fuel exemption and BAT limitation.
- h. The permittee has elected to comply with the exemption from the NO_x emission standards and associated monitoring and compliance methods specified in 40 CFR Part 60, Subpart Db, under the option of a federally enforceable limitation on the annual capacity factor for natural gas pursuant to 40 CFR Part 60.44b(l)(1) and term and condition c)(2) of this permit. Alternatively, nothing in these terms shall prohibit the permittee from complying with the alternative NO_x compliance methods and emission monitoring specified in Subpart Db in lieu of compliance with the annual capacity factor restriction in c)(2). The permittee shall amend and re-submit the Subpart Db initial notification required by 60.7, 60.49b(a), and term e)(2) to indicate a change in compliance method(s) under this rule.
- i. This emissions unit is not subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Industrial, Commercial, and Institutional Boilers and Process Heaters, 40 CFR Part 63, Subpart DDDDD, pursuant to the exemption specified in 63.7491(k) and the definition of a blast furnace gas fuel-fired boiler specified in 63.7575 which excludes sources that receive 90 percent or more of its total annual gas volume from blast furnace gas. The permittee shall maintain annual records of total annual gas volume for each fuel type by summing the monthly records for blast furnace gas and natural gas required in d)(5) of this permit in order to demonstrate this emissions unit is exempt.
- j. On July 6, 2010, US EPA announced the proposed CAIR replacement rule, the "Transport Rule" as required by the original court vacatur of the federal CAIR program in July 2008. The permittee shall comply with any applicable federally mandated programs that may replace the CAIR program affecting electric generating facilities.
- k. The BAT requirement for SO₂ under ORC 3704.03(T) has been applied to all emissions units combusting blast furnace gas at the Air Products and Chemicals, Inc. - Middletown Cogeneration facility (B001, B002, P001, and P003). In the event that during the course of operation of this emissions unit it is discovered that SO₂ emission rates from blast furnace gas combustion vary above 0.32 pound per mmBtu during representative normal operations, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise this BAT determination to have the emission limitation adjusted consistent with the best available information on blast furnace

gas sulfur content variability. Any such revision of the emission limitation under ORC 3704.03(T) shall also be consistent with any applicable requirements of 40 CFR Part 60, Subpart Db.

c) **Operational Restrictions**

- (1) The maximum amount of blast furnace gas combusted in emissions units B001, B002, and P001, combined, shall not exceed 12,702,000 million Btu per year of actual heat input, as a rolling 12-month summation.

To ensure enforceability during the first 12 calendar months of operation or the first 12 calendar months following the issuance of this permit, the permittee shall not exceed the heat input levels specified in the following table:

Month	Maximum Allowable Blast Furnace Gas Cumulative Heat Input (in mmBtu)
1	1,500,000
1-2	3,000,000
1-3	4,500,000
1-4	6,000,000
1-5	7,500,000
1-6	9,000,000
1-7	10,500,000
1-8	12,000,000
1-9	12,702,000
1-10	12,702,000
1-11	12,702,000
1-12	12,702,000

After the first 12 calendar months of operation or the first 12 calendar months following the issuance of this permit, compliance with the annual blast furnace gas heat input limitation shall be based upon a rolling, 12-month summation of the actual blast furnace gas heat input rates.

- (2) The annual capacity factor for natural gas, based on actual heat input, shall not exceed 10 percent (0.10) as a 12-month rolling average for this emissions unit. This operational restriction is federally enforceable.

d) **Monitoring and/or Recordkeeping Requirements**

- (1) See 40 CFR Part 60, Subpart Db (40 CFR 60.40b-49b).
- (2) The permittee shall maintain annual records, on a calendar year basis, of the following information to demonstrate that the emissions unit is not an affected unit under the acid rain program:
 - a. the potential electrical output capacity of emissions units B001 and B002;
 - b. the average electric sales to the utility power distribution system;
 - c. the percentage of average electric sales as compared to the potential electrical output capacity; and
 - d. the total actual electric output (on a gross basis), in MWe-hours.
- (3) The permittee shall install, operate, and maintain equipment to monitor and record the natural gas and blast furnace gas fuel flow rates to this emissions unit, in standard cubic feet per hour (scfh). The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The flow monitoring equipment shall have an accuracy of within plus or minus five percent (5%). The monitoring device and any recorder shall be maintained in continuous operation when the emissions unit is in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for this emissions unit.
- (4) The permittee shall determine the heat content of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in accordance with either Alternative 1 or Alternative 2 described below:
 - a. **Alternative 1:**

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Higher (Gross) Heating Value (HHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per standard cubic foot (Btu/scf). The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above

maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

b. **Alternative 2:**

The permittee shall properly install, operate, and maintain equipment which analyzes and records the Lower (Net) Heating Value (LHV) of the blast furnace gas vented to emissions units B001, B002, P001, and P003, in Btu per standard cubic foot (Btu/scf). The equipment shall be capable of calculating and recording the HHV of the blast furnace gas based upon the measured LHV multiplied by the appropriate conversion factor for blast furnace gas. The monitoring device(s) and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals and/or the permittee's established protocols for proper operation and maintenance practices pursuant to the anticipated maintenance and calibration schedules provided by the permittee in the application for PTI P0106675. The monitoring device(s) and any recorder shall be maintained in continuous operation, when any or all of these emissions units are in operation, except during periods of calibration, adjustment, or repair conducted in accordance with the above maintenance and calibration schedules provided by the permittee, unless otherwise specified in the applicable monitoring requirements of 40 CFR Part 60 for these emissions units.

The permittee has provided a conversion factor of 1.059 based on blast furnace gas composition analyses provided with the application for permit P0106675. Under this Alternative, the permittee shall collect and analyze monthly samples of the blast furnace gas vented to emissions units B001, B002, P001, and P003, for composition and heat content to confirm the conversion factor as provided. Upon collecting and analyzing 12 consecutive months of blast furnace gas samples, the permittee may submit a written request to the Director of OhioEPA for approval of a reduced blast furnace gas sampling schedule. Such a request shall include copies of the blast furnace gas analyses and sufficient documentation to support a reduced sampling schedule.

- (5) The permittee shall maintain monthly records of the following information for this emissions unit:
- a. the total quantity of blast furnace gas burned each month, in mmscf;
 - b. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total quantity of blast furnace gas burned, in mmscf;
 - c. the average heat content of the blast furnace gas burned each month, in Btu/scf, based upon the data collected in d)(4);
 - d. beginning after the first 12 calendar months of operation, the rolling, 12-month average heat content the blast furnace gas burned, in Btu/scf;

- e. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total blast furnace gas heat input rate, in million Btu;
 - f. the total quantity of natural gas burned each month, in mmscf;
 - g. the total PE, SO₂, CO, NO_x, and VOC emissions for each month, in tons, calculated in accordance with the equations in d)(6) for emissions units B001, B002, and P001, combined; and
 - h. beginning after the first 12 calendar months of operation, the rolling, 12-month summation of the total PE, SO₂, CO, NO_x, and VOC emissions, in tons, for emissions units B001, B002, and P001, combined.
- (6) The monthly PE, SO₂, CO, NO_x, and VOC emissions for emissions units B001, B002, and P001, combined, are calculated based on the following equations and the records collected above in d)(5):

a.
$$B001_{ER} = [(C_{BFG} \text{ mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{ lb/mmBtu}) + (C_{NG} \text{ mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{ lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$B001_{ER}$ = pollutant emission rate, in tons, from emissions unit B001;

C_{BFG} = total blast furnace gas usage in emissions unit B001 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{\text{Pollutant}}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit B001 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{\text{Pollutant}}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

b.
$$B002_{ER} = [(C_{BFG} \text{ mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{ lb/mmBtu}) + (C_{NG} \text{ mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{\text{Pollutant}} \text{ lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$B002_{ER}$ = pollutant emission rate, in tons, from emissions unit B002;

C_{BFG} = total blast furnace gas usage in emissions unit B002 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{\text{Pollutant}}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit B002 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{Pollutant}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

c.
$$P001_{ER} = [(C_{BFG} \text{ mmscf} \times H_{BFG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu}) + (C_{NG} \text{ mmscf} \times H_{NG} \text{ Btu/scf} \times EF_{Pollutant} \text{ lb/mmBtu})] / 2000 \text{ lbs/ton}$$

Where:

$P001_{ER}$ = pollutant emission rate, in tons, from emissions unit P001;

C_{BFG} = total blast furnace gas usage in emissions unit P001 (in mmscf);

H_{BFG} = heat content of the blast furnace gas (in Btu/scf);

$EF_{Pollutant}$ = pollutant-specific emission factor* from blast furnace gas combustion;

C_{NG} = total natural gas usage in emissions unit P001 (in mmscf);

H_{NG} = heat content of natural gas as 1,020 Btu/scf; and

$EF_{Pollutant}$ = pollutant-specific emission factor* for natural gas combustion.

*See Table 1 in f)(4) for emission factors to be used in this equation.

d.
$$\text{Total}_{ER} = B001_{ER}, \text{ for each pollutant} + B002_{ER}, \text{ for each pollutant} + P001_{ER} \text{ for each pollutant}$$

Where:

Total_{ER} = monthly emission rate, in tons, of each pollutant for emissions units B001, B002, and P001, combined.

e) Reporting Requirements

- (1) Unless other arrangements have been approved by the Director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.
- (2) See 40 CFR Part 60, Subpart Db (40 CFR 60.40b-49b).
- (3) The permittee shall submit quarterly deviation (excursion) reports that identify each exceedance of the rolling, 12-month restriction on the blast furnace gas actual heat input specified in c)(1) for emissions units B001, B002, and P001, combined.

The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.

f) **Testing Requirements**

(1) Compliance with the emission limitations in b)(1) and b)(2) of these terms and conditions shall be determined in accordance with the following methods:

a. **Emission Limitations:**

When combusting blast furnace gas or a combination of blast furnace gas and natural gas:

PE shall not exceed 0.015 pound per mmBtu.

CO emissions shall not exceed 0.110 pound per mmBtu.

NO_x emissions shall not exceed 0.10 pound per mmBtu.

VOC emissions shall not exceed 0.005 pound per mmBtu.

Applicable Compliance Methods:

The PE, CO, and VOC emission limitations above are based upon the manufacturer's guaranteed emission factors and/or engineering factors for this emissions unit as provided in the application for PTI number P0106675. Compliance with the PE, CO, and VOC emission limitations shall be demonstrated by the emission testing required in f)(2) below.

The NO_x emission limitation above is based upon the allowable limit for new source very large gas-only fired boilers in OAC rule 3745-110-03(D). The manufacturer's guaranteed emission factor of 0.046 pound per mmBtu, as provided in the application for PTI number P0106675, is less than the rule allowable limitation. Compliance with the NO_x emission limitation shall be demonstrated by the testing required in f)(2) below.

b. **Emission Limitation:**

When combusting blast furnace gas, natural gas, or a combination of blast furnace gas and natural gas:

SO₂ emissions shall not exceed 0.32 pound per mmBtu.

Applicable Compliance Method:

The SO₂ emission limitation is based upon the low sulfur gaseous fuel exemption specified in 40 CFR 60.42b(k)(2) which states gaseous fuels fired by this emissions unit shall not exceed 0.32 pound of SO₂ per mmBtu of actual heat input. Compliance with the SO₂ emission limitation shall be demonstrated by the data collected in the site-specific fuel analysis plan required pursuant to 40 CFR Part 60, Subpart Db.

c. **Emission Limitations:**

When combusting only natural gas:

PE shall not exceed 0.005 pound per mmBtu.

CO emissions shall not exceed 0.085 pound per mmBtu.

NOx emissions shall not exceed 0.10 pound per mmBtu.

VOC emissions shall not exceed 0.005 pound per mmBtu.

Applicable Compliance Methods:

The PE and CO emission limitations above are based upon the manufacturer's guaranteed emission factors for this emissions unit when combusting only natural gas as provided in the application for PTI number P0106675. If required, the permittee shall demonstrate compliance with the PE and CO emission limitations when combusting only natural gas through emission tests performed in accordance with 40 CFR Part 60, Appendix A, Methods 1 through 4, 5, and 10.

The NOx emission limitation above is based upon the allowable limit for new source very large gas-only fired boilers in OAC rule 3745-110-03(D). The manufacturer's guaranteed emission factor of 0.08 pound per mmBtu, as provided in the application for PTI number P0106675, is less than the rule allowable limitation. If required, the permittee shall demonstrate compliance with the NOx emission limitation when combusting only natural gas through emission tests performed in accordance with 40 CFR Part 60, Appendix A, Methods 1 through 4, and 7.

The VOC emission limitation above is based upon the emissions unit's potential to emit when combusting only natural gas and the US EPA AP-42 emission factors found in Section 1.4, Table 1.4-2, dated 7/1998. If required, the permittee shall demonstrate compliance with the VOC emission limitation when combusting natural gas through emission tests performed in accordance with 40 CFR Part 60, Appendix A, Methods 1 through 4, and 25.

d. **Emission Limitation:**

Visible particulate emissions from any stack shall not exceed 20% opacity, as a 6-minute average, except as specified by rule.

Applicable Compliance Method:

If required, compliance with the stack visible particulate emissions limitation shall be determined through visible emissions observations performed in accordance with U.S. EPA Method 9.

- (2) The permittee shall conduct, or have conducted, emission testing for this emissions unit in accordance with the following requirements:

- a. the emission testing shall be conducted within 60 days after achieving the maximum production rate at which the emissions unit will be operated, but not later than 180 days after initial startup of the emissions unit;
- b. emission testing shall be conducted to demonstrate compliance with the allowable mass emission rates for PE, CO, NO_x, and VOC when combusting a combination of blast furnace gas and natural gas (at a minimum 95 percent blast furnace gas composition) in this emissions unit as specified in b)(1)a. and b)(1)b.;
- c. the following test methods shall be employed to demonstrate compliance with the allowable mass emission rates:
 - i. 40 CFR Part 60, Appendix A, Methods 1 through 4; and
 - ii. 40 CFR Part 60, Appendix A, Method 5 and the procedures specified in OAC rule 3745-17-03(B)(9) for PE;
 - iii. 40 CFR Part 60, Appendix A, Method 10 for CO;
 - iv. 40 CFR Part 60, Appendix A, Method 7 for NO_x; and
 - v. 40 CFR Part 60, Appendix A, Method 25 for VOC.

Alternative U.S. EPA approved test methods may be used with prior approval from the Ohio EPA.

- d. The test(s) shall be conducted while the emissions unit is operating at or near its maximum capacity, unless otherwise specified or approved by the Hamilton County Department of Environmental Services or the Director of the OhioEPA.
- e. Not later than 30 days prior to the proposed test date(s), the permittee shall submit an "Intent to Test" notification to the Hamilton County Department of Environmental Services. The "Intent to Test" notification shall describe in detail the proposed test methods and procedures, the emissions unit operating parameters, the time(s) and date(s) of the test(s), and the person(s) who will be conducting the test(s). Failure to submit such notification for review and approval prior to the test(s) may result in the Hamilton County Department of Environmental Services' refusal to accept the results of the emission test(s).
- f. Personnel from the Hamilton County Department of Environmental Services shall be permitted to witness the test(s), examine the testing equipment, and acquire data and information necessary to ensure that the operation of the emissions unit and the testing procedures provide a valid characterization of the emissions from the emissions unit and/or the performance of the control equipment.
- g. A comprehensive written report on the results of the emissions test(s) shall be signed by the person or persons responsible for the tests and submitted to the Hamilton County Department of Environmental Services within 30 days following completion of the test(s). The permittee may request additional time for the

submittal of the written report, where warranted, with prior approval from the Hamilton County Department of Environmental Services.

- (3) Pursuant to 40 CFR Part 60.8(e), the permittee shall provide, or cause to be provided, emission testing facilities for this emissions unit as follows:
- a. Sampling ports adequate for test methods applicable to this emissions unit. This includes:
 - i. constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures; and,
 - ii. providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.
 - b. Safe sampling platform(s).
 - c. Safe access to sampling platform(s).
 - d. Utilities for sampling and testing equipment.
- (4) The record keeping requirements for this emissions unit in d)(5) and d)(6) may utilize the following annual average emission factors in Table 1 derived from permittee-supplied engineering estimates and/or manufacturer performance guarantees provided in the application for PTI number P0106675. In the event that during the course of operation of this emissions unit it is discovered that the emission factors listed below are not representative of normal operations, the permittee may submit a written request to the Director (the appropriate Ohio EPA District Office or local air agency) to revise the annual average emission factors based upon the best available information.

Table 1. Emission Factors for 12-Month Rolling Average Emission Calculations

Pollutant	Blast Furnace Gas Combustion (in pound per mmBtu, HHV dry)	Natural Gas Combustion (in pound per mmBtu, HHV dry)
NOx	0.046	0.08
CO	0.110	0.085
SO ₂	0.127	0.0006
PE/PM10/PM2.5 - filterable	0.015	0.005
VOC	0.005	0.005

g) Miscellaneous Requirements

- (1) Modeling to demonstrate compliance with, the "Toxic Air Contaminant Statute", ORC 3704.03(F)(4)(b), was not necessary because the emissions unit's maximum annual emissions for each toxic air contaminant, as defined in OAC rule 3745-114-01, will be less than 1.0 ton per year. OAC Chapter 3745-31 requires permittees to apply for and obtain a new or modified PTI prior to making a "modification" as defined by OAC rule 3745-31-01. The permittee is hereby advised that changes in the composition of the materials, or use of new materials, that would cause the emissions of any toxic air contaminant to increase to above 1.0 ton per year may require the permittee to apply for and obtain a new PTI.

Attachment B

Finding of No Significant Impact

**FINDING OF NO SIGNIFICANT IMPACT
FOR THE
AIR PRODUCTS AND CHEMICALS, INC. WASTE ENERGY PROJECT
AT THE AK STEEL CORPORATION MIDDLETOWN WORKS,
MIDDLETOWN, OHIO**

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: DOE completed the *Final Environmental Assessment for the Air Products and Chemicals, Inc. Waste Energy Project at the AK Steel Corporation Middletown Works, Middletown, Ohio* (DOE/EA-1743). Based on the analyses in the Environmental Assessment (EA), DOE determined that its proposed action - awarding a federal grant to Air Products and Chemicals, Inc. (Air Products) to facilitate construction and operation of a waste energy recovery plant at the AK Steel Corporation (AK Steel) Middletown Works - would result in no significant adverse impacts. DOE further determined that the proposed project would have potential beneficial impacts to the nation's energy efficiency and local air quality. Additionally, beneficial local socioeconomic impacts could occur as a result of increased employment opportunities and spending in the project area.

BACKGROUND: As part of the *American Recovery and Reinvestment Act of 2009* (Recovery Act; Public Law 111-5, 123 Stat. 115), DOE's National Energy Technology Laboratory (NETL), on behalf of the Office of Energy Efficiency and Renewable Energy's Industrial Technologies Program, is providing up to \$156 million in federal funding for competitively awarded agreements to facilitate the deployment of district energy systems, combined heat and power systems, waste energy recovery systems, and energy-efficient industrial equipment and processes at single or multiple installations and sites.

The federal action of providing funding for these Industrial Technologies Program projects requires compliance with the *National Environmental Policy Act of 1969* (NEPA) (NEPA; 42 U.S.C. 4321 et seq.), the Council on Environmental Quality regulations (40 CFR Parts 1500 to 1508) and DOE's NEPA implementing procedures (10 CFR Part 1021). DOE prepared an EA to evaluate the potential environmental consequences of providing a grant for this proposed project under the Industrial Technologies Program.

PURPOSE AND NEED: The overall purpose and need for DOE action pursuant to the Industrial Technologies Program and the funding opportunity under the Recovery Act is to set up U.S. industry as the world leader in energy efficiency and productivity. The program's goal is to facilitate a 25-percent reduction in industrial energy intensity by 2017. The Industrial Technologies Program's three-part strategy intends to achieve this objective by:

- Sponsoring research, development, and demonstration of industry-specific and crosscutting technologies to reduce energy and carbon intensity;

- Conducting technology delivery activities to help plants access today's technology and management practices; and
- Promoting a culture of energy efficiency and carbon management within industry.

The strategy also calls for an 18-percent reduction in U.S. carbon intensity by 2012. DOE seeks to identify projects and suitable technologies that it can fund to meet this goal. Air Products' proposed project at AK Steel's Middletown Works would also contribute to the nation's economic recovery by creating or helping to retain manufacturing jobs in the United States in accordance with the objectives of the Recovery Act.

DESCRIPTION OF THE PROPOSED ACTION: DOE's proposed action is to provide a grant to partially fund Air Product's proposed project - construction and operation of a waste energy recovery plant at AK Steel's Middletown Works. The project would include: (1) minimal site preparation and removal of small foundations on two previously disturbed sites at the Middletown Works; (2) construction of a combined-cycle power generation plant and a management system for the blast furnace gas; and (3) production of steam and electricity from previously flared waste blast furnace gases. DOE would provide a \$30 million financial assistance grant in a cost-sharing arrangement in order to facilitate construction and operation of the project. The total cost of the project is estimated at \$315 million.

ALTERNATIVES CONSIDERED: In addition to the proposed action, DOE considered the No-Action Alternative as required under NEPA. Under the No-Action Alternative, DOE would not provide funds for the proposed project. For the purposes of the EA, DOE assumed that the project would not proceed without DOE funding. This assumption established a baseline against which the potential environmental impacts of the proposed project were compared.

ENVIRONMENTAL CONSEQUENCES: DOE evaluated the potential environmental consequences of the proposed project and the No-Action Alternative. DOE considered 14 environmental resource areas in the EA. However, not all areas were evaluated at the same level of detail. For nine of the resource areas, DOE determined there would be no impacts or the potential impacts would be small, temporary, or both, and therefore did not carry these areas forward for additional analysis. DOE focused its more detailed analyses on those resources that could require new or amended permits, have the potential for significant impacts or controversy, or interest the public, such as socioeconomics and occupational health and safety.

DOE focused its more detailed analyses of potential impacts on the following resources areas: air quality, water resources, wastes, socioeconomics, and occupational health and safety. For these areas, DOE determined that potential environmental impacts would be small, temporary, or both. Air emission and water use permits would require minor amendments to existing permits. Air emissions from the proposed project would remain at levels similar to current Middletown Works emissions, with the exception of a reduction in nitrogen oxides. The proposed project would generate enough electricity to serve about 80,000 households with no increase in greenhouse gas emissions because the plant would use existing waste gases to generate electricity, unlike conventional electricity generation plants that burn fossil fuels.

DOE also evaluated socioeconomics to determine the potential benefits of the proposed project on the surrounding communities. The project is anticipated to result in small increases in local employment and local spending, potentially providing a minor beneficial impact to the local communities.

The other environmental resource areas DOE evaluated for potential impacts were geology and soils; land use; aesthetics and visual resources; noise; biological resources; historic and cultural resources; environmental justice; transportation and utilities; and energy and materials. DOE determined that there would be no adverse impacts for these resource areas, or that the impacts would be small, temporary, or both. The EA provides more detail on the reasons DOE did not conduct more detailed evaluations of these areas.

Under the No-Action Alternative, DOE assumed the project would either be delayed, as Air Products sought other funding sources, or abandoned altogether. The potential environmental consequences, if the project were delayed, could be different if the project were modified. If abandoned, the potential environmental consequences would not occur. Furthermore, the potential beneficial impacts would change or not occur.

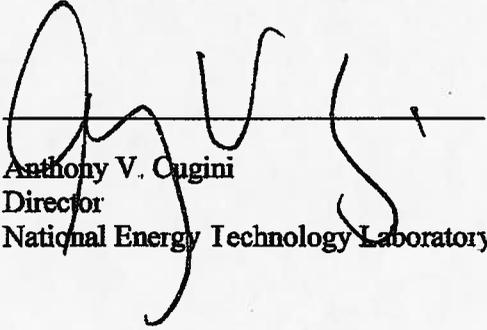
PUBLIC AVAILABILITY: DOE issued the Draft EA on May 9, 2010, and advertised its availability in the *Middletown Journal* on May 9, 10, and 11. In addition, DOE sent a copy of the Draft EA for public review to the Middletown Public Library. DOE established a 15-day public comment period that began May 9, 2010, and ended May 23, 2010 and announced it would accept comments by mail, e-mail, and facsimile. Copies of the Final EA and this FONSI are available at DOE's National Energy Technology Laboratory web site at www.netl.doe.gov/publications/others/nepa/ea.html.

The Draft EA was distributed to various federal, state, and local agencies with jurisdiction or special expertise. DOE conducted formal consultations by mail with the responsible U.S. Fish and Wildlife Service (USFWS) field office, the Ohio Environmental Protection Agency (OEPA), State Historic Preservation Office (SHPO), and Tribal contacts in Ohio. The USFWS commented that the project would occur within the range of the Indiana Bat, an endangered species, and listed its habitat requirements. However, DOE determined that the proposed site does not contain suitable habitat for the Indiana bat. The USFWS also recommended that DOE contact the Ohio Department of Natural Resources to determine whether any active bald eagle nests are near site. The state agency informed DOE that the closest nest is more than fifteen miles southeast of the project site. The OEPA commented that it is actively involved in discussions regarding air permitting for the project. OEPA also identified a section of the Middletown Works that is undertaking a Resource Conservation and Recovery Act (RCRA) corrective action, which could impact activities at the project site. The SHPO concurred with the Department's determination of no historic properties would be affected.

DETERMINATION: On the basis of the evaluations in the Final EA, DOE determined that its proposed action, to provide a \$30 million financial assistance grant, and Air Products' proposed project, construction and operation of a plant to recover waste energy, would have no significant impact on the human environment. Although the proposed project would require amendments to existing air and water permits, the waste energy recovery operations would comply with and operate within all amended permit requirements. All other potential environmental impacts DOE

identified and analyzed in the EA would be small, temporary or both. Therefore, preparation of an environmental impact statement is not required and DOE is issuing this Finding of No Significant Impact.

Issued in Pittsburgh, Pennsylvania, this 13th day of July 2010.



Anthony V. Cugini
Director
National Energy Technology Laboratory



Environmental
Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

5/17/2011

Certified Mail

Mr. Frederick Lash
Air Products and Chemicals, Inc. - Middletown CoGen
7201 Hamilton Blvd
Allentown, PA 18195-1501

Yes	TOXIC REVIEW
No	PSD
No	SYNTHETIC MINOR TO AVOID MAJOR NSR
No	CEMS
No	MACT/GACT
Yes	NSPS
No	NESHAPS
No	NETTING
No	MAJOR NON-ATTAINMENT
No	MODELING SUBMITTED

RE: FINALAIR POLLUTION PERMIT-TO-INSTALL
Facility ID: 1409001091
Permit Number: P0106675
Permit Type: Initial Installation
County: Butler

Dear Permit Holder:

Enclosed please find a final Air Pollution Permit-to-Install (PTI) which will allow you to install or modify the described emissions unit(s) in a manner indicated in the permit. Because this permit contains several conditions and restrictions, we urge you to read it carefully. Please complete a survey at www.epa.ohio.gov/dapc/permitsurvey.aspx and give us feedback on your permitting experience. We value your opinion.

The issuance of this PTI is a final action of the Director and may be appealed to the Environmental Review Appeals Commission pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the Director's action. The appeal must be accompanied by a filing fee of \$70.00, made payable to "Ohio Treasurer Josh Mandel," which the Commission, in its discretion, may reduce if by affidavit you demonstrate that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the Environmental Review Appeals Commission at the following address:

Environmental Review Appeals Commission
309 South Fourth Street, Room 222
Columbus, OH 43215

The Ohio EPA is encouraging companies to investigate pollution prevention and energy conservation. Not only will this reduce pollution and energy consumption, but it can also save you money. If you would like to learn ways you can save money while protecting the environment, please contact our Office of Compliance Assistance and Pollution Prevention at (614) 644-3469. If you have any questions regarding this permit, please contact the Hamilton County Dept. of Environmental Services. This permit can be accessed electronically on the Division of Air Pollution Control (DAPC) Web page, www.epa.ohio.gov/dapc by clicking the "Issued Air Pollution Control Permits" link.

Sincerely,

Michael W. Ahern
Michael W. Ahern, Manager
Permit Issuance and Data Management Section, DAPC

Cc: U.S. EPA
HCDOES; Indiana; Kentucky

50 West Town Street, Suite 700
P.O. Box 1049
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Response to Comments

Response to comments for: Permit-To-Install

Table with 2 columns: Field Name and Value. Fields include Facility ID, Facility Name, Facility Description, Facility Address, Permit #, and Hearing date.

The following comments were received during the comment period specified. Ohio EPA reviewed and considered all comments received during the public comment period. By law, Ohio EPA has authority to consider specific issues related to protection of the environment and public health.

In an effort to help you review this document, the questions are grouped by topic and organized in a consistent format. PDF copies of the original comments in the format submitted are available upon request.

Topic: Comments from Air Products and Chemicals Inc.

Comment 1: On pages 6 and 7, terms A.4. and A.6. of the Standard Terms and Conditions, the requirements are ambiguous, not applicable, and/or inconsistent with record keeping and reporting requirements in other sections of the permit.

Response 1: The Standard Terms and Conditions are a uniform template in use by Ohio EPA for all air permits issued in the State of Ohio at this time. As such, Ohio EPA will not make any changes to these terms in the final permit. Ohio EPA has advised the permittee to work with the District Office and/or Local Air Agency staff to identify and discuss for clarification any paragraphs in the Standard Terms and Conditions that may have requirements beyond the facility-wide and emissions unit-specific record keeping and reporting requirements specified in Sections B and C. of the final permit.

Comment 2: On page 7, term A.5. of the Standard Terms and Conditions, this term appears to conflict with the permit application for the gas turbine which has incorporated hours of operation when the SCR is offline for maintenance.

Response 2: Ohio EPA agrees that the anticipated routine SCR maintenance, as presented by the permittee in the application for the Middletown Cogeneration Project, should be included as an allowable limitation under BAT for P001. Therefore, Ohio EPA has added terms and conditions to P001 allowing for 24 hours of operation, as a rolling 12-month restriction, when bypassing the SCR to allow for preventive maintenance of the SCR unit such that this operating scenario will not conflict with term A.5.

Comment 3: On page 9, term A.11.a) of the Standard Terms and Conditions, does this term waive the permittee's right to contest an order to install additional facilities?

Response 3: Ohio EPA does not believe it does. Ohio EPA believes that if that section would be invoked, then any action(s) would be subject to all rights under the premise of appealable action(s) by the director of Ohio EPA.

Comment 4: On page 14, terms B.6 and B.7., omit PM2.5 from post-project record keeping and reporting since post-project emissions do not exceed the 50% of the NSR threshold.

Response 4: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 5: On pages 16, 19, and 28, change the allowable VOC emission limitation for P001 from 1.4 ppmvd to 1.6 ppmvd due to a subsequent correction of the emission rate to accurately reflect the dry basis.

Response 5: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 6: On pages 17 and 29, change the allowable NOx and CO rolling 12-month emission limitations from 10.5 to 10.3 TPY for NOx and from 8.1 to 7.2 TPY for CO due to subsequent refinement of startup emission calculations for P001.

Response 6: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 7: On pages 19, 21, 25, 29, the limitations and record keeping requirements for start-ups and shutdowns should not apply to the initial shakedown period (commissioning) on P001.

Response 7: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 8: On page 22, add language to terms d)(3) and d)(4) for the continuous monitoring equipment to be off-line for repairs, maintenance, and calibration. Add language to term d)(4) to allow alternate use of the process calorimeter that measures LHV and conversion of data to HHV. (Comment applies to emission units P001, P003, B001, and B002).

Response 8: Ohio EPA agrees with the comments regarding the continuous monitoring equipment based upon additional calibration and maintenance schedules and documentation provided by the permittee during this comment period and will change the fuel flow and heat content monitoring terms to include the need for such activities in the final permit. Ohio EPA also agrees to add alternative heat content monitoring in the final permit based upon additional heat content calculations and documentation provided by the permittee during this comment period.

Comment 9: On pages 48 and 57, change the allowable PE limitation for B001 and B002 from 0.014 to 0.015 pound per mmBtu due to a minor correction of the emission rate.

Response 9: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 10: On page 48, add the SO₂ limitation of 0.32 pound per mmBtu under BAT when combusting blast furnace gas, or a mixture of blast furnace gas or natural gas.

Response 10: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 11: On page 52, the NESHAP Subpart DDDDD term b)(2)i. should revised to reflect the final rule.

Response 11: Ohio EPA agrees with this comment and will make the change in the final permit.

Comment 12: On page 59, add a statement to f)(2) that indicates stack testing on B001 may be considered representative of B002 and vice versa.

Response 12: Ohio EPA has historical evidence that suggests identical boilers may realize very different efficiencies and emissions. Since this project relies upon engineering estimated emission factors to demonstrate that the project is not subject to major NSR and these emissions factors may be significantly less than emission standards established under state and/or federal rules, Ohio EPA will not agree to allow representative stack testing for these emissions units. Each new boiler (emissions units B001 and B002) will be subject to stack testing as specified in the final permit.

Topic: Comments from US EPA Region V, Air Permits Section

Comment 13: Middletown Cogeneration appears to be a support facility for AK Steel Middletown. Please revise the permit to include the emissions of AK Steel Middletown Works and other facilities considered to be part of this source or provide detailed information indicating that Middletown Cogeneration is a separate source.

Response 13: As noted in the Permit Strategy Write-Up, for purposes of new source review permitting, it has been determined that both the AK Steel's Middletown Works facility and the Middletown Cogeneration installation project, operated by Air Products, are one stationary source. The Middletown Cogeneration facility (facility ID 1409001091), owned and operated by Air Products and Chemicals, Inc., is a support facility for the AK Steel Middletown Works (facility ID no. 14-09-01-0006), owned and operated by AK Steel Corporation, for permitting purposes under OAC Chapter 3745-31, and OAC Chapter 3745-77. All blast furnace gas (BFG) used in the Middletown Cogeneration facility will be produced by the AK Steel Middletown Works blast furnace (emission unit F012). All of the process steam and most of the electricity produced by the proposed new Middletown Cogeneration facility will be supplied to AK Steel. Ohio EPA has determined that the proposed new Middletown Cogeneration facility is under the common control of AK Steel Corporation. As shown in the Permit Strategy Write-Up issued with the proposed permit, the proposed new Middletown Cogeneration facility will be a minor modification to an existing major stationary source. The emissions and emissions units that comprise the AK Steel Middletown Works are maintained in the Emission Profile for the AK Steel Middletown Works in the Ohio EPA Air Services system.

Comment 14: The facility is located within an Environmental Justice area and associated with other sources of public concern. Please notify us of any concerns that affected residents have expressed regarding this proposed project.

Response 14: There have been no concerns or comments, written or oral, formal or informal, with regard to the proposed project by residents in the Middletown area or anywhere else. No one spoke at the April 27, 2011 public hearing in Middletown on the proposed permit. The project will be located entirely within the boundaries of the existing AK Steel Middletown Works, on a parcel next to the existing blast furnace leased



**Environmental
Protection Agency**

Response to Comments
Air Products and Chemicals, Inc. - Middletown Cogen
Permit Number: P0106675
Facility ID: 1409001091

by Air Products. As noted in the Permit Strategy Write-Up, as a result of the proposed project blast furnace gas (BFG) will be combusted more efficiently, and with much lower NOx emissions, than under current operations, at the same time useful energy (electricity and process steam) is produced with otherwise flared BFG that can be expected to displace electricity generated using coal.