**MEMORANDUM**

**DATE**: May 1, 2023

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U.S. Environmental Protection Agency, Research Triangle Park, NC

**TO**: Coke Ovens Residual Risk and Technology Review (RTR) Project File

**SUBJECT:** Coke Ovens Risk and Technology Review: Data Summary

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# 1.0 INTRODUCTION AND BACKGROUND

This memorandum describes the data acquired to support the Residual Risk and Technology Review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coke Ovens: Pushing, Quenching, and Battery Stacks (PQBS) (40 CFR part 63, subpart CCCCC) and technology review of Coke Ovens (40 CFR part 63, subpart L). In accordance with section 112(d)(2) and (3) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) promulgated a NESHAP for coke oven facility sources under Coke (PQBS) subpart CCCCC on April 14, 2003 (68 FR 18008). The 2003 Coke PQBS NESHAP established maximum achievable control technology (MACT) standards for pushing, quenching, and battery stacks. The MACT for the Coke Ovens, subpart L, NESHAP was promulgated on October 27, 1993 (58 FR 57898) and set standards for leaks from oven doors, lids, and offtake, and for charging. The RTR for Coke Ovens, subpart L, was promulgated on April 15, 2005 (72 FR 19992).

Under section 112(f)(2) of the CAA, the EPA is required to perform a residual risk analysis of MACT standards within eight years of promulgation. In addition, the EPA is required to perform a technology review of MACT standards every eight years under section 112(d)(6) of the CAA. The Coke PQBS RTR was due in 2011. The technology review of Coke Ovens, subpart L, NESHAP was due in 2013.

In the coke production process, coal is heated in ovens in the absence of air to temperatures approaching 2,000°F (1,100oC), which drives off most of the volatile organic constituents of the coal, as gases and vapor, to form coke, which consists almost entirely of carbon. Coal is charged into the top or end of the oven, depending on the process, and the finished coke is pushed out using doors on both ends of the ovens. The hot coke product is cooled in quench towers that use water spray to cool hot coke in rail cars that drive into the bottoms of quench towers. The coke product is used either in blast furnaces in the integrated iron and steel industry (II&S) or at iron and steel foundries that produce iron molds for shaping molten metal. Coke oven temperatures are slightly higher to produce blast furnace coke than foundry coke. Coking lasts for 15 to 18 hours to produce blast furnace coke and 25 to 30 hours to produce foundry coke.

The coke ovens are arranged in a series of adjacent ovens called batteries, where one battery may have up to 100 ovens and multiple batteries may be used by one facility. For the 14 coke facilities in the Coke Oven Risk Modeling Database, the number of batteries per facility ranged from 1 to 10, and the total number of ovens at the facility ranged from 56 to 708, with median values of 3 batteries per facility and 126 ovens total at the facility. Ovens at ByP facilities are tall and narrow (approximately 20 ft/6 m by 1.3 ft/0.4 m; whereas, at heat and nonrecovery recovery (HNR) facilities, the ovens are short and wide (approximately 7.8 ft/2.4 m by 12 ft/3.6 m). ByP ovens are operated at positive pressure, whereas HNR ovens operate under negative pressure. The organic gases and vapors that evolve from the ovens are removed through an exhaust system: for by-product (ByP) plants, gases are sent to a chemical recovery plant that recovers chemicals and other by-products for sale and also cleans the coke oven gas (and is regulated under 40 CFR part 61, subpart L NESHAP); for nonrecovery plants (*i.e.*, no chemical recovery) with heat recovery, the oven gases are sent to a heat recovery steam generator that produces power for sale and also to units that perform gas cleaning; for nonrecovery plants without heat recovery, oven exhaust gases are released to the air through waste heat stacks.

The purpose of this memorandum is to describe the emissions and related data obtained for coke production facilities and their emission units, the review and quality control (QC) checks performed on the data; and development of the emission estimates used in the Coke Oven Emissions and Risk Modeling Databases. See the memorandum titled *HAP**Emissions from Coke Oven Facilities* (EPA, 2023) for summaries of the emissions developed for the sources. See below for the table of contents and a list of abbreviations used.

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ABBREVIATIONS

|  |  |
| --- | --- |
| acfm | actual cubic feet per minute |
| ACCCI | American Coke and Coal Chemicals Institute |
| ADL | above detection limit |
| BDL  BF  BOPF | below detection limit  blast furnace  basic oxygen process furnace |
| BSO | benzene-soluble organic |
| ByP | by-product coke production process |
| ˚C | degrees Celsius |
| CAA | Clean Air Act |
| CAP | criterial air pollutant |
| CD | control device |
| CO | carbon monoxide |
| CO2 | carbon dioxide |
| COE | coke oven emissions |
| COETF | Coke Oven Environmental Task Force |
| COG | coke oven gas |
| Cr | chromium |
| D/F | dioxin/furans |
| DLL | detection level limited |
| dscf | dry standard cubic feet |
| dscfm | dry standard cubic feet per minute |
| dscm | dry standard cubic meters |
| EDL | estimated detection limit |
| EIS | EPA’s Emission Inventory System |
| EP | emission process |
| EPA | U.S. Environmental Protection Agency |
| ˚F | degrees Fahrenheit |
| ft | feet |
| fps | feet per second |
| gr/dscf | grains per dry standard cubic foot |
| HAP | hazardous air pollutant |
| HCl | hydrogen chloride |
| HCN | hydrogen cyanide |
| HF | hydrogen fluoride |
| HNR | heat and/or nonrecovery |
| Hg | mercury |
| HRSG | heat recovery steam generator |
| hr/yr | hours per year |
| II&S | Integrated Iron and Steel source category |
| LAER | lowest achievable emissions rate |
| lb/hr | pounds per hour |
| lb/mmscf | pounds per millions of standard cubic feet |
| lb/ton | pounds per ton |
| m | meter |
| MACT | maximum achievable control technology |
| MDL | method detection limit |
| mg/dscm | milligrams per dry standard cubic meter |
| mg/L | milligrams per liter |
| mmscf/hr | millions of standard cubic feet per hour |
| mmscf/yr | millions of standard cubic feet per year |
| NEI | EPA’s National Emission Inventory |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| ng/dscm | nanograms per dry standard cubic meter |
| % | percent |
| PAHs | polycyclic aromatic hydrocarbons |
| PCM | pushing/charging machine |
| P&EF | processes and emissions flow table |
| PLD | percent leaking doors |
| PLL | percent leaking lids |
| PLO | percent leaking offtakes |
| PM filterable | filterable particulate matter |
| PM2.5 | PM that is 2.5 micrometers or less in diameter, both filterable and condensable |
| ppm | parts per million |
| PQBS | Pushing, Quenching, and Battery Stacks |
| QC | quality control |
| RDL | reportable detection limit |
| RTR  s/charge | residual risk and technology review  seconds of visible emissions per charge of coal into the oven |
| SCC | source classification codes |
| SDA | spray dryer absorber |
| SO2 | sulfur dioxide |
| TEF | toxicity equivalence factors |
| TEQ | toxic equivalency |
| tph | tons per hour |
| tpy | tons per year |
| TDS | total dissolved solids |
| TSO | toluene soluble organics |
| µg/dscm | micrograms per dry standard cubic meter |
| µm | micrometer |
| UOM | units of measurement |
| VOHAP | speciated volatile HAP |
| WHO | World Health Organization |

2.0 DATA USED TO DEVELOP THE COKE OVEN EMISSIONS DATABASE

The primary sources of data for the Coke RTR were the responses to two CAA section 114 requests (Coke 114 request) sent to selected facilities in the coke industry in April 2016 and June 2022 that included a questionnaire and a source test request. The EPA sent out the Coke 114 requests under the authority of section 114 of the CAA (42 U.S.C. 7414) to acquire the necessary data for the RTR for Coke PQBS and the technology review for Coke Ovens, subpart L. The questionnaire portion of the Coke 114 requests included questions pertaining to inventory, process, and control device information for the emission units at the coke facilities. The source test request portion of the Coke 114 requests described the source tests, the test methods to be used, the pollutants to test, and other details concerning the requested testing. Copies of the Coke 114 requests and responses received by the EPA are included in dockets for both coke ovens rules, subparts CCCCC and L (Docket ID No.’s EPA-HQ-OAR-2002-0085 (subpart CCCCC); and Docket ID No.’s EPA-HQ-OAR-2003-0051 (subpart L)).

**Table 1** lists the coke facilities and companies that were operating in 2016 and 2022, the type of coke they produced, whether the facilities submitted data and/or performed source testing in response to the Coke 114 requests, and the estimated typical annual coke production.

The questionnaire portion of the 2016 Coke 114 request was sent to nine Coke companies that included 11 coke facilities operating in 2016: Mountain State Carbon, LLC (later purchased by AK Steel); AK Steel Corporation (that owned two coke facilities in 2016 and owned three coke facilities by 2020); ArcelorMittal Burns Harbor LLC; ArcelorMittal Monessen LLC; ArcelorMittal Warren LLC; Erie Coke Corporation;[[1]](#footnote-2) DTE Energy Services, Inc.; Sun Coke Energy, Inc. (which owns three of the coke facilities receiving the 2016 Coke 114 request) and U.S. Steel Clairton. There are four other operating coke facilities that did not receive the 2016 Coke 114 request that are currently operating (or on stand-by): ABC Coke; Bluestone Coke; Sun Coke Indiana Harbor Coke; and SunCoke Jewell Coke and Coal. The test request portion of the 2016 Coke 114 request was sent to seven of the 11 facilities. **Table 2** shows the details of the 2016 CAA section 114 request in terms of companies that received the request and the parts of the request they were requested to do. In 2020, Cleveland-Cliffs Inc. acquired the AK Steel: Follansbee, WV (Mountain State Carbon) and Middletown, OH cokemaking facilities and the ArcelorMittal USA LLC: Burns Harbor, IN; Monessen, PA; and Warren, OH cokemaking facilities.

The questionnaire portion of the 2022 Coke 114 request was sent to six companies that included eight facilities at coke companies operating in 2022: ABC Coke; Cleveland-Cliffs, Inc. (3 facilities); DTE Energy Services, Inc.; Sun Coke Energy, Inc. (2 facilities), U.S. Steel, and Cokenergy. The test request portion of the 2022 Coke 114 request was sent to eight facilities. **Table 3** shows the companies and facilities that received the 2022 114 request and the parts of the request applicable to each facility.

The 2016 and 2022 Coke 114 requests included request for test data, along with physical and operating information about the emission units, were used to populate the Coke Oven Emissions Database. The emissions in the database, along with modeling release point information such as stack heights, air flowrates, and geographical locations, were used to develop the Coke Oven Risk Modeling Database for estimating the residual risk after implementation of the 2003 MACT standards for the Coke PQBS source category. The emissions data are also available to be used for developing any new MACT standards, if appropriate. The emissions data in the two databases—emissions vs. modeling—were almost identical except in the treatment of test measurements that were below the detection limit (BDL), which are described below in detail in **Section 2.9**. Development of emission data for all coke facilities and their processes are described in detail below.

**Appendix A** contains a summary of the facility responses to the Coke 114 request Questionnaire. **Appendix B** contains the Coke Oven Emissions Database and other relevant information, such as tables of individual HAP emissions reported as Total D/F, PAH, and VOHAP in **Section 4**. **Appendix C** contains the Coke Oven Risk Modeling Database.

**Table 1. Coke Facilities, Companies, Locations, Facility Type, and 114 Request Status**

| **Facility Name** | **Company Name**  **[Previous Company Name]** | **Facility ID**  **[Previous Facility ID]** | **City** | **State** | **Type of Coke and Facility1** | **2016 Coke 114 Request Submissions2** | **2022 Coke 114 Request Submissions2** | **Typical Annual Coke Production**  **(tons)3** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC Coke | Drummond Company | ABC-Tarrant-AL | Tarrant | AL | Foundry | No | Yes (T) | 525,685 |
| Bluestone Coke | Bluestone | BLU-Birmingham-AL | Birmingham | AL | Foundry | No | No | 348,713 |
| Cleveland-Cliffs Follansbee Works | Cleveland-Cliffs [Mountain State Carbon, LLC] | CC-Follansbee-WV  [AKS-Follansbee-WV] | Follansbee | WV | BF, ByP | Yes | No | 561,862 |
| Cleveland-Cliffs Middletown Works | Cleveland-Cliffs  [AK Steel Corporation] | CC-Middletown-OH  [AKS-Middletown-OH] | Middletown | OH | BF, ByP | Yes (T) | No | 401,752 |
| Cleveland-Cliffs Burns Harbor | Cleveland-Cliffs [ArcelorMittal Burns Harbor LLC] | CC-BurnsHarbor-IN  [AM-BurnsHarbor-IN] | Burns Harbor | IN | BF, ByP | Yes (T) | Yes (T) | 1,888,153 |
| Cleveland-Cliffs Monessen | Cleveland-Cliffs [ArcelorMittal Monessen LLC] | CC-Monessen-PA  [AM-Monessen-PA] | Monessen | PA | BF, ByP | Yes (T) | Yes (T) | 336,022 |
| Cleveland-Cliffs Warren | Cleveland-Cliffs [ArcelorMittal Warren LLC] | CC-Warren-OH  [AM-Warren-OH] | Warren | OH | BF, ByP | Yes | Yes (T) | 359,281 |
| EES Coke Battery | DTE Energy Services, Inc. | EES-RiverRouge-MI | River Rouge | MI | BF, ByP | Yes | Yes (T) | 981,765 |
| Indiana Harbor Coke | SunCoke Energy, Inc. | SC-EastChicago-IN | East Chicago | IN | BF, HNR | No | No | 1,300,000 |
| Haverhill Coke | SunCoke Energy, Inc. | SC-FranklinFurnace-OH | Franklin Furnace | OH | BF, HNR | Yes | Yes (T) | 683,313 |
| Gateway Energy and Coke | SunCoke Energy, Inc. | SC-GraniteCity-IL | Granite City | IL | BF, HNR | Yes (T) | No | 428,412 |
| Middletown Coke Company | SunCoke Energy, Inc. | SC-Middletown-OH | Middletown | OH | BF, HNR | Yes (T) | No | 357,010 |
| Jewell Coke and Coal | SunCoke Energy, Inc. | SC-Vansant-VA | Vansant | VA | BF, HNR | No | Yes (T) | 710,000 |
| US Steel-Clairton | U.S. Steel | USS-Clairton-PA | Clairton | PA | BF, ByP | Yes (T) | Yes (T) | 3,776,244 |
| Cokenergy4 | Coke Energy | CC-EastChicago-IN | East Chicago | IN | BF, HNR | No | Yes (T) | 1,300,000 |

1 BF = blast furnace. ByP = by-product. HNR = heat and/or nonrecovery.

2 T = Facility also performed testing as part of Coke 114 request. Other facilities that responded to Coke 114 request but did not test submitted Enclosure 1 questionnaire.

3 Typical production as estimated by one or more of the following: (1) facilities in their Coke 114 request Enclosure 1 responses: (2) industry during the Coke 114 request review process; (3) 1998 coke production values from the NESHAP for Coke Ovens: Pushing, Quenching, and Battery Stacks – Background Information for Proposed Standards (EPA, 2001a); or (4) 55 percent capacity utilization of coke production design capacity from Coke 114 request Enclosure 1 responses for facilities that did not provide actual coke production values. See **Section 4.1.1.3** below for details.

4 Cokenergy operates a combined heat and power system that uses the waste heat in the flue gas from Indiana Harbor Coke Company’s (IHCC) metallurgical coke facility to produce steam and electricity for the Cleveland-Cliffs Indiana Harbor integrated steel mill. Cokenergy owns and operates the 16 heat recovery steam generators (HRSG) to recover heat from the flue gas to allow for environmental treatment by the flue gas desulfurization system.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2. Details of 2016 CAA Section 114 Request and Portions Requested** | | | |
| **Facility/Location** | **2016 Enclosure 1 Survey** | **12 Months**  **Leak Data** | **2016 Enclosure 2 Testing Sources:**  **Pushing, Battery Stack, Quench Tower, Boiler, HRSG Main stack, HNR Bypass Stack, HNR charging** |
| CC-BurnsHarbor-IN | X | X | Pushing, Battery Stack |
| CC-Follansbee-WV | X | X | None |
| CC-Middletown-OH | X | X | Pushing, Battery Stack |
| CC-Monessen-PA | X | X | Pushing, Battery Stack, Quench Tower, Boiler |
| CC-Warren-OH | X | X | None |
| EES-RiverRouge-MI | X | X | None |
| SC-FranklinFurnace-OH | X | -- | None |
| SC-GraniteCity-IL | X | -- | Pushing, Bypass/Waste Stack |
| SC-Middletown-OH | X | -- | Pushing, HRSG Main Stack, Charging |
| USS-Clairton-PA | X | X | Battery Stack, Quench Tower |

**Table 3. Details of 2022 CAA Section 114 Request and Portions Requested**

|  |  |  |  |
| --- | --- | --- | --- |
| **Facility/Location** | **2022**  **Enclosure 1 Survey Sections:** | **12 Months**  **Leak Data** | **2022 Enclosure 2 Testing Sources: CBRP Stacks (2), Flares, Fugitives, ByP Oven Doors** |
| ABC-Tarrant-AL | A, B, C, D, E | X | CBRP, Flares, Fugitives |
| CC-BurnsHarbor-IN | A, B, C, D, E | X | CBRP, Doors, Flares, Fugitives |
| CC-Monessen-PA | A, B, C, D, E | X | Flares |
| CC-Warren-OH | A, B, C, D, E | X | Flares |
| EES-RiverRouge-MI | A, B, C, D, E | X | Flares, Fugitives |
| USS-Clairton-PA | A, B, C, D, E | X | CBRP, Doors, Flares, Fugitives |
| SC-FranklinFurnace-OH | A and E | -- | Fugitives; HNR Bypass/Waste Heat Stack |
| SC-Vansant-VA | A and E | -- | -- |
| SC-EastChicago-IN (Cokenergy) | A and E | -- | HRSG Main Stack |

## Coke 114 Request Questionnaire Responses

The Enclosure 1 questionnaire portion of the 2016 Coke 114 request was composed of the following parts:

1. Owner Information

II. General Facility Information

III. Regulatory Information

IV. Process Flow Diagrams and Plot Plans

V. Emission Points

VI. Process and Emission Unit Operations

VII. Air Pollution Control and Monitoring Equipment

VIII. Economics/Costs

IX. Startup and Shutdown

X. Management Practices

The Enclosure 1 questionnaire portion of the 2022 Coke 114 request was composed of the following parts:

Part A. Background Facility Information from 2016 114 Request – Verify and Update, or Provide New

Part B. Coke By-Product Recovery Plants

Part C. Coke Oven Doors, Lids, Offtakes, and Charging at By-product Coke Oven Facilities

Part D. Coke By-product Battery Stack Opacity Data

Part E. Miscellaneous: Emergency Battery Flares; Community Issues; Paperwork Reduction Act Estimates

Specific information about the HAP-emitting process units was provided by coke companies in the 2016 Coke 114 request Enclosure 1 questionnaire Parts IV-VI and the 2022 Coke 114 request Enclosure 1 questionnaire Part A. The information about HAP-emitting units formed the basis of the Coke Oven Emissions Database. Coke facilities also provided the operating hours of each unit, stack diameters, stack heights, exhaust velocity, exhaust temperature, stack latitude and longitude, and other information related to their operations or HAP emissions at the facility that were used in the Coke Oven Risk Modeling Database (see **Section 5** and **Appendix C**).

The primary HAP-emitting PQBS operating units at coke facilities are: pushing (ByP and HNR), battery stacks (ByP only), heat recovery steam generator (HRSG) main stacks (HNR only), HRSG bypass/waste heat stacks (HNR only), fugitive pushing emissions from the ovens (ByP and HNR), and quench towers (ByP and HNR). The other HAP emissions operating units at coke facilities are: Coke Ovens, subpart L, sources: charging (both ByP and HNR); ByP lids, doors (on both coal (push) and coke sides of the oven), and offtakes; ByP chemical recovery plants; boilers; flares; II&S (40 CFR part 63, subpart FFFFF) co-located sources; and other miscellaneous units not in the coke source categories. **Table 4** summarizes the number of Coke PQBS units of each type at the coke facilities that are represented in the Coke Oven Emissions Database that were identified through the Coke 114 requests and discussions with industry representatives. Note that the number of units in **Table 4** and the number of modeling release points in the Coke Oven Risk Modeling Database do not have a one-to-one correspondence because of some units that exhaust to multiple release points and multiple units that combine into one release point or are modeled as if combined through one release point. **Table 5** summarizes the number of primary noncategory units of each type at the coke facilities that are represented in the Coke Oven Emissions Database.

**Table 4. Number of Coke PQBS Emission Units1 by Facility in Coke Oven Emissions Database**

| **Facility** | **No. of Batteries** | **No. of Ovens, by Battery#** | **ByP & HNR Pushing**  **Control Systems** | **Fugitive Pushing (batteries/ ovens)** | **Quench Tower** | **ByP Battery Stack** | **HRSG Main Stack**  **[No. HRSGs]** | **HRSG Bypass/ Waste Heat Stack** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | 3 | *#1: 78*  *#5: 25*  *#6: 29* | 32 | 3/132 | 2 | 2 | -- | -- |
| BLU-Birmingham-AL | 3 | #3: 30  #4: 30  #6: 60 | 18 | 3/120 | 2 | 2 | -- | -- |
| CC-Follansbee-WV | 4 | *#1: 47*  *#2: 47*  *#3: 51*  *#8: 79* | 23 | 4/224 | 3 | 4 | -- | -- |
| CC-Middletown-OH | 1 | #1: 76 | 14 | 1/76 | 1 | 1 | -- | -- |
| CC-BurnsHarbor-IN | 2 | #1: 82  #2: 82 | 25 | 2/164 | 2 | 2 | -- | -- |
| CC-Monessen-PA | 2 | #1B: 37  #2: 19 | 16 | 2/56 | 1 | 2 | -- | -- |
| CC-Warren-OH | 1 | #1: 85 | 17 | 1/85 | 1 | 1 | -- | -- |
| EES-RiverRouge-MI | 1 | #1:85 | 19 | 1/85 | 1 | 1 | -- | -- |
| SC-EastChicago-IN / CE-EastChicago-IN | 4 | *#A: 67*  *#B: 67*  *#C: 67*  *#D: 67* | 110 | 4/268 | 2 | -- | 1 [16] | 16 |
| SC-FranklinFurnace-OH | 4 | #A: 60  #B: 40  #C: 60  #D: 40 | 211 | 4/200 | 2 | -- | 2 [6] | 10 |
| SC-GraniteCity-IL | 3 | #A: 40  #B: 40  #C: 40 | 112 | 3/120 | 1 | -- | 1 [7] | 6 |
| SC-Middletown-OH | 3 | #A: 40  #B: 20  #C: 40 | 112 | 3/100 | 1 | -- | 1 [5] | 5 |
| SC-Vansant-VA | 6 | #2D: 18  #2E: 27  #3B: 26  #3C: 36  #3F: 17  #3G: 18 | 613 | 6/142 | 2 | -- | -- | 16 |
| USS-Clairton-PA | 10 | #1: 64  #2: 64  #3: 64  #13: 61  #14: 61  #15: 61  #19: 87  #20: 87  #B: 75  #C: 84 | 514 | 10/708 | 7 | 10 | -- |  |
| **Total Units** | **47** | **2,538** | **17** | **2,538** | **28** | **25** | **5 [34]** | **53** |
| **Total Modeling**  **Release Points** |  |  | **51** | **47** | **28** | **25** | **5** | **53** |

1 In the Coke Oven Risk Modeling Database, the number of units and number of modeling release points do not have a one-to-one correspondence because of units exhausting to multiple modeling release points and multiple units combined to singular modeling release point.

2 Two control units serving one battery and one control unit serving two batteries.

3 One control unit has 14 stacks serving three batteries and one control unit serving one battery.

4 One control unit has five stacks serving one battery.

5 Two control units serving one battery each.

6 One control unit serving two batteries.

7 One mobile pushing control device serving one battery.

8 One control unit serving three batteries.

9 One control unit serving one battery.

10 One control unit serving four batteries.

11 Two mobile pushing control devices serving two batteries each.

12 One mobile pushing control device serving three batteries.

13 Cokeside shed settling chamber for each battery.

14 Two control units serving three batteries each, one control unit serving two batteries, and two control units serving one battery each.

**Table 5. Number of Noncategory Emission Units1 by Facility in Coke Oven Emissions Database**

| **Facility ID** | **ByP & HNR Charging (batteries/ ovens)** | **ByP Doors (batteries/ ovens/doors)** | **ByP Lids (batteries/ ovens/lids)** | **ByP Offtakes (batteries/ ovens/offtakes)** | **Boilers** | **Flares** | **ByP**  **Chemical Recovery Plant** | **Other Miscellaneous Units/Release Points** | **II&S Plants/ Release Points** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | 3/132 | 3/132/264 | 3/132/582 | 3/132/132 | 32 | 1 | 1 | -- | -- |
| BLU-Birmingham-AL | 3/120 | 3/120 | 3/120 | 3/120 | 3 | 1 | 1 | -- | -- |
| CC-Follansbee-WV | 4/224 | 4/224/448 | 4/224/896 | 4/224/303 | 53 | 1 | 1 | 1/1 | -- |
| CC-Middletown-OH | 1/76 | 1/76/152 | 1/76/228 | 1/76/152 | 4 | 1 | 1 | 20/31 | 1/8 |
| CC-BurnsHarbor-IN | 2/164 | 2/164/328 | 2/164/656 | 2/164/164 | 6 | 1 | 1 | 12/15 | 1/17 |
| CC-Monessen-PA | 2/56 | 2/56/112 | 2/56/224 | 2/56/112 | 22 | 1 | 1 | -- | -- |
| CC-Warren-OH | 1/85 | 1/85/170 | 1/85/255 | 1/85/170 | 3 | 1 | 1 | 2/2 | -- |
| EES-RiverRouge-MI | 1/85 | 1/85/170 | 1/85/340 | 1/85/170 |  | 1 | 1 | -- | -- |
| SC-EastChicago-IN /  CE-EastChicago-IN | 4/268 | -- | -- | -- | -- | -- | -- | 1/1 | 1/05 |
| SC-FranklinFurnace-OH | 4/200 | -- | -- | -- | -- | -- | -- | 2/2 | -- |
| SC-GraniteCity-IL | 4/120 | -- | -- | -- | -- | -- | -- | 1/1 | -- |
| SC-Middletown-OH | 3/100 | -- | -- | -- | -- | -- | -- | -- | -- |
| SC-Vansant-VA | 6/143 | -- | -- | -- | -- | -- | -- | 2/2 | -- |
| USS-Clairton-PA | 10/708 | 10/708/1,416 | 10/708/2,916 | 10/708/1,332 | 64 | -- | 1 | 1/1 | -- |
| **Total Emission Units** | **47/2,480** | **27/1,650/3,300** | **27/1,650/6,697** | **27/1,650/2,655** |  |  |  |  |  |
| **Total Modeling Release Points** | **47** | **54** | **27** | **27** | **25** | **8** | **9** | **56** | **25** |

1 In the Coke Oven Risk Modeling Database, the number of emission units and number of modeling release points do not have a one-to-one correspondence in some cases because some units exhaust to multiple modeling release points and multiple emission units are combined to singular modeling release point.

2 1 modeling release point.

3 4 units go to 1 modeling release point; 1 unit goes to another modeling release point.

4 5 modeling release points.

5 See **Section 4.2.5** for an explanation of the II&S facility at SC-East Chicago-IN

## Coke 114 Request Source Test Data

The Coke 114 request Enclosure 2 source test data requested included the following pollutants or parameters: particulate matter (PM) including filterable PM (PM filterable) and PM that is 2.5 micrometers (µm) or less in diameter (PM2.5) both filterable and condensable; hazardous air pollutant (HAP) metal compounds; hydrogen chloride (HCl), hydrogen fluoride (HF), and hydrogen cyanide (HCN); hydrogen sulfide (H2S) and sulfur dioxide (SO2);carbon monoxide (CO);carbon dioxide (CO2), toluene soluble organics (TSO), speciated volatile HAP (VOHAP); semi-volatile HAP such as polycyclic aromatic hydrocarbons (PAHs) and dioxin/furans; air flow rate/velocity and the related parameters of O2/CO2 and moisture; opacity and/or visible emissions; and the water soluble versions of many of the above air pollutants as well as pH and total dissolved solids (TDS) in quench tower discharge water. **Table 6**, below, lists the individual pollutants in the HAP groups.

The following is a list of the emission process (EP) units required to be tested at both by-product (ByP) and HNR coke oven batteries, including the control devices (CD) on these units:

**2016 Coke 114 Request**

EP-1 ByP Pushing (CD and oven)

EP-2 ByP Charging (oven port only)

EP-3 ByP Battery (Combustion)Stack

EP-4 ByP Boiler stacks

EP-5 Flares (inlet)

EP-6 HRSG Main Stacks

EP-7 HRSG Bypass/Waste Heat Stacks

EP-8 HNR Charging (CD and oven)

EP-9 HNR Pushing (CD and oven)

EP-10 Quench Towers

EP-11 Lids, Doors, and Offtakes

**2022 Coke 114 Request**

Door Leaks, Bench and Yard

Cooling Tower Inlet

Light Oil Condenser (if venting to atmosphere)

Sulfur Recovery/Desulfurization

CBRP Flares

Emergency Battery Flare

HNR Main Stack (after HRSG+CD)

HNR Bypass Stacks

HNR Waste Heat Stacks

Fugitive emissions at the fenceline, and at interior facility locations near: (1) coke oven batteries and (2) CBRP

**Table 6. Individual HAP within HAP Groups**

| **HAP Group** | **Individual HAP** |
| --- | --- |
| HAP Metals | antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium. |
| Acid Gases | hydrogen chloride, hydrogen fluoride |
| Speciated Volatile Organic HAP | formaldehyde, acrylonitrile, benzene, bromoform, bromomethane, carbon disulfide, carbon tetrachloride,  chlorobenzene, chloroethane, chloroform, chloromethane,  1,2-dichloroethane, 1,1-dichloroethene, 1,2-dichloropropane, ethylbenzene, iodomethane, methylene chloride, styrene, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, and xylenes |
| PAH | acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene,  benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene,  dibenz[a,h]anthracene, fluoranthene, fluorene, indeno (1,2,3-cd) pyrene, naphthalene, phenanthrene, perylene,  pyrene |
| Dioxin/furans | 2,3,7,8-tetrachlorodibenzo-p-dioxin,  1,2,3,7,8-pentachlorodibenzo-p-dioxin,  1,2,3,4,7,8-hexachlorodibenzo-p-dioxin,  1,2,3,6,7,8-hexachlorodibenzo-p-dioxin,  1,2,3,7,8,9-hexachlorodibenzo-p-dioxin,  1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin, octachlorodibenzo-p-dioxin,  2,3,7,8-tetrachlorodibenzofuran,  1,2,3,7,8-pentachlorodibenzofuran,  2,3,4,7,8-pentachlorodibenzofuran,  1,2,3,4,7,8-hexachlorodibenzofuran,  1,2,3,6,7,8-hexachlorodibenzofuran,  2,3,4,6,7,8-hexachlorodibenzofuran,  1,2,3,7,8,9-hexachlorodibenzofuran,  1,2,3,4,6,7,8-heptachlorodibenzofuran,  1,2,3,4,7,8,9-heptachlorodibenzofuran, octachlorodibenzofuran |

The source test data was compiled into the Coke Oven Emissions Database. **Table 7** summarizes theemissionprocess units and corresponding pollutants tested for the Coke 114 request.

**Table 7. Summary of Required Emissions Tests for the Coke 114 Request**

| **Emission Process (EP) Unit** | **Pollutant(s) Tested** |
| --- | --- |
| **2016 Coke 114 Request** | |
| *Both By-Product (ByP) Process and Heat/Non-Recovery (HNR) Process* | |
| EP-1: ByP Pushing Operations (production side): Control Device (CD) stack and Oven Doors (fugitive), and  EP-9: HNR Pushing Operations (production side): CD stack and Oven Door (fugitive) | *Oven only:* Opacity  *CD only*: Toluene-soluble organics (TSO), carbon monoxide (CO), carbon dioxide (CO2), HAP metals (including vapor phase Hg) and PM filterable, hydrogen chloride (HCl), hydrogen cyanide (HCN), hydrogen fluoride (HF), hydrogen sulfide (H2S), PM2.5 filterable&condensible, semi-volatile HAP (Semi-vol) which includes PAHs and dioxin/furans, sulfur dioxide (SO2), speciated volatile organic HAP (VOHAP) |
| EP-10: Quench Towers | *Air only*: TSO, CO2, PM filterable, PM2.5 filterable& condensible  *Water only*: pH, total dissolved solids (TDS)  *Air&Water*: HAP metals (including vapor phase Hg in air samples), HCl, HCN, HF, H2S (*Water*: total sulfide), Semi-vol, SO2 (*Water*: total sulfate), VOHAP |
| *By-Product Process Only* | |
| EP-2: ByP Charging Operations (port) | Visible emissions (leaks) |
| EP-3: ByP Battery stack | TSO, CO, CO2, HAP metals (including vapor phase Hg) and PM filterable, HCl, HCN, HF, H2S, opacity, PM2.5 filterable&condensible, Semi-vol, SO2, VOHAP |
| EP-4: ByP Boiler Stacks | TSO, CO, CO2, HAP metals (including vapor phase Hg) and PM filterable, HCl, HCN, HF, opacity, PM2.5 filterable&condensible, Semi-vol |
| EP-11: Lids, Doors, and Offtakes | Visible emissions (leaks) |
| *Heat and Non-Recovery Process (HNR) Only* | |
| EP-6: Main Stack After Heat Recovery Steam Generators (HRSG) | TSO, CO, CO2, HAP metals (including vapor phase Hg) and PM filterable, HCl, HCN, HF, opacity, PM2.5 filterable&condensible, Semi-vol |
| EP-7: Heat Recovery Steam Generator (HRSG) Bypass Stacks | TSO, CO, CO2, HAP metals (including vapor phase Hg) and PM filterable, HCl, HCN, HF, H2S, opacity, PM2.5 filterable&condensible, Semi-vol, SO2, VOHAP |
| EP-8: HNR Charging Operations (CD stack) | *CD only*: TSO, CO2, HAP metals (including vapor phase Hg) and PM filterable |
| EP-8: HNR Charging Operations (oven) | *Oven only*: opacity  *Door only*: Visible emissions (leaks) |
| **2022 Coke 114 Request** | |
| *Coke ByP Process Only* | |
| Door Leaks, Bench and Yard | Visible emissions (leaks) |
| *Coke ByP Recovery Plant (CBRP) Only* | |
| Cooling Tower Inlet | BTEX, TO-15A analytes, H2S, COS, CS2 |
| Light Oil Condenser (if venting to atmosphere) | BTEX, H2S, COS, CS2 |
| Sulfur Recovery/Desulfurization | SO2, H2S, COS, CS2 |
| CBRP Flares  Emergency Battery Flare | Visible emissions, gas composition (proximate/ultimate analysis), flow rate, and heat content |
| *Heat and Non-Recovery Process (HNR) Only* | |
| HNR Main Stack (after HRSG+CD) | Filterable PM& HAP metals, CO2, CO, NOx, formaldehyde, HCl, HF, HCN, PAH, D/F, opacity (stack), SO2,BTEX |
| HNR Bypass Stacks  HNR Waste Heat Stacks | Filterable PM& HAP metals,CO2, CO, NOx, formaldehyde, HCl, HF, HCN, PAHs, D/F, opacity (stack), SO2,BTEX |
| *Fugitive Emission Testing at Facility Fenceline//Interior Facility Grounds* | |
| Fugitive emissions at the fenceline, and at interior facility locations near: (1) coke oven batteries and (2) CBRP | 1,3 Butadiene, BTEX, PAHs, volatile organic compounds (VOC) (Table 1, EPA Method TO-13A for PAHs and Table 1-1, EPA Method TO-15A for VOC |

## Process Data Submitted with Coke 114 Request Test Data

From each Coke 114 request test report submitted, the following testing information data and process parameters were compiled for each test run into the Coke Oven Emissions Database:

**Testing Information**

* Test date
* Exhaust gas flow rate, in actual cubic feet per minute (acfm) and dry standard cfm (dscfm)
* Sample volume, in dry standard cubic feet (dscf) and dry standard cubic meters (dscm)
* Stack moisture, in percent (%)
* Stack gas temperature, in degrees Fahrenheit (˚F)
* Sampling velocity, in feet per second (fps)
* Isokinetic sampling percent (%)
* Oxygen content of stack gas, in percent (%)
* Carbon dioxide content of stack gas, in percent (%)
* Reported pollutant concentration, in parts per million (ppm), milligrams per dry standard cubic meter (mg/dscm), or grains per dry standard cubic foot (gr/dscf), etc.
* Reported pollutant emission rate, lb/hr
* Data quality classifications, *e.g.*, above detection limit (ADL), BDL, or detection level limited (DLL)
* Latitude and longitude of stack tested (decimal degrees, six decimal places)

**Process Parameters**

* Emission unit(s) ID – Use same ID as in processes and emissions flow (P&EF) table in the Coke 114 request Enclosure 1
* Type of process (pushing, charging, quenching)
* Type of air control device (*e.g.*, baghouse, scrubber, ESP, other)
* Latitude of stack (decimal degrees, 5 decimal places)
* Longitude of stack (decimal degrees, 5 decimal places)
* Date of test
* Battery ID number/name
* ID numbers of ovens pushed/charged
* Location of oven(s) tested within battery
* Number of ovens pushed during testing
* Type of coal charged during testing
* Average coking time per oven(s) tested (hours)
* Average temperature of coking per oven(s) tested (degrees Fahrenheit)
* Dry coal processed per oven(s) during testing (tons)
* Coke produced during test period (tons)
* Pushing period during testing (minutes)
* Charging period during testing (minutes)
* Quantity of coke oven gas burned in power plant (millions of standard cubic feet per hour (mmscf/hr) during tests)
* Quantity of coke oven gas burned in coke battery (mmscf/hr during tests)
* Quantity of natural gas burned in coke battery (mmscf/hr during tests)
* Quantity of coke oven gas generated (including gas recovered and used in ovens) (mmscf/hr during tests)

## Unit Conversion and Emissions Factor Development in the Coke Oven Emissions Database

All reported emissions data compiled into the Coke Oven Emissions Database were converted to micrograms per dry standard cubic meter (µg/dscm) and lb/hr. Data for multiple runs in each test were averaged together for an overall average for the source test. Where possible, emission factors were calculated in pounds per ton (lb/ton) or lb/mmscf using the emission rate (lb/hr) and either coke produced during test (tph), wet coal charged during test (tph), or COG burned during test (mmscf/hr).

## Speciation Factors

### Speciated Chromium Emissions Estimates

For facilities that measured total chromium for the Coke 114 requests with EPA Method 29, the total chromium emissions were speciated into two chromium species for risk modeling purposes in the Coke Oven Emissions Database, as follows: Chromium III and Chromium VI (Pope, A., 2016). Default chromium speciation factors are typically used in risk modeling for industrial sources unless information is provided otherwise. **Table 8** shows the chromium speciation factors used for the Coke Oven Emissions Database and Coke Oven Risk Modeling Database. Speciated emissions were calculated as follows:

Total Chromium *Method 29*\* Speciation Factor *Chromium Specie*= Speciated Chromium Emissions *Chromium Specie*

**Table 8. Default Speciation Factors Used to Estimate Speciated Chromium Emissions**

**in the Coke Oven Emissions Database (Pope, A., 2016)**

| **Chromium Species** | **Speciation Factor** |
| --- | --- |
| Chromium III | 0.97 |
| Chromium VI | 0.03 |

### Speciated Mercury Emissions Estimates

For facilities that measured total mercury for the Coke 114 requests with EPA Method 29, the total mercury emissions were speciated into three mercury species for risk modeling purposes in the Coke Oven Emissions Database, as follows: elemental gaseous, gaseous divalent, and particulate divalent mercury (EPA, 2020). Default mercury speciation factors are typically used in risk modeling for industrial sources unless information is provided otherwise. **Table 9** summarizes the mercury speciation factors used for the Coke Oven Emissions Database and Coke Oven Risk Modeling Database. Speciated mercury emissions were calculated as follows:

Total Mercury *Method 29*\* Speciation Factor *Mercury Specie*= Speciated Mercury Emissions *Mercury Specie*

**Table 9. Default Speciation Factors Used to Estimate Speciated Mercury Emissions**

**in the Coke Oven Emissions Database (EPA, 2020)**

|  |  |
| --- | --- |
| **Mercury Species** | **Speciation Factor** |
| Elemental gaseous Hg | 0.80 |
| Gaseous divalent Hg | 0.15 |
| Particulate divalent Hg | 0.05 |

## Multiple Stacks in the Coke Oven Emissions Database

For some coke process units, there are multiple stacks. For the emissions and modeling databases, the emissions were split between each stack. **Table 10** lists the units that had multiple stacks.

**Table 10. Units with Multiple Stacks**

|  |  |  |
| --- | --- | --- |
| **Facility ID** | **Unit ID** | **Number of Stacks** |
| ***EP-1 ByP Pushing (CD)*** | | |
| CC-Follansbee-WV | Batteries #1, #2, and #3 Pushing Baghouse | 14 |
| CC-Middletown-OH | Wilputte Coke Oven Battery - PEC Baghouse | 5 |

## Dioxins/Furans Unit Conversions Coke Oven Emissions Database

Emissions of 17 individual dioxin/furan congeners were required to be tested in the Coke 114 requests for purposes of estimating health risk. These 17 specific dioxin/furan congener mass values reported in the laboratory analysis of the test reports were compiled and converted to nanograms per dry standard cubic meter (ng/dscm) and lb/hr emissions values. The 17 dioxin/furan congener values, expressed as mass rates, were entered in the Coke Oven Emissions Database for each facility and unit. The mass rates are used in the risk assessment.

The 17 specific dioxin/furan congener mass values also were converted to 2,3,7,8-TCDD toxic equivalency (TEQ) values using the 2005 World Health Organization (WHO) toxicity equivalence factors (TEF). (EPA, 2010) The 17 congener TEQ values then were summed to calculate a total TEQ value for each stack test run in the Coke Oven Emissions Database. Total TEQ toxicity values are used to establish MACT, if needed, but not for risk modeling. **Table 11** lists the 17 specific dioxin/furan congeners of interest and the corresponding WHO 2005 TEF.

Table 11. Dioxin/Furan Toxicity Equivalence Factors (TEF)

| Dioxin/furan Congener | Abbreviation | WHO 2005 TEF |
| --- | --- | --- |
| 2,3,7,8-tetrachlorodibenzo-p-dioxin | 2,3,7,8-TCDD | 1 |
| 1,2,3,7,8-pentachlorodibenzo-p-dioxin | 1,2,3,7,8-PeCDD | 1 |
| 1,2,3,4,7,8-hexachlorodibenzo-p-dioxin | 1,2,3,4,7,8-HxCDD | 0.1 |
| 1,2,3,7,8,9-hexachlorodibenzo-p-dioxin | 1,2,3,6,7,8-HxCDD | 0.1 |
| 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin | 1,2,3,7,8,9-HxCDD | 0.1 |
| 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin | 1,2,3,4,6,7,8-HpCDD | 0.01 |
| Octachlorodibenzo-p-dioxin | OCDD | 0.0003 |
| 2,3,7,8-tetrachlorodibenzofuran | 2,3,7,8-TCDF | 0.1 |
| 1,2,3,7,8-pentachlorodibenzofuran | 1,2,3,7,8-PeCDF | 0.03 |
| 2,3,4,7,8-pentachlorodibenzofuran | 2,3,4,7,8-PeCDF | 0.3 |
| 1,2,3,4,7,8-hexachlorodibenzofuran | 1,2,3,4,7,8-HxCDF | 0.1 |
| 1,2,3,6,7,8-hexachlorodibenzofuran | 1,2,3,6,7,8-HxCDF | 0.1 |
| 2,3,4,6,7,8-hexachlorodibenzofuran | 2,3,4,6,7,8-HxCDF | 0.1 |
| 1,2,3,7,8,9-hexachlorodibenzofuran | 1,2,3,7,8,9-HxCDF | 0.1 |
| 1,2,3,4,6,7,8-heptachlorodibenzofuran | 1,2,3,4,6,7,8-HpCDF | 0.01 |
| 1,2,3,4,7,8,9-heptachlorodibenzofuran | 1,2,3,4,7,8,9-HpCDF | 0.01 |
| Octachlorodibenzofuran | OCDF | 0.0003 |

Note: TEF obtained from an EPA report on toxicity factors (EPA, 2010).

## Data Quality Classifications and Treatment of Non-detected Values for Data Obtained via Test Methods with Multiple Fractions

The tests for metal HAP (EPA Method 29) include numerous test fractions and containers that are isolated for analytical purposes, as follows:

* Front Half (all HAP metals), Fraction 1: Container 1 filter, Container 2 acetone probe rinse, and Container 3 acid probe rinse
* Back Half (all HAP metals), Fraction 2A and Fraction 2B: Container 4 HNO3/H2O2 (nitric acid/ hydrogen peroxide) impingers
* Back Half (Hg Only), Fraction 3A: Container 5A HNO3
* Back Half (Hg Only), Fraction 3B: Container 5B KMnO4/H2SO4 (potassium permanganate/sulfuric acid) absorbing solution
* Back Half (Hg Only), Fraction 3C: Container 5C HCl rinse and dilution

For any test fractions in the metal HAP tests where the laboratory results were classified as BDL, the method detection limit (MDL) or similar value[[2]](#footnote-3) was used as the mass of the fraction in the Coke Oven Emissions Database, as per EPA protocol for developing emissions estimates that potentially could be used to develop standards. For risk assessment purposes and in this memorandum, BDL data are handled differently, as described below in **Section 2.9**, The entire run was considered BDL only if all fractions of a test run were BDL. Similarly, the entire run was considered ADL only if all fractions of a test run were ADL. If there was a mix of fractions classified as either BDL or ADL in a run, then the run was labelled DLL. Note that only tests with more than one fraction could be possibly classified as DLL. For pollutants that did not have multiple fractions in the testing, the data was classified as either ADL or BDL, for mass values above or below the MDL, respectively.

The tests for dioxin/furans (EPA Method 23) measures multiple individual dioxin/furan congeners. For each congener, the run was classified as BDL if the congener mass was below the Estimated Detection Limit (EDL)[[3]](#footnote-4). For each congener mass that was below the EDL, the EDL mass was used for the fraction/congener mass in the Coke Oven Emissions Database and in emissions calculations for total TEQ. Like the situation with the HAP metals test, the total TEQ value is comprised of multiple congeners that comprise the total TEQ mass in each run. Therefore, like HAP metals, the run was classified as BDL only if all the individual congener masses were below the EDL and the test runs data are classified ADL only if all congeners were above the EDL. The runs are considered DLL if one or more congeners, but not all, were below the EDL.

## Treatment of BDL, DLL, and ADL Values Used for MACT Floor and APCD Cost Effectiveness Calculations vs. Coke Oven Risk Modeling

In the Coke Oven Emissions Database, for stack run data where values were at or below detection, the MDL or similar value was used for the run/fraction mass, as per EPA protocol for developing emissions estimates that potentially could be used to develop emission standards. (See details in **Section 2.8** above). This type of data is classified as data that is “not adjusted for nondetected” values and was used for the calculation of MACT limits and estimates of air pollution control device cost effectiveness in the “*Maximum Achievable Control Technology Standard Calculations, Cost Impacts, and Beyond-the-Floor Cost Impacts for Coke Ovens Facilities under 40 CFR Part 63, Subpart CCCCC*” memorandum . In order to provide emissions for the Coke Oven Risk Modeling Database, for run data below detection, the emissions for the run were converted to half of the MDL (or EDL) for use in developing the test run value, as per EPA policy for performing risk assessments. This type of data is classified as “adjusted for nondetected” values. Both sets of data can be found in the Coke Oven Emissions Database, whereas only “adjusted for nondetected” data are used in the Coke Oven Risk Modeling Database. Note that for test runs classified as “DLL” or “ADL,” there were no adjustments made to the test run values for either database. Although both “adjusted” and “not adjusted” for nondetected data are in the Coke Oven Emissions Database, only “adjusted for nondetected” data are shown in this memorandum and the Coke Oven Risk Modeling Database.

# 3.0 COKE 114 REQUESTS DATA QUALITY CONTROL (QC) CHECKS

After the data were compiled into the Coke Oven Emissions Database and appropriate conversions and calculations were made, as described above in **Section 2.4**, several rounds of review were performed by both the EPA project team and representatives from the coke industry to ascertain the accuracy of reported data and subsequent calculations. See **Appendix B** for all data relevant to emission estimates and the calculations performed (with supporting documents included in Coke PQBS docket (EPA-HQ-OAR-2002-0085). A final QC was performed by the risk database QA staff at the EPA.

## 3.1 Internal EPA QC Checks

### 3.1.1 Laboratory Report QC for D/F

A review of the laboratory reports for dioxin/furan Coke 114 requests Enclosure 2 stack test data was performed to confirm that emissions were calculated correctly. The mass values from the laboratory reports were used to calculate the emissions and compared to the reported dioxin/furan emissions.

### 3.1.2 Inadvertent Omitted HAP

There were a few HAP for which Coke 114 requests Enclosure 2 stack test data was not obtained. These include perylene and total OCDD and OCDF. **Table 12** lists the HAP and their sources omitted from the Coke 114 requests responses. The circumstances of the omissions are described below.

**Perylene:**

USS Clairton, PA noted in their stack test reports that that the compound perylene had not been subjected to Maxxam’s standard validation procedure for this matrix; as such, no perylene was reported for their samples for 2016 Coke 114 request submissions.

**Total OCDD and Total OCDF:**

An inadvertent omission was made in the list of HAP in 2016 Coke 114 request Enclosure 2 for octachlorodibenzo-p-Dioxin (Total OCDD) and octachlorodibenzofuran (Total OCDF) dioxin/furan congeners. Some facilities still had their labs analyze for Total OCDD and Total OCDF congeners, while other facilities followed the exact list of HAP in the 2016 Coke 114 request Enclosure 2 and, therefore, did not analyze for Total OCDD and Total OCDF.

**Table 12. Specific HAP and their Sources Omitted from Coke 114 Request Stack Tests**

| **Facility ID** | **Emission Unit ID** | **Process ID** | **Pollutant Name in Coke Oven**  **Emissions Database** |
| --- | --- | --- | --- |
| CC-Monessen-PA | Battery Combustion Stack #2 | EP-3 ByP Battery Stack | Total OCDD |
| CC-Monessen-PA | Battery Combustion Stack #2 | EP-3 ByP Battery Stack | Total OCDF |
| CC-Monessen-PA | Boiler #1 and #2 | EP-4 ByP Boiler stacks | Total OCDD |
| CC-Monessen-PA | Boiler #1 and #2 | EP-4 ByP Boiler stacks | Total OCDF |
| CC-Monessen-PA | Pushing Baghouse Stack | EP-1 ByP Pushing (CD) | Total OCDD |
| CC-Monessen-PA | Pushing Baghouse Stack | EP-1 ByP Pushing (CD) | Total OCDF |
| CC-Monessen-PA | Quench Tower Stack | EP-10 Quench Tower | Total OCDD |
| CC-Monessen-PA | Quench Tower Stack | EP-10 Quench Tower | Total OCDF |
| EC-Erie-PA | Battery Combustion Stack (805) | EP-3 ByP Battery Stack | Total OCDD |
| EC-Erie-PA | Battery Combustion Stack (805) | EP-3 ByP Battery Stack | Total OCDF |
| EC-Erie-PA | Boiler #1 Stack | EP-4 ByP Boiler stacks | Total OCDD |
| EC-Erie-PA | Boiler #1 Stack | EP-4 ByP Boiler stacks | Total OCDF |
| USS-Clairton-PA | Battery B Combustion Stack (S012) | EP-3 ByP Battery Stack | Perylene |
| USS-Clairton-PA | P052-Quench Tower No. 7A& 8 | EP-10 Quench Tower | Perylene |

### 3.1.3 Facility and/ or Unit Operating Status Changes after 2016 Coke 114 Request Data Received

The Erie Coke facility received the Coke 114 request and conducted testing from August through October 2016 on several units: ByP Pushing, ByP Battery Stack, and Boiler Stack. However, as work was being finalized for developing coke emissions for the coke industry, the EPA was notified that the Erie Coke facility was being shut down in late 2019. Therefore, the emissions for Erie Coke were used, as planned, to develop emission factors for other coke facilities that produce foundry coke and did not perform testing, but the Erie Coke units and emissions were not included in the Coke Oven Risk Modeling Database. **Appendix D** summarizes the Erie 2016 Coke 114 request data that were received.

In 2020, Cleveland-Cliffs Inc. acquired the AK Steel: Follansbee, WV (Mountain State Carbon) and Middletown, OH cokemaking facilities and the ArcelorMittal USA LLC: Burns Harbor, IN; Monessen, PA; and Warren, OH cokemaking facilities.

The Bluestone Birmingham, AL; Cleveland Cliffs Follansbee, WV; and Cleveland Cliffs Middletown, OH facilities were not operating during the development of the 2022 Coke 114 request and did not receive the request.

### 3.1.4 Suspect Data Evaluations

Early in the development of the Coke Oven Emissions Database, suspect data were identified based on test report comments. The EPA test method experts reviewed the suspect data and made the decisions to include or not include the data in the Coke Oven Emissions Database. **Table 13** below summarizes the Coke 114 requests data that was not included in the Coke Oven Emissions Database.

**Table 13. Suspect 114 Requests Data Not Included in the Coke Oven Emissions Database**

| **Facility ID**  **Unit ID**  **Unit Type**  **Pollutant Tested**  **Test Method**  **Run(s)**  **Start Test Date** | **Suspect Data** |
| --- | --- |
| CC-Middletown-OH  Pushing Baghouse  EP-1 ByP Pushing (CD)  HCl & HF  EPA Method 26  1  8/23/2016 | The EPA did not use CC-Middletown-OH EPA Method 26 Run 1 data, failed isokinetic test. |
| CC-BurnsHarbor-IN  #2 Coke Battery Pushing Emission Control Baghouse Stack  EP-1 ByP Pushing (CD)  MeCl Method 0031  1-3  8/30-9/1/2016 | The EPA did not use CC-BurnsHarbor-IN SW 846 0031 methylene chloride data. Methylene chloride (MeCl2) results for all condensate samples were much higher than anticipated. It is believed that cross contamination occurred between the Method 23/0010 MeCl2 samples and the Method 0031 condensate samples as these samples were transported to Maxxam Analytics, Inc., in the same batch. In addition, the methylene chloride that was used in the field recovery of Method 23/0010, was in close proximity to where the Method 0031 condensate samples were recovered. Consequently, the Method 0031 condensate data was not considered representative of actual emissions from the source. |
| CC-BurnsHarbor-IN  #2 Coke Battery Pushing Emission Control Baghouse Stack  EP-1 ByP Pushing (CD)  Toluene  SW846 Method 0031  1-3  8/30-9/1/2016 | The EPA did not use CC-BurnsHarbor-IN SW 846 0031 toluene data, because results biased high likely due to cross contamination from the recovery reagents used for the Method 23/0010 sampling train. |
| CC-Monessen-PA  Quench Tower Stack  EP-10 Quench Tower  All Pollutants Tested  All Methods  1-3  10/25-11/2/2016 | The EPA did not use CC-Monessen-PA quench data because of high velocity (confirmed in facility test report). Velocity values shown are based on measurements taken only at the start of a quench and are considered maximum velocity readings. |
| SC-GraniteCity-IL  Coke Oven Battery C - Bypass Vent 5  EP-7 HRSG Bypass/waste heat stacks  HCN  Zinc Acetate Method  1-3  5/3-5/2017 | The EPA did not use hydrogen cyanide from SC-GraniteCity-IL test data because it appears there was excessive breakthrough (higher HCN values in the backup impinger) making these results invalid. Note that the EPA abandoned the zinc acetate approach in mid-2017 due to its limited dynamic range of measurement, *i.e.*, poor and inconsistent sample recovery. |
| SC-FranklinFurnace-OH  Bypass Vent Stack 6  EP-7 HRSG Bypass/waste heat stacks  Formaldehyde  EPA Method 320  2  10/1-2/2022 | At 00:01 on 10/2 (p 256), the formaldehyde spiked as high as 65 ppm. The moisture increased to an average of 6% on that run, also measured by the FTIR. It appears they did not have anything else going on at the same time. The average flow rate was used for all three runs vs an independent measurement during the test run.  EPA emailed facility Mon 1/9/2023 5:37 PM to inquire if the test was conducted during normal operations vs a small upset. The facility has not provided a response.  Run 2 was an outlier when tested with all other formaldehyde runs and was not used for MACT or Cost calculations, but was in the risk modeling file. |

## 3.2 Coke Industry Review of Coke 114 Request Data

Numerous reviews of the source emissions from the Coke 114 request data were performed by the facilities in the coke industry. Beginning in September 2019, the EPA sent the coke industry their processed data to review, first individually to each facility. In August 2020, the EPA sent the draft of the combined Coke 114 request data to the whole industry with all facilities’ data. The EPA continued to work with industry to finalize and correct the emission estimates.

# 4.0 COKE OVEN EMISSONS DATABASE

The Coke Oven Emissions Database, and other information pertinent to the modeling of HAP emissions that were requested in the Coke 114 request (*e.g.*, stack diameter, stack height, and operating hours), was developed in part to provide a repository of emissions data to be used to populate the Coke Oven Risk Modeling Database (described in **Section 5**). The following sections discuss the data from the Coke Oven Emissions Database used to develop the emissions for the Coke Oven Risk Modeling Database (“adjusted for nondetected” data). All emission calculations and supporting files are included in **Appendix B** along with the complete Coke Oven Emissions Database.

## 4.1 Actual Annual Emissions for Coke PQBS Source Category

The HAP emissions from the 2016 and 2022 Coke 114 request Enclosure 2 and 1998 uncontrolled stack test data for fugitive pushing HAP profile (EPA, 1999a and EPA, 1999b) were used to develop the Coke Oven Emissions Database “actual” annual HAP emissions estimates for all HAP-emitting Coke PQBS units at coke facilities (pushing, battery combustion stack, HRSG main stack, HRSG bypass/waste heat stack, quench tower, and fugitive pushing). All emissions, calculations, and supporting files are described in **Appendix B**.). The Coke Oven Emissions Database was then used to populate the Coke Oven Risk Modeling Database described in **Section 5**.

### 4.1.1 Emissions Developed from 2016 and 2022 Coke 114 Request Enclosure 2 Stack Test Data

A number of Coke PQBS sources were requested to conduct testing as per the 2016 and 2022 Coke 114 request Enclosure 2 stack tests. **Table 14** summarizes the units for facilities from which the EPA received 2016 and 2022 Coke 114 request Enclosure 2 stack test data that were used to estimate emissions from other facilities in the industry and other units at the facilities that were not tested.

**Table 14. Coke Facility Units Providing Test Data for the Coke PQBS RTR**

| **Facility ID** | **Unit ID** | **Type of Coke** | **Coke 114 Request** |
| --- | --- | --- | --- |
| ***EP-1 ByP Pushing (CD)*** | | |  |
| CC-Middletown-OH | Pushing Baghouse | Blast furnace | 2016 |
| CC-BurnsHarbor-IN | #2 Battery Pushing Baghouse | Blast furnace | 2016 |
| CC-Monessen-PA1 | Pushing Baghouse Stack | Blast furnace | 2016 |
| EC-Erie-PA2 | Coke Side Shed Baghouse (802) | Foundry | 2016 |
| ***EP-3 ByP Battery Stack*** | | |  |
| CC-Middletown-OH | Combustion Stack | Blast furnace | 2016 |
| CC-BurnsHarbor-IN | Coke Battery No. 2 Underfire Stack | Blast furnace | 2016 |
| CC-Monessen-PA1 | Battery Combustion Stack #2 | Blast furnace | 2016 |
| EC-Erie-PA2 | Battery Combustion Stack (805) | Foundry | 2016 |
| USS-Clairton-PA | Battery B Combustion Stack (S012) | Blast furnace | 2016 |
| ***EP-6 HRSG Main Stacks*** | | |  |
| SC-Middletown-OH | P90-Coke Oven Battery A-C-Main Stack | Blast furnace | 2016 |
| CE-EastChicago-IN |  | Blast furnace | 2022 |
| ***EP-7 HRSG Bypass/waste heat stacks*** | | |  |
| SC-GraniteCity-IL | Coke Oven Battery C - Bypass Vent 5 | Blast furnace | 2016 |
| SC-FranklinFurnace-OH | Bypass Vent Stack 6 | Blast furnace | 2022 |
| ***EP-9 HNR Pushing (CD)*** | | |  |
| SC-GraniteCity-IL | Gateway Flat Push Hot Car | Blast furnace | 2016 |
| SC-Middletown-OH | Middletown Flat Push Hot Car | Blast furnace | 2016 |
| ***EP-10 Quench Tower3*** | | |  |
| USS-Clairton-PA | 7A Quench Tower (P052) | Blast furnace | 2016 |
| 1 CC-Monessen-PA did not test for OCDD and OCDF due to an EPA omission. Default emission factors were used instead for this facility. See **Section 3.1.2**  2 While Erie Coke data was used to develop foundry emissions for the Coke PQBS RTR, because the facility is now permanently closed, the data for this facility was not modeled.  3 Despite a conscientious testing effort, the CC-Monessen-PA Quench Tower Stack results were not able to be used. See **Section 3.1.4**, for more explanation. | | |  |

**Table 15** summarizes the calculations used to develop coke oven facility emission estimates in tons per year (TPY) from 2016 and 2022 Coke 114 request stack test data. The individual components of the calculations are described in the sections that follow.

**Table 15. Calculation Methodology for Coke PQBS Units with Coke 114 Requests Stack Test Data**

| **Process ID** | **Test Data/ Emission Factor UOM** | **Calculation of Actual Emissions (TPY)** |
| --- | --- | --- |
| EP-1 ByP Pushing (CD) | lb/ton coke produced | = lb/ton coke x Coke Production TPY / 2000 |
| EP-3 ByP Battery Stack | lb/ton coke produced | = lb/ton coke x Coke Production TPY / 2000 |
| EP-6 HRSG Main Stacks | lb/hr | = lb/hr x hr/yr / 2000 |
| EP-7 HRSG Bypass/waste heat stacks | lb/hr | = lb/hr x hr/yr / 2000 |
| EP-9 HNR Pushing (CD) | lb/ton coke produced | = lb/ton coke x Coke Production TPY / 2000 |
| EP-10 Quench Tower | lb/ton coke produced | = lb/ton coke x Coke Production TPY / 2000 |

#### 4.1.1.1 Emission Factors Developed from Coke 114 Requests Enclosure 2 Stack Test Data

The 2016 and 2022 Coke 114 request Enclosure 2 stack test data (“adjusted for nondetected”) was used to create default industry emission factors by coke type (*i.e.*, foundry coke vs. blast furnace coke), process ID and pollutant to use for all other facilities and units that were not required to test to develop the Coke Emissions Database. The emissions for Erie Coke were used to develop emission factors for facilities that produce foundry coke (see **Section 3.1.3**). **Tables 16 - 19** summarize the emission factors and units of measurement (UOM) for each default industry emission factor per process ID and coke type, as applicable. See **Appendix B** for a complete listing of the units for each facility and individual HAP emission factors used in the Coke Oven Emissions Database.

**Table 16. Pushing (CD) Default Emission Factors1 per Coke Type**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced2)** | | |
| --- | --- | --- | --- |
| **ByP –**  **Blast Furnace Coke** | **ByP –**  **Foundry Coke** | **HNR –**  **Blast Furnace Coke** |
| **HAP Metals** | | | |
| Antimony | 1.23E-07 | 1.54E-07 | 2.34E-06 |
| Arsenic | 1.39E-07 | 2.10E-07 | 2.02E-05 |
| Beryllium | 5.32E-08 | 3.86E-08 | 2.90E-07 |
| Cadmium | 6.91E-08 | 1.27E-07 | 1.42E-07 |
| Chromium (total)3 | 5.41E-06 | 3.53E-06 | 5.14E-06 |
| Chromium III3 | 5.24E-06 | 3.43E-06 | 4.98E-06 |
| Chromium VI3 | 1.62E-07 | 1.06E-07 | 1.54E-07 |
| Cobalt | 1.14E-07 | 1.15E-07 | 9.19E-07 |
| Lead | 4.51E-07 | 4.36E-07 | 2.52E-05 |
| Manganese | 4.91E-06 | 4.58E-05 | 6.91E-06 |
| Mercury (total)3 | 1.91E-07 | 1.01E-07 | 1.22E-07 |
| Elemental gaseous Hg3 | 1.53E-07 | 8.08E-08 | 9.77E-08 |
| Gaseous divalent Hg3 | 2.86E-08 | 1.51E-08 | 1.83E-08 |
| Particulate divalent Hg3 | 9.54E-09 | 5.05E-09 | 6.11E-09 |
| Nickel | 3.54E-06 | 3.54E-06 | 3.68E-06 |
| Selenium | 1.24E-06 | 6.70E-07 | 3.63E-06 |
| **Other (Gaseous) HAP** | | | |
| Carbon disulfide | 5.30E-06 | 1.34E-04 | 1.15E-05 |
| Formaldehyde | 3.01E-06 | 7.58E-06 | 1.38E-05 |
| Hydrogen chloride | 1.12E-03 | 1.00E-03 | 1.34E-03 |
| Hydrogen cyanide | 5.19E-04 | 4.49E-04 | 2.40E-05 |
| Hydrogen fluoride | 1.49E-04 | 4.37E-04 | 3.20E-04 |
| Total D/F4,5 | 1.13E-11 | 3.68E-11 | 1.21E-11 |
| Total PAH4 | 3.60E-05 | 6.44E-04 | 4.11E-06 |
| Total VOHAP5,6,7,8 | 3.57E-04 | 1.12E-02 | 4.35E-06 |

1 See **Table 14** for the data source for each type of emissions factor.

2 Estimated SC-Middletown-OH and SC-GraniteCity-IL Coke produced using the Erie Coke Wet Coal Charged Capacity/Coke Produced Capacity ratio value of 1.3, applied to the wet coal charged values reported by SunCoke.

3 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.

4 See **Appendix B** for the individual HAP in the groups.

5 ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**.

6 The CC-BurnsHarbor-IN SW 846 0031 data for methylene chloride and toluene were not used in the average. See **Section 3.1.4**

7 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately.

8 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately.

**Table 17. ByP Battery Stack Default Emission Factors1 per Coke Type**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)** | |
| --- | --- | --- |
| **ByP & HNR –**  **Blast Furnace Coke** | **ByP –**  **Foundry Coke** |
| Antimony | 1.49E-06 | 1.97E-06 |
| Arsenic | 1.61E-05 | 2.87E-05 |
| Beryllium | 2.86E-07 | 4.92E-07 |
| Cadmium | 5.02E-07 | 7.34E-07 |
| Chromium (total)2 | 2.08E-04 | 1.20E-04 |
| Chromium III2 | 2.02E-04 | 1.16E-04 |
| Chromium VI2 | 6.24E-06 | 3.59E-06 |
| Cobalt | 1.90E-06 | 7.41E-06 |
| Lead | 2.15E-05 | 3.01E-05 |
| Manganese | 3.53E-05 | 7.71E-05 |
| Mercury (total)2 | 7.83E-06 | 4.99E-06 |
| Elemental gaseous Hg2 | 6.26E-06 | 3.99E-06 |
| Gaseous divalent Hg2 | 1.17E-06 | 7.49E-07 |
| Particulate divalent Hg2 | 3.91E-07 | 2.50E-07 |
| Nickel | 1.12E-04 | 1.52E-04 |
| Selenium | 2.66E-05 | 1.79E-05 |
| Carbon disulfide | 1.31E-04 | 3.49E-05 |
| Formaldehyde | 9.62E-06 | 7.29E-05 |
| Hydrogen chloride | 2.48E-02 | 8.29E-03 |
| Hydrogen cyanide | 1.45E-03 | 3.77E-03 |
| Hydrogen fluoride | 9.17E-04 | 2.69E-04 |
| Total D/F3,4 | 5.98E-10 | 8.63E-10 |
| Total PAH3 | 6.14E-04 | 4.60E-03 |
| Total VOHAP3,5,6 | 8.51E-03 | 1.95E-03 |

1 See **Table 14** for the data source for each type of emissions factor.

2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.

3 See **Appendix B** for the individual HAP in the groups.

4 ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**.

5 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately.

6 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately.

**Table 18. HRSG Main Stack and HRSG Bypass/Waste Heat Stack Default Emission Factors1**

| **HAP** | **Default Emission Factor (lb/hr)** | |
| --- | --- | --- |
| **HRSG Main Stack**  **HNR – Blast Furnace Coke** | **HRSG Bypass/Waste Heat Stack**  **HNR – Blast Furnace Coke** |
| **HAP Metals** | | |
| Antimony | 4.45E-04 | 3.15E-03 |
| Arsenic | 8.26E-04 | 2.67E-02 |
| Beryllium | 3.51E-05 | 2.36E-04 |
| Cadmium | 1.99E-04 | 1.25E-03 |
| Chromium (total)2 | 2.64E-03 | 1.55E-03 |
| Chromium III2 | 2.56E-03 | 1.50E-03 |
| Chromium VI2 | 7.92E-05 | 4.65E-05 |
| Cobalt | 1.99E-04 | 1.11E-03 |
| Lead | 1.97E-03 | 7.18E-02 |
| Manganese | 4.55E-03 | 1.06E-03 |
| Mercury (total)2 | 8.40E-03 | 2.55E-03 |
| Elemental gaseous Hg2 | 4.20E-04 | 1.28E-04 |
| Gaseous divalent Hg2 | 1.26E-03 | 3.83E-04 |
| Particulate divalent Hg2 | 6.72E-03 | 2.04E-03 |
| Nickel | 2.51E-03 | 7.03E-03 |
| Selenium | 9.69E-03 | 1.49E-02 |
| **Other (Gaseous) HAP** | | |
| Carbon disulfide | -- | 3.07E-04 |
| Formaldehyde7,8 | 5.19E-01 | 9.11E-02 |
| Hydrogen chloride | 3.87E+01 | 2.97E+01 |
| Hydrogen cyanide | 3.31E-01 | 2.37E-024 |
| Hydrogen fluoride | 1.81E-01 | 8.02E-01 |
| Total D/F3 | 4.24E-08 | 1.28E-08 |
| Total PAH3 | 1.80E-03 | 2.87E-04 |
| Total VOHAP3,5,6 | -- | 5.67E-03 |
| BTEX8 | 5.71E-01 |  |

1 See **Table 14** for the data source for each type of emissions factor.

2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.

3 See **Appendix B** for the individual HAP in the groups.

4 Not using SC-GraniteCity-IL Hydrogen Cyanide values, see **Section 3.1.4**.

5 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately.

6 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately.

7 HRSG bypass/waste heat stack emission factor developed for modeling file includes all three of SunCoke Franklin Furnace runs along with SunCoke Granite City run data..

8 Only Cokenergy main stack was tested for formaldehyde and benzene toluene, ethylbenzene, and xylenes (BTEX).

**Table 19. Quench Tower Default Emission Factors1**

| **HAP** | **Default Emission Factor (lb/ton coke produced)** |
| --- | --- |
| **ByP & HNR –**  **Blast Furnace Coke & Foundry Coke** |
| **Metal HAP** | |
| Antimony | 3.39E-06 |
| Arsenic | 6.92E-05 |
| Beryllium | 2.64E-07 |
| Cadmium | 2.12E-07 |
| Chromium (total)2 | 2.67E-06 |
| Chromium III2 | 2.59E-06 |
| Chromium VI2 | 8.00E-08 |
| Cobalt | 5.96E-07 |
| Lead | 7.43E-06 |
| Manganese | 2.51E-06 |
| Mercury (total)2 | 1.14E-06 |
| Elemental gaseous Hg2 | 9.10E-07 |
| Gaseous divalent Hg2 | 1.71E-07 |
| Particulate divalent Hg2 | 5.69E-08 |
| Nickel | 2.51E-06 |
| Selenium | 6.50E-06 |
| **Other (Gaseous) HAP** | |
| Carbon disulfide | 9.75E-05 |
| Formaldehyde | 1.28E-05 |
| Hydrogen chloride | 3.27E-04 |
| Hydrogen cyanide | 1.53E-04 |
| Hydrogen fluoride | 9.46E-05 |
| Total D/F3 | 1.30E-10 |
| Total PAH3 | 7.45E-05 |
| Total VOHAP3,4,5,6 | 2.55E-04 |

1 See **Table 14** for the data source for each type of emissions factor.

2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.

3 See **Appendix B** for the individual HAP in the groups.

4 USS-Clairton-PA did not have Perylene values, see **Section 3.1.2**.

5 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately.

6 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately.

#### 4.1.1.2 Similar Units Used with Surrogate Data

The EPA used the 2016 and 2022 Coke 114 request Enclosure 2 stack test data (“adjusted for nondetected”) for similar units at the test facilities as “surrogate” data. **Table 20** summarized the units where data from similar units were used for those units at the same facility that were not required to test.

**Table 20. Similar Units Used with Surrogate Data**

| **Facility ID** | **Unit Tested** | **Similar Unit** |
| --- | --- | --- |
| ***EP-1 ByP Pushing (CD)*** | | |
| CC-BurnsHarbor-IN | EU512-14 pushing #2 | EU512-06 pushing #1 |
| ***EP-3 ByP Battery Stack*** | | |
| CC-BurnsHarbor-IN | EU512-16 battery #2 underfiring | EU512-08 battery #1 underfiring |
| CC-Monessen-PA | Coke Oven Battery 2 underfiring | Coke Oven Battery 1B underfiring |
| USS-Clairton-PA | Coke Oven B Battery underfiring | Coke Oven Battery 1, 2, 3, 13, 14, 15, 19, 20, C underfiring |

#### 4.1.1.3 Coke Production and Operating Hours Data

The calculation of emissions for coke process units from emission factors required knowledge of coke production or operating hours, depending on the units of the emission factors, *i.e.*, lb HAP per ton coke produced or lb HAP per hour. The annual coke facility production and operating hours obtained for this purpose are summarized in **Tables 21 and 22** below, respectively. The information was obtained from the 2016 Coke 114 request, previous EPA reports, or communication with the COETF.

**Table 21. Annual Coke Production Values, by Facility and Battery**

| **Facility ID** | **Battery ID** | **2016 Coke 114 Request**  **"Actual" Coke Production TPY** |
| --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1 | 377,6061 |
| ABC-Tarrant-AL | Coke Battery #5 | 68,5551 |
| ABC-Tarrant-AL | Coke Battery #6 | 79,5241 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 105,0381 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 98,0071 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 145,6681 |
| CC-Follansbee-WV | No. 1 ,2 , 3 Battery | 36,2641 each |
| CC-Follansbee-WV | No. 8 Battery | 453,0692 |
| CC-Middletown-OH | Coke Oven Battery | 401,7522 |
| CC-BurnsHarbor-IN | Battery #1 | 932,1782 |
| CC-BurnsHarbor-IN | Battery #2 | 955,9752 |
| CC-Monessen-PA | Battery 1B | 222,0152 |
| CC-Monessen-PA | Battery 2 | 114,0072 |
| CC-Warren-OH | No. 4 Battery | 359,2812 |
| EES-RiverRouge-MI | Coke Battery #5 | 981,7652 |
| SC-EastChicago-IN | Battery A, B, C, D | 325,0003 each |
| SC-FranklinFurnace-OH | A, C Battery | 204,9944 each |
| SC-FranklinFurnace-OH | B, D Battery | 136,6634 each |
| SC-GraniteCity-IL | Battery A, B, C | 142,8044 each |
| SC-Middletown-OH | A, C Battery | 142,8044 each |
| SC-Middletown-OH | B Battery | 71,4024 |
| SC-Vasant-VA | Battery 2D, 3G | 90,0003 each |
| SC-Vasant-VA | Battery 2E | 135,0003 |
| SC-Vasant-VA | Battery 3B | 130,0003 |
| SC-Vasant-VA | Battery 3C | 180,0003 |
| SC-Vasant-VA | Battery 3F | 85,0003 |
| USS-Clairton-PA | Battery 1, 2, 3 | 217,2242 each |
| USS-Clairton-PA | Battery 13, 14, 15 | 225,7242 each |
| USS-Clairton-PA | Battery 19, 20 | 424,3072 each |
| USS-Clairton-PA | B Battery | 718,2162 |
| USS-Clairton-PA | C Battery | 880,5702 |

1 Value reported by industry (COETF). See docket for the rule (EPA-HQ-OAR-2004-0085) for records of communications with COETF.

2 Value reported by facility to 2016 Coke 114 request Enclosure 1 (Q29.b-pt.8). Total production for year 2015 (tpy).

3 1998 coke production values from the NESHAP for Coke Ovens: Pushing, Quenching, and Battery Stacks – Background Information for Proposed Standards, February 2001, EPA-453/R01-006 (EPA, 2001a).

4 Typical operation using 2016 Coke 114 request Enclosure 1 (Q28.i). Coke production design capacity multiplied by average capacity utilization (55%)

**Table 22. Annual Operating Hours for HRSG Main Stacks and HRSG Bypass/Waste Heat Stacks**

| **Facility ID** | **Emission Unit** | **Annual Operating Hours** |
| --- | --- | --- |
| ***EP-6 HRSG Main Stacks*** | | |
| SC-EastChicago-IN | HRCCF Main Stack 001 | 8,760 |
| SC-FranklinFurnace-OH | FGD - Main Stacks AB and CD | 8,760 each |
| SC-GraniteCity-IL | FGD - Main Stack | 8,760 |
| SC-Middletown-OH | FGD - Main Stack | 8,760 |
| ***EP-7 HRSG Bypass/Waste Heat Stacks*** | | |
| SC-EastChicago-IN | Venting Stack 1-16 | 1,139 each |
| SC-FranklinFurnace-OH | HRSG Bypass Vent Stack 1-10 | 192 each |
| SC-GraniteCity-IL | HRSG Bypass Vent Stack 1-6 | 312 each |
| SC-Middletown-OH | HRSG Bypass Vent Stack 1-5 | 312 each |
| SC-Vansant-VA | Venting 1-16 Stack | 8,760 each |

#### 4.1.1.4 Control Device Efficiency Corrections

The emission factors for the EP-9 HNR Pushing (CD) units were developed from test data at SunCoke’s Middletown-OH facility from units with a multiclone control device. Although two other SunCoke facilities (Haverhill and Franklin Furnace) also use multiclones, the SC-Vansant-VA facility utilizes cokeside sheds and the SC-EastChicago-IN facility utilizes a baghouse for their pushing controls. As such, a control device efficiency correction was calculated for these two facilities and applied to the emission factors developed from multiclone tests. In the SunCoke permit application for Middletown, the estimated particulate control efficiency of the multiclone is 98% (based on AP-42 factors in Table 12.2-6 and AP-42, Appendix B.2, Figure B.2-1 (EPA, 2001b). **Table 23** summarizes the control device efficiency correction factors used for cokeside shed and baghouse pushing controls.

**Table 23. HNR Pushing Control Device Efficiency Correction Factors**

|  |  |  |  |
| --- | --- | --- | --- |
| **HNR Pushing Control** | **Control Device Efficiency Correction Factor** | **Control Device Efficiency Calculations** | |
| **Control Device Efficiency Correction** | **References** |
| Cokeside Shed | 0.76 | 74% control efficiency for cokeside shed divided by 98% control efficiency for multiclone | AP-42, Table 12.2-6.  (EPA, 2001b) |
| Baghouse | 1.0 | 99% control efficiency for baghouse divided by 98% control efficiency for multiclone | AP-42, Appendix B.2, Figure B.2-1.  (EPA, 2001b) |

#### 4.1.1.5 Oven to HRSG Bypass/Waste Heat Stack Adjustment

The EPA estimated emissions for HRSG bypass/waste heat stacks based on the emission factors developed from source testing at the SunCoke Gateway facility in Granite City, IL, in units of lb HAP/hr. For the SC-Vansant-VA facility, this approach was adjusted to account for the SC-Vansant-VA facility having fewer ovens per stack as compared to the SunCoke Gateway facility. The SC-Vansant-VA facility has 143 ovens and 16 HRSG bypass/waste heat stacks resulting in approximately 9 ovens per stack. However, the SC-GraniteCity-IL facility has 120 ovens and 6 HRSG bypass/waste heat stacks resulting in 20 ovens per stack. Therefore, the SC-Vansant-VA stack emissions were multiplied by the ratio of the number of ovens per stack for each facility, or 9/20, to account for the lower number of ovens per stack at SC-Vansant-VA.

### 4.1.2 Fugitive Pushing Emission Estimates

The basis for calculating metal HAP and PAH “surrogate” emissions for fugitive pushing emissions from the ovens were data from two stack tests: Arcelor Burns Harbor in 1998 (EPA report EPA-454-R-99-001a; Docket No. A-2000-34, Document No. II-A-15) (EPA, 1999a) and ABC Coke in 1998 (EPA report EPA-454-R-99-002a; Docket No. A-2000-34, Document No. II-A-16) (EPA, 1999b). The test data from ArcelorMittal Burns Harbor applies to blast furnace coke facilities (ByP and HNR), while the test data from ABC Coke applies to foundry coke facilities. The COETF provided battery-specific capture efficiencies for 27 batteries at nine facilities (COETF, 2021a). A capture efficiency of 95 percent was used as default for facilities that did not provide specific capture efficiencies per battery, where all data were <4% opacity by Method 9. **Table 24** summarizes the capture efficiencies used for each battery and the source.

**Table 24. Pushing Device PM Capture Efficiencies, as Fraction of Total PM Emissions**

| **Facility ID** | **Battery ID** | **Pushing PM Capture Fraction1,2** |
| --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1 | 0.9502 |
| ABC-Tarrant-AL | Coke Battery #5 & #6 | 0.9497 |
| CC-Follansbee-WV | No. 1 Battery | 0.9658 |
| CC-Follansbee-WV | No. 2 Battery | 0.9667 |
| CC-Follansbee-WV | No. 3 Battery | 0.9663 |
| CC-Follansbee-WV | No. 8 Battery | 0.9519 |
| CC-Middletown-OH | Coke Oven Battery | 0.973 |
| CC-BurnsHarbor-IN | Battery #1 & #2 | 0.962 |
| CC-Monessen-PA | Battery 1B & 2 | 0.9768 |
| CC-Warren-OH | No. 4 Battery | 0.9516 |
| BLU-Birmingham-AL | Coke Battery No. 3, 4, 5 | 0.9 |
| EES-RiverRouge-MI | Coke Battery #5 | 0.95 |
| SC-EastChicago-IN | Battery A, B, C, D | 0.95 (default) |
| SC-FranklinFurnace-OH | Battery A, B, C, D | 0.95 (default) |
| SC-GraniteCity-IL | Battery A, B, C | 0.95 (default) |
| SC-Middletown-OH | Battery A, B, C | 0.95 (default) |
| SC-Vasant-VA | Battery 2D, 2E, 3B, 3C, 3F, 3G | 0.95 (default) |
| USS-Clairton-PA | Battery 1 | 0.9903 |
| USS-Clairton-PA | Battery 2 | 0.9924 |
| USS-Clairton-PA | Battery 3 | 0.9936 |
| USS-Clairton-PA | Battery 13 | 0.9931 |
| USS-Clairton-PA | Battery 14 | 0.9944 |
| USS-Clairton-PA | Battery 15 | 0.9988 |
| USS-Clairton-PA | Battery 19 | 0.9968 |
| USS-Clairton-PA | Battery 20 | 0.9975 |
| USS-Clairton-PA | B Battery | 0.9996 |
| USS-Clairton-PA | C Battery | 0.9998 |
| 1 Where more than one battery is listed, fraction applies to each battery.  2The COETF (2021a) provided the documentation for the pushing capture efficiencies in most cases. A value of 0.95 was used as a conservative default factor where no information was available. | | |

The annual battery coke production values from the 2016 Coke 114 request Enclosure 1 from **Table 21** above, as revised by industry where applicable, also were used in the following equation to calculate TPY emissions for metal HAP and PAHs:

HAPi = FPM \* SFi \* (1 – Capture) / Coke Pushed \* Coke Production

Where:

HAPi = Emission rate of HAP i (ton/yr)

FPM = Uncontrolled filterable PM emission rate (lb/hr)

SFi = Speciation factor of HAP i (dimensionless)

Capture = Pushing capture efficiency (fraction)

Coke Pushed (ton/hr) from ABC Coke and ArcelorMittal Burns Harbor stack tests

Coke Production (ton/yr)

For acid gases, semi-volatile HAP, and D/F, the industry default emission factors, as described in **Section 4.1.1**, were used with the pushing capture efficiencies provided by industry in the following equation to calculate TPY “surrogate” emissions for Acid Gases, Semi-Volatile HAP and D/Fs.

HAPi = ((HAPi EF \* Coke Production / 2000) / Capture) \* (1 - Capture)

Where:

HAPi = Emission rate of HAP i (ton/yr)

HAPi EF = Industry default emission factors (lb/ton coke)

Coke Production (ton/yr)

Capture = Pushing capture efficiency (fraction)

## 4.2 Actual Annual Emissions for Noncategory Emissions

The HAP emissions from the 2016 and 2022 Coke 114 request Enclosures 1&2 and EPA’s 2017 National Emission Inventory (NEI)/ Emission Inventory System (EIS) data were used to develop the Coke Oven Emissions Database “actual” annual HAP emissions estimates for all HAP-emitting noncategory units at coke facilities. The noncategory HAP emissions operating units at coke facilities are: Coke Ovens, subpart L, sources: charging (both ByP and HNR); ByP lids, doors and offtakes; ByP chemical recovery plants; boilers; flares; II&S (40 CFR part 63, subpart FFFFF) sources, *i.e*., BF, BF stoves, BOPF control devices, ladle metallurgy, hot metal transfer skimming and desulfurization, sinter plant windbox, sinter plant discharge end, and BF cooling tower; and other miscellaneous units not related to coke manufacturing (*e.g.*, process heaters, metal finishing, steel pickling, annealing furnaces, coating line pot heaters, reheat furnaces, thermal coal dryers, etc.). All emission calculations are show in **Appendix B**.Supporting files are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085). The Coke Oven Emissions Database was used to populate the Coke Oven Risk Modeling Database described in **Section 5**.

### 4.2.1 Noncategory Emissions Developed from Coke 114 Request Enclosure 2 Stack Test Data

#### 4.2.1.1 Noncategory Emission Factors Developed from Coke 114 Request Enclosure 2 Stack Test Data

**Table 25** summarizes the units tested as part of the Coke 114 request Enclosure 2 test request.

**Table 25. Coke Noncategory Units Tested as Part of the Coke 114 Request Enclosure 2**

| **Facility ID** | **Unit ID** | **Type of Coke** |
| --- | --- | --- |
| ***ByP Boiler Stacks*** | | |
| CC-Monessen-PA | Boiler #1 and #2 | Blast furnace |
| EC-Erie-PA | Boiler #1 Stack | Foundry |
| ***HNR Charging (CD)*** | | |
| SC-Middletown-OH | Pushing/Charging Machine (PCM) | Blast furnace |
| Note:While Erie Coke data was used to develop foundry emissions for the Coke PQBS RTR, because the facility is now permanently closed, the data for this facility was not modeled. | | |

**Table 26** summarizes the methodology used to develop coke oven facility emission estimates in TPY for the coke noncategory sources with Coke 114 request stack test data. The development of the individual components of the calculation are described in the sections that follow.

**Table 26. Calculation Methodology for Noncategory Units with Coke 114 Request Stack Test Data**

| **Process ID** | **Test Data/ Emission Factor UOM** | **Calculation of Actual Emissions (TPY)** |
| --- | --- | --- |
| EP-4 ByP Boiler stacks | lb/COG mmscf | = lb/ COG mmscf x COG mmscf/yr / 2000 |
| EP-8 HNR Charging (CD) | lb/ton wet coal charged | = lb/ton wet coal x Wet Coal Charged TPY / 2000 |

The EPA used the 2016 Coke 114 request Enclosure 2 stack test data to create default industry emission factors per coke type (*i.e.*, foundry coke vs. blast furnace coke), per process ID, and per pollutant, to use for all other units that were not required to test as “surrogate” data. **Tables 27 and 28** summarize the emission factors and UOM for each default industry emission factor per process ID.

**Table 27. ByP Boiler Default Emission Factors1 per Coke Type**

| **HAP** | **Default Emission factor (lb/mmscf COG)** | |
| --- | --- | --- |
| **ByP - Blast Furnace Coke** | **ByP - Foundry Coke** |
| **HAP Metals** | | |
| Antimony | 5.64E-05 | 2.58E-04 |
| Arsenic | 3.18E-04 | 1.61E-02 |
| Beryllium | 9.60E-06 | 6.44E-05 |
| Cadmium | 9.60E-06 | 1.31E-03 |
| Chromium (total)2 | 8.59E-04 | 4.27E-02 |
| Chromium III2 | 8.33E-04 | 4.14E-02 |
| Chromium VI2 | 2.58E-05 | 1.28E-03 |
| Cobalt | 1.55E-04 | 1.62E-03 |
| Lead | 1.34E-04 | 4.56E-03 |
| Manganese | 5.37E-04 | 2.25E-02 |
| Mercury (total)2 | 7.20E-04 | 5.42E-04 |
| Elemental gaseous Hg2 | 5.76E-04 | 4.34E-04 |
| Gaseous divalent Hg2 | 1.08E-04 | 8.13E-05 |
| Particulate divalent Hg2 | 3.60E-05 | 2.71E-05 |
| Nickel | 1.45E-03 | 1.06E-01 |
| Selenium | 2.52E-04 | 5.59E-03 |
| **Other (Gaseous) HAP** | | |
| Hydrogen chloride | 1.31E-01 | 2.33E+00 |
| Hydrogen cyanide | 1.39E-01 | 3.59E-01 |
| Hydrogen fluoride | 1.39E-02 | 6.29E-02 |
| Total D/F3,4 | 4.21E-09 | 2.66E-08 |
| Total PAH3 | 4.09E-03 | 2.40E+00 |

1 See **Table 25** for the data source for each type of emissions factor.

2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.

3 See **Appendix B** for the individual HAP in the groups.

4 ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**.

**Table 28. HNR Charging Default Emission Factors1**

| **HAP Tested** | **Default Emission Factor**  **(lb HAP/ton Wet Coal Charged** |
| --- | --- |
| **HNR – Blast Furnace Coke** |
| **HAP Metals** | |
| Antimony | 2.52E-07 |
| Arsenic | 8.41E-07 |
| Beryllium | 2.46E-08 |
| Cadmium | 4.99E-08 |
| Chromium (total)2 | 1.27E-06 |
| Chromium III2 | 1.23E-06 |
| Chromium VI2 | 3.81E-08 |
| Cobalt | 9.43E-08 |
| Lead | 8.23E-07 |
| Manganese | 1.79E-06 |
| Mercury (total)2 | 8.93E-08 |
| Elemental gaseous Hg2 | 7.14E-08 |
| Gaseous divalent Hg2 | 1.34E-08 |
| Particulate divalent Hg2 | 4.46E-09 |
| Nickel | 1.34E-06 |
| Selenium | 2.48E-07 |

1 See **Table 25** for the data source for each type of emissions factor.

2 ForHg and Cr speciation factors, see **Section 2.5.** Total Hg and Cr provided for information purposes only.

#### 4.2.1.2 Wet Coal Charged Data for Calculating HNR Charging Emissions

For the noncategory HNR charging units tested and using default industry emission factors shown in **Table 28**, the HNR charging HAP emissions (TPY) were calculated by process ID and individual HAP using annual wet coal charged (in TPY), shown in **Table 29** below.

**Table 29. Annual Wet Coal Charged Values**

| **Facility ID** | **Battery** | **Annual Wet Coal Charged (TPY)** |
| --- | --- | --- |
| SC-EastChicago-IN | Battery A, B, C, D | 487,939 each |
| SC-FranklinFurnace-OH | Battery A, C | 467,784 each |
| SC-FranklinFurnace-OH | Battery B, D | 311,856 each |
| SC-GraniteCity-IL | Battery A, B, C | 324,850 each |
| SC-Middletown-OH | Battery A, C | 324,850 each |
| SC-Middletown-OH | Battery B | 162,425 |
| SC-Vansant-VA | Battery 2D, 3G | 117,500 each |
| SC-Vansant-VA | Battery 2E | 176,250 |
| SC-Vansant-VA | Battery 3F | 110,972 |
| SC-Vansant-VA | Battery 3B | 169,722 |
| SC-Vansant-VA | Battery 3C | 235,000 |

#### 4.2.1.3 Boiler COG Usage Data for Calculating Boiler Emissions

For the noncategory boiler units tested and using default industry emission factors, the boiler HAP emissions (TPY) were calculated using boiler COG usage (mmscf/yr), shown in **Table 30** below.

**Table 30. Annual Boiler COG Usage (mmscf/yr)**

| **Facility ID** | **Emission Unit and Modeling release Point ID** | **Regulatory Code** | **Fuel** | **COG Usage (mmscf/yr)** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Boilers 7, 8, and 9 combined stack | Boilers 7 and 8: JCDH Section 6.1.1, 6.3, and 7.1.1;  Boiler 9: JCDH Section 6.1.1 and 6.4.1  NSPS Subpart Db | COG | 2,628 |
| BLU-Birmingham-AL | No. 1, 3 steam generator | JCDH Section 6.1.1, 6.3, and 7.1.1 | COG | 781 (each) |
| BLU-Birmingham-AL | No. 4 steam generator | JCDH Section 6.1.1 and 6.3.1  NSPS Subpart Db | COG | 590 |
| CC-Follansbee-WV | Boilers 6, 7, 9, and 10 combined stack | WV 45 CSR2-3.1 and 45 CSR2-4.1  WV SIP | COG | 3,370 |
| CC-Follansbee-WV | Boiler No. 8 | 63DDDDD | NG | N/A |
| CC-Middletown-OH | Boiler No.1, 2, 3, 4 | 63DDDDD | COG | 304 (each) |
| CC-BurnsHarbor-IN | Power station boiler #07, 08, 09, 10, 11, 12 | 63DDDDD | COG | 2,081 (each) |
| CC-Monessen-PA | Boiler #1 and #2 combined stack | NSPS Subpart Db  PA RACT and PM Standards | COG | 1,568 |
| CC-Warren-OH | Boiler B001 | 63DDDDD | COG | 1,180 |
| CC-Warren-OH | Boiler B002 | 63DDDDD | COG | 928 |
| CC-Warren-OH | Boiler B004 | 63DDDDD | COG | 1,124 |
| USS-Clairton-PA | Boiler #1, stck s31 / boiler #1 | 63DDDDD | COG | 5,932 |
| USS-Clairton-PA | Boiler #2, stck s32 / boiler #2 | 63DDDDD | COG | 3,405 |
| USS-Clairton-PA | Boiler R1&R2, Combined Stack S36 | 63DDDDD | COG | 1,130 |
| USS-Clairton-PA | Boiler T1, Stack S38 / Boilers T1, COG, Stack S38 | 63DDDDD | COG | 848 |
| USS-Clairton-PA | Boiler T2, Stack S39 / Boiler T2, Cog, Stack S39 | 63DDDDD | COG | 848 |

Note: N/A = not applicable, boiler burns natural gas. Regulatory codes, are as follows:

63DDDDD= CAA part 63 National Emission Standards for Hazardous Air Pollutants for Source Categories, subpart DDDDD— National Emission Standards for Hazardous Air Pollutants for Major sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

JCDH = Jefferson County Department of Health, Alabama

NSPS Subpart Db = CAA part 60 Standards of Performance for New Stationary Sources, subpart Db—Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

PA RACT= Pennsylvania's Reasonably Available Control Technology

WV 45 CSR2 = West Virginia SIP, 45 CSR 2 - To Prevent and Control Particulate Air Pollution Control From Combustion of Indirect Heat Exchangers

WV SIP = West Virginia State Implementation Plans

### 4.2.3 Coke Ovens Subpart L Emissions Estimates

Coke ovens, subpart L, sources include ByP Charging, Doors-, Lids, and Offtakes. **Table 31** summarizes the Coke Ovens Subpart L sources per facility and battery.

**Table 31. Coke PQBS Noncategory Unit Counts - Coke Ovens Subpart L**

| **Facility ID** | **Battery ID** | **#Ovens Per Battery** | **Type of Coke** | **Per Oven** | | **Per Battery** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Lids** | **Offtakes** | **Doors** | **Lids** | **Offtakes** |
| ABC-Tarrant-AL | Coke Battery #1 | 78 | foundry | 4 | 1 | 156 | 312 | 78 |
| ABC-Tarrant-AL | Coke Battery #5 | 25 | foundry | 5 | 1 | 50 | 125 | 25 |
| ABC-Tarrant-AL | Coke Battery #6 | 29 | foundry | 5 | 1 | 58 | 145 | 29 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 30 | foundry | 5 | 1 | 60 | 150 | 30 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 30 | foundry | 5 | 1 | 60 | 150 | 30 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 60 | foundry | 5 | 1 | 120 | 300 | 60 |
| CC-Follansbee-WV | No. 1 Battery | 47 | BF | 4 | 1 | 94 | 188 | 47 |
| CC-Follansbee-WV | No. 2 Battery | 47 | BF | 4 | 1 | 94 | 188 | 47 |
| CC-Follansbee-WV | No. 3 Battery | 51 | BF | 4 | 1 | 102 | 204 | 51 |
| CC-Follansbee-WV | No. 8 Battery | 79 | BF | 4 | 2 | 158 | 316 | 158 |
| CC-Middletown-OH | Coke Oven Battery | 76 | BF | 3 | 2 | 152 | 228 | 152 |
| CC-BurnsHarbor-IN | Battery #1 | 82 | BF | 4 | 1 | 164 | 328 | 82 |
| CC-BurnsHarbor-IN | Battery #2 | 82 | BF | 4 | 1 | 164 | 328 | 82 |
| CC-Monessen-PA | Battery 1B | 37 | BF | 4 | 2 | 74 | 148 | 74 |
| CC-Monessen-PA | Battery 2 | 19 | BF | 4 | 2 | 38 | 76 | 38 |
| CC-Warren-OH | No. 4 Battery | 85 | BF | 3 | 2 | 170 | 255 | 170 |
| EES-RiverRouge-MI | Coke Battery #5 | 85 | BF | 4 | 2 | 170 | 340 | 170 |
| USS-Clairton-PA | Battery 1 | 64 | BF | 4 | 2 | 128 | 256 | 128 |
| USS-Clairton-PA | Battery 2 | 64 | BF | 4 | 2 | 128 | 256 | 128 |
| USS-Clairton-PA | Battery 3 | 64 | BF | 4 | 2 | 128 | 256 | 128 |
| USS-Clairton-PA | Battery 13 | 61 | BF | 4 | 2 | 122 | 244 | 122 |
| USS-Clairton-PA | Battery 14 | 61 | BF | 4 | 2 | 122 | 244 | 122 |
| USS-Clairton-PA | Battery 15 | 61 | BF | 4 | 2 | 122 | 244 | 122 |
| USS-Clairton-PA | Battery 19 | 87 | BF | 4 | 2 | 174 | 348 | 174 |
| USS-Clairton-PA | Battery 20 | 87 | BF | 4 | 2 | 174 | 348 | 174 |
| USS-Clairton-PA | B Battery | 75 | BF | 4 | 2 | 150 | 300 | 150 |
| USS-Clairton-PA | C Battery | 84 | BF | 5 | 1 | 168 | 420 | 84 |

For the Coke Ovens, subpart L, sources (ByP charging, doors, lids, and offtakes), Method 303 data obtained from responses to questions in the 2016 and 2022 Coke 114 request Enclosure 1 were used with the benzene-soluble organic (BSO) estimating procedures from AP-42 (EPA, 2001b) to calculate coke oven emissions (COE) from each source. The COETF provided Method 303 data for the non-114 request facilities as part of their review (see data in **Appendix B**). Relevant documents are included in Coke PQBS docket, (EPA-HQ-OAR-2002-0085). The calculated emissions for doors were divided by two to represent the emissions from doors on each side of the battery (*i.e.*, push side and coke side) for modeling purposes. **Table 32** summarizes the equations used to estimate emissions for Coke Ovens, subpart L, sources.

**Table 32. Calculation Methodology for Emission Sources for Coke Ovens, Subpart L--**

**Units with Coke 114 Request Enclosure 1 Data (EPA, 2003)**

| **Emissions Source** | **Calculation Methodology** |
| --- | --- |
| **Charging** | BSOcharging = VE x (charges/year) x (0.0093 lb BSO/10 seconds)  Where,  BSOcharging = BSO emission rate from charging (lb/yr)  VE = average seconds of visible emissions per charge |
| **Doors** | BSOdoors = ND x (PLDYARD/100) x (0.04 lb/hr) +  ND x (6% PLDBENCH/100) x (0.023 lb/hr)  where,  BSOdoors = BSO emission rate from door leaks (lb/hr)  ND = total number of doors on battery  PLDYARD = percent leaking doors from the yard as determined by Method 303  PLDBENCH = 6% percent leaking doors from the bench (EPA, 2008) |
| **Lids** | BSOlids = NL x (PLL/100) x (0.0075 lb/hr)  where,  BSOlids = BSO emission rate from lids (lb/hr)  NL = total number of lids on battery  PLL = average percent leaking lids |
| **Offtakes** | BSOofftakes = NO x (PLO/100) x (0.0075 lb/hr)  where,  BSOofftakes = BSO emission rate from offtakes (lb/hr)  NO = total number of offtakes on battery  PLO = average percent leaking offtakes |
| Note: Equations are taken from AP-42 (EPA, 2001b) | |

For charging, the “VE” values (average seconds of visible emissions per charge) came from the Coke 114 request Enclosure 1 responses or were provided by COETF as part of their review. The “charges/year” values also were obtained from the Coke 114 request Enclosure 1 responses or provided by COETF as part of their review. For doors, the “ND total number of doors on battery” values were obtained from responses to the Coke 114 request Enclosure 1 or were provided by COETF as part of their review. The values for “PLD percent leaking doors as determined by Method 303” were obtained from the Coke 114 request responses to Enclosure 1 or were provided by COETF as part of their review. For lids, the “NL = total number of lids on battery” values were obtained from the responses to the Coke 114 request Enclosure 1 or were provided by COETF as part of their review. The “PLL = average percent leaking lids” values were obtained from responses to the Coke 114 request Enclosure 1 or were provided by COETF as part of their review. For offtakes, the “NO = total number of offtakes on battery” values came from Coke 114 request Enclosure 1 responses or were provided by COETF as part of their review. The “PLO = average percent leaking offtakes” values were obtained from Coke 114 request Enclosure 1 responses or were provided by COETF as part of their review.

**Table 33** through **40** shows the data calculation elements used to estimate COE emissions (in TPY) for charging and leaks from doors, lids, and offtakes for each battery at the coke facilities, and results of the calculations. **Tables 41** and **42** summarize the results for the coke facilities as overall facility averages along with the allowable limits and facility average as a percent of the limit.

**Table 33. 2016 Charging COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Visible Emissions per Charge (sec)1** | | **Charges/**  **year1** | **COE Emission Rate from Charging2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **lb/yr** | **TPY** | |
| **By Battery** | **Facility Average** | **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 3.7 | 4.1 | 19,645 | 67.60 | 0.034 | 0.058 |
| ABC-Tarrant-AL | Coke Battery #5 | 4.3 | 5,661 | 22.64 | 0.011 |
| ABC-Tarrant-AL | Coke Battery #6 | 4.3 | 6,566 | 26.26 | 0.013 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 4.3 | 4.0 | 9,449 | 37.87 | 0.019 | 0.056 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 4.3 | 8,827 | 35.38 | 0.018 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 3.5 | 12,184 | 39.43 | 0.020 |
| CC-Follansbee-WV | No. 1 Battery | 7.4 | 6.6 | 2,978 | 20.54 | 0.010 | 0.068 |
| CC-Follansbee-WV | No. 2 Battery | 7.4 | 2,978 | 20.54 | 0.010 |
| CC-Follansbee-WV | No. 3 Battery | 7.4 | 2,978 | 20.54 | 0.010 |
| CC-Follansbee-WV | No. 8 Battery | 4.1 | 19,623 | 74.84 | 0.037 |
| CC-Middletown-OH | Coke Oven Battery | 5.8 | 5.8 | 32,864 | 178.54 | 0.089 | 0.089 |
| CC-BurnsHarbor-IN | Battery #1 | 9.0 | 9.3 | 38,330 | 321.56 | 0.16 | 0.33 |
| CC-BurnsHarbor-IN | Battery #2 | 9.7 | 38,426 | 345.78 | 0.17 |
| CC-Monessen-PA | Battery 1B | 6.3 | 6.3 | 17,463 | 102.82 | 0.051 | 0.078 |
| CC-Monessen-PA | Battery 2 | 6.3 | 8,967 | 52.79 | 0.026 |
| CC-Warren-OH | No. 4 Battery | 3.5 | 3.5 | 30,078 | 98.33 | 0.049 | 0.049 |
| EES-RiverRouge-MI | Coke Battery #5 | 1.3 | 1.3 | 42,355 | 51.54 | 0.026 | 0.026 |
| USS-Clairton-PA | Battery 1 | 4.5 | 7.5 | 21,281 | 88.23 | 0.044 | 1.1 |
| USS-Clairton-PA | Battery 2 | 4.5 | 21,281 | 89.69 | 0.045 |
| USS-Clairton-PA | Battery 3 | 4.7 | 21,281 | 92.78 | 0.046 |
| USS-Clairton-PA | Battery 13 | 3.6 | 20,449 | 68.65 | 0.034 |
| USS-Clairton-PA | Battery 14 | 3.8 | 20,449 | 71.73 | 0.036 |
| USS-Clairton-PA | Battery 15 | 3.8 | 20,449 | 71.66 | 0.036 |
| USS-Clairton-PA | Battery 19 | 4.5 | 30,304 | 125.86 | 0.063 |
| USS-Clairton-PA | Battery 20 | 4.1 | 30,304 | 116.06 | 0.058 |
| USS-Clairton-PA | B Battery | 4.3 | 28,278 | 114.14 | 0.057 |
| USS-Clairton-PA | C Battery | 38 | 36,329 | 1,268.06 | 0.63 |
| 1 Data from the 2016 Coke 114 request.  2 COE from charging (lb) = VE x (charges/year) x (0.0093 lb COE/10 seconds). | | | | | | | |

**Table 34. 2022 Charging COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Visible Emissions per Charge (sec)1** | | **Charges/**  **year1** | **COE Emission Rate from Charging2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **lb/yr** | **TPY** | |
| **By Battery** | **Facility Average** | **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 4.5 | 4.7 | 21,735 | 90.17 | 0.045 | 0.070 |
| ABC-Tarrant-AL | Coke Battery #5 | 4.9 | 5,140 | 23.23 | 0.012 |
| ABC-Tarrant-AL | Coke Battery #6 | 4.9 | 5,963 | 26.94 | 0.013 |
| CC-BurnsHarbor-IN | Battery #1 | 8.4 | 8.4 | 37,874 | 295.49 | 0.15 | 0.29 |
| CC-BurnsHarbor-IN | Battery #2 | 8.5 | 36,625 | 288.86 | 0.14 |
| CC-Monessen-PA | Battery 1B | 4.4 | 4.4 | 18,152 | 73.91 | 0.037 | 0.056 |
| CC-Monessen-PA | Battery 2 | 4.4 | 9,322 | 37.96 | 0.019 |
| CC-Warren-OH | No. 4 Battery | 4.5 | 4.5 | 35,287 | 148.03 | 0.074 | 0.074 |
| EES-RiverRouge-MI | Coke Battery #5 | 1.8 | 1.8 | 41,617 | 69.57 | 0.035 | 0.035 |
| USS-Clairton-PA | Battery 1 | 2.1 | 2.4 | 21,287 | 41.89 | 0.021 | 0.29 |
| USS-Clairton-PA | Battery 2 | 2.3 | 21,287 | 45.01 | 0.023 |
| USS-Clairton-PA | Battery 3 | 2.1 | 21,287 | 41.83 | 0.021 |
| USS-Clairton-PA | Battery 13 | 1.8 | 19,531 | 32.84 | 0.016 |
| USS-Clairton-PA | Battery 14 | 1.8 | 19,531 | 32.77 | 0.016 |
| USS-Clairton-PA | Battery 153 | 3.8 | 0 | 71.66 | 0.036 |
| USS-Clairton-PA | Battery 19 | 1.8 | 32,956 | 55.28 | 0.028 |
| USS-Clairton-PA | Battery 20 | 1.8 | 32,956 | 54.41 | 0.027 |
| USS-Clairton-PA | B Battery | 2.9 | 31,342 | 84.79 | 0.042 |
| USS-Clairton-PA | C Battery | 3.5 | 35,774 | 116.96 | 0.06 |
| 1 Data from the 2022 Coke 114 request.  2 COE from charging (lb) = VE x (charges/year) x (0.0093 lb COE/10 seconds).  3 USS-Clairton-PA Battery 15 was hot idled in 2021, values are from 2016. | | | | | | | |

**Table 35. 2016 Doors COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Total Number of Battery Doors (ND)1** | **Percent Leaking Doors**  **from Yard as**  **Determined by**  **Method 3031** | | **COE Emission Rate from Door Leaks2** | | | **COE Emission Rate from Door Leaks3** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** | **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 156 | 2.2% | 0.82% | 0.35 | 1.5 | 2.2 | 0.2067 | 0.91 | 0.95 |
| ABC-Tarrant-AL | Coke Battery #5 | 50 | 0.21% | 0.07 | 0.32 | 0.0065 | 0.028 |
| ABC-Tarrant-AL | Coke Battery #6 | 58 | 0.11% | 0.08 | 0.36 | 0.0039 | 0.017 |
| CC-Follansbee-WV | No. 1 Battery | 94 | 0.081% | 0.44% | 0.13 | 0.58 | 3.2 | 0.0047 | 0.021 | 0.71 |
| CC-Follansbee-WV | No. 2 Battery | 94 | 0.081% | 0.13 | 0.58 | 0.0047 | 0.021 |
| CC-Follansbee-WV | No. 3 Battery | 102 | 0.081% | 0.14 | 0.63 | 0.0051 | 0.022 |
| CC-Follansbee-WV | No. 8 Battery | 158 | 1.5% | 0.31 | 1.4 | 0.1479 | 0.65 |
| CC-Middletown-OH | Coke Oven Battery | 152 | 1.7% | 1.7% | 0.31 | 1.4 | 1.4 | 0.1604 | 0.70 | 0.70 |
| CC-BurnsHarbor-IN | Battery #1 | 164 | 2.1% | 2.3% | 0.36 | 1.6 | 3.3 | 0.2129 | 0.93 | 2.0 |
| CC-BurnsHarbor-IN | Battery #2 | 164 | 2.4% | 0.39 | 1.7 | 0.2469 | 1.1 |
| CC-Monessen-PA | Battery 1B | 74 | 0.56% | 0.75% | 0.12 | 0.52 | 0.81 | 0.0255 | 0.11 | 0.21 |
| CC-Monessen-PA | Battery 2 | 38 | 0.95% | 0.07 | 0.29 | 0.0222 | 0.097 |
| CC-Warren-OH | No. 4 Battery | 170 | 1.7% | 1.7% | 0.35 | 1.5 | 1.5 | 0.1821 | 0.80 | 0.80 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 60 | 1.6% | 1.4% | 0.12 | 0.53 | 2.0 | 0.0603 | 0.26 | 0.87 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 60 | 1.6% | 0.12 | 0.53 | 0.0599 | 0.26 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 120 | 1.1% | 0.22 | 0.95 | 0.0791 | 0.35 |
| EES-RiverRouge-MI | Coke Battery #5 | 170 | 0.018% | 0.018% | 0.24 | 1.0 | 1.0 | 0.0019 | 0.0084 | 0.0084 |
| USS-Clairton-PA | Battery 1 | 128 | 0.81% | 0.54% | 0.22 | 0.96 | 9.8 | 0.0639 | 0.28 | 2.0 |
| USS-Clairton-PA | Battery 2 | 128 | 0.69% | 0.21 | 0.93 | 0.0544 | 0.24 |
| USS-Clairton-PA | Battery 3 | 128 | 1.3% | 0.24 | 1.1 | 0.1002 | 0.44 |
| USS-Clairton-PA | Battery 13 | 122 | 0.40% | 0.19 | 0.82 | 0.0301 | 0.13 |
| USS-Clairton-PA | Battery 14 | 122 | 0.47% | 0.19 | 0.84 | 0.0353 | 0.15 |
| USS-Clairton-PA | Battery 15 | 122 | 0.39% | 0.19 | 0.82 | 0.0293 | 0.13 |
| USS-Clairton-PA | Battery 19 | 174 | 0.42% | 0.27 | 1.2 | 0.0450 | 0.20 |
| USS-Clairton-PA | Battery 20 | 174 | 0.31% | 0.26 | 1.1 | 0.0332 | 0.15 |
| USS-Clairton-PA | B Battery | 150 | 0.25% | 0.22 | 0.97 | 0.0231 | 0.10 |
| USS-Clairton-PA | C Battery | 168 | 0.35% | 0.26 | 1.1 | 0.0362 | 0.16 |
| 1 From 2016 Coke 114 request.  2 COEdoors (lb/hr) = ND x (PLDYARD/100) x (0.04 lb/hr) + ND x (6% PLDBENCH/100) x (0.023 lb/hr). Leaks are assumed to occur 8,760 hours per year.  3 COEdoors (lb/hr) = ND x (PLDYARD/100) x (0.04 lb/hr) + ND x (bench ratio\*PLDYARD/100) x (0.023 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | | | | |

**Table 36. 2022 Doors COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Total Number of Battery Doors (ND)1** | **Percent Leaking Doors**  **from Yard as**  **Determined by**  **Method 3031** | | **COE Emission Rate from Door Leaks2** | | | **COE Emission Rate from Door Leaks3** | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** | **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 156 | 2.4% | 0.85% | 0.37 | 1.6 | 2.3 | 0.23 | 1.0 | 1.0 |
| ABC-Tarrant-AL | Coke Battery #5 | 50 | 0.066% | 0.070 | 0.31 | 0.0020 | 0.0089 |
| ABC-Tarrant-AL | Coke Battery #6 | 58 | 0.040% | 0.081 | 0.35 | 0.0014 | 0.0063 |
| CC-BurnsHarbor-IN | Battery #1 | 164 | 2.6% | 1.8% | 0.40 | 1.7 | 3.0 | 0.26 | 1.1 | 1.6 |
| CC-BurnsHarbor-IN | Battery #2 | 164 | 1.1% | 0.30 | 1.3 | 0.11 | 0.47 |
| CC-Monessen-PA | Battery 1B | 74 | 0.086% | 0.11% | 0.10 | 0.46 | 0.70 | 0.0039 | 0.017 | 0.031 |
| CC-Monessen-PA | Battery 2 | 38 | 0.14% | 0.055 | 0.24 | 0.0032 | 0.014 |
| CC-Warren-OH | No. 4 Battery | 170 | 1.2% | 1.2% | 0.31 | 1.4 | 1.4 | 0.12 | 0.54 | 0.54 |
| EES-RiverRouge-MI | Coke Battery #5 | 170 | 0.12% | 0.12% | 0.24 | 1.1 | 1.1 | 0.012 | 0.053 | 0.053 |
| USS-Clairton-PA | Battery 1 | 128 | 0.87% | 0.46% | 0.22 | 0.97 | 9.7 | 0.068 | 0.30 | 1.7 |
| USS-Clairton-PA | Battery 2 | 128 | 0.85% | 0.22 | 0.96 | 0.067 | 0.29 |
| USS-Clairton-PA | Battery 3 | 128 | 0.47% | 0.20 | 0.88 | 0.037 | 0.16 |
| USS-Clairton-PA | Battery 13 | 122 | 0.18% | 0.18 | 0.78 | 0.014 | 0.060 |
| USS-Clairton-PA | Battery 14 | 122 | 0.22% | 0.18 | 0.78 | 0.016 | 0.071 |
| USS-Clairton-PA | Battery 154 | 122 | 0.39% | 0.19 | 0.82 | 0.029 | 0.13 |
| USS-Clairton-PA | Battery 19 | 174 | 0.29% | 0.26 | 1.1 | 0.031 | 0.14 |
| USS-Clairton-PA | Battery 20 | 174 | 0.29% | 0.26 | 1.1 | 0.031 | 0.14 |
| USS-Clairton-PA | B Battery | 150 | 0.54% | 0.24 | 1.05 | 0.050 | 0.22 |
| USS-Clairton-PA | C Battery | 168 | 0.50% | 0.27 | 1.2 | 0.052 | 0.23 |
| 1 From 2022 Coke 114 request.  2 COEdoors (lb/hr) = ND x (PLDYARD/100) x (0.04 lb/hr) + ND x (6% PLDBENCH/100) x (0.023 lb/hr). Leaks are assumed to occur 8,760 hours per year.  3 COEdoors (lb/hr) = ND x (PLDYARD/100) x (0.04 lb/hr) + ND x (bench ratio\*PLDYARD/100) x (0.023 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | | | | |

4 USS-Clairton-PA Battery 15 was hot idled in 2021, values are from 2016.

**Table 37. 2016 Lids COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NL = total number of lids on battery** | **Percent Leaking Lids (PLL) Determined by**  **Method 3031** | | **COE Emission Rate from Lid Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 312 | 0.000% | 0.000% | 0.000000 | 0.0E+00 | 0.0E+00 |
| ABC-Tarrant-AL | Coke Battery #5 | 125 | 0.000% | 0.000000 | 0.0E+00 |
| ABC-Tarrant-AL | Coke Battery #6 | 145 | 0.000% | 0.000000 | 0.0E+00 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 150 | 0.11% | 0.087% | 0.001238 | 5.4E-03 | 1.6E-02 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 150 | 0.08% | 0.000900 | 3.9E-03 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 300 | 0.07% | 0.001575 | 6.9E-03 |
| CC-Follansbee-WV | No. 1 Battery | 188 | 0.000% | 0.0023% | 0.000000 | 0.0E+00 | 9.5E-04 |
| CC-Follansbee-WV | No. 2 Battery | 188 | 0.000% | 0.000000 | 0.0E+00 |
| CC-Follansbee-WV | No. 3 Battery | 204 | 0.000% | 0.000000 | 0.0E+00 |
| CC-Follansbee-WV | No. 8 Battery | 316 | 0.0092% | 0.000217 | 9.5E-04 |
| CC-Middletown-OH | Coke Oven Battery | 228 | 0.0053% | 0.0053% | 0.000091 | 4.0E-04 | 4.0E-04 |
| CC-BurnsHarbor-IN | Battery #1 | 328 | 0.060% | 0.10% | 0.001476 | 6.5E-03 | 2.1E-02 |
| CC-BurnsHarbor-IN | Battery #2 | 328 | 0.14% | 0.003424 | 1.5E-02 |
| CC-Monessen-PA | Battery 1B | 148 | 0.000% | 0.000% | 0.000000 | 0.0E+00 | 0.0E+00 |
| CC-Monessen-PA | Battery 2 | 76 | 0.000% | 0.000000 | 0.0E+00 |
| CC-Warren-OH | No. 4 Battery | 255 | 0.039% | 0.039% | 0.000741 | 3.2E-03 | 3.2E-03 |
| EES-RiverRouge-MI | Coke Battery #5 | 340 | 0.00083% | 0.00083% | 0.000021 | 9.3E-05 | 9.3E-05 |
| USS-Clairton-PA | Battery 1 | 256 | 0.000% | 0.0030% | 0.000000 | 0.0E+00 | 3.0E-03 |
| USS-Clairton-PA | Battery 2 | 256 | 0.010% | 0.000192 | 8.4E-04 |
| USS-Clairton-PA | Battery 3 | 256 | 0.000% | 0.000000 | 0.0E+00 |
| USS-Clairton-PA | Battery 13 | 244 | 0.000% | 0.000000 | 0.0E+00 |
| USS-Clairton-PA | Battery 14 | 244 | 0.000% | 0.000000 | 0.0E+00 |
| USS-Clairton-PA | Battery 15 | 244 | 0.000% | 0.000000 | 0.0E+00 |
| USS-Clairton-PA | Battery 19 | 348 | 0.000% | 0.000000 | 0.0E+00 |
| USS-Clairton-PA | Battery 20 | 348 | 0.010% | 0.000261 | 1.1E-03 |
| USS-Clairton-PA | B Battery | 300 | 0.010% | 0.000225 | 9.9E-04 |
| USS-Clairton-PA | C Battery | 420 | 0.000% | 0.000000 | 0.0E+00 |
| 1 From 2016 Coke 114 request.  2 COElids = NL x (PLL/100) x (0.0075 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

**Table 38. 2022 Lids COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NL = total number of lids on battery** | **Percent Leaking Lids (PLL) Determined by**  **Method 3031** | | **COE Emission Rate from Lid Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 312 | 0.023% | 0.014% | 5.5E-04 | 2.4E-03 | 0.0032 |
| ABC-Tarrant-AL | Coke Battery #5 | 125 | 0.010% | 9.4E-05 | 4.1E-04 |
| ABC-Tarrant-AL | Coke Battery #6 | 145 | 0.0092% | 1.0E-04 | 4.4E-04 |
| CC-BurnsHarbor-IN | Battery #1 | 328 | 0.055% | 0.075% | 1.4E-03 | 5.9E-03 | 0.019 |
| CC-BurnsHarbor-IN | Battery #2 | 410 | 0.096% | 2.9E-03 | 1.3E-02 |
| CC-Monessen-PA | Battery 1B | 148 | 0.00000% | 0.000000% | 0.0E+00 | 0.0E+00 | 0.0 |
| CC-Monessen-PA | Battery 2 | 76 | 0.00000% | 0.0E+00 | 0.0E+00 |
| CC-Warren-OH | No. 4 Battery | 255 | 0.084% | 0.084% | 1.6E-03 | 7.0E-03 | 0.0070 |
| EES-RiverRouge-MI | Coke Battery #5 | 340 | 0.013% | 0.013% | 3.4E-04 | 1.5E-03 | 0.0015 |
| USS-Clairton-PA | Battery 1 | 256 | 0.0049% | 0.0054% | 9.5E-05 | 4.2E-04 | 0.0057 |
| USS-Clairton-PA | Battery 2 | 256 | 0.0053% | 1.0E-04 | 4.4E-04 |
| USS-Clairton-PA | Battery 3 | 256 | 0.0025% | 4.7E-05 | 2.1E-04 |
| USS-Clairton-PA | Battery 13 | 244 | 0.0032% | 5.9E-05 | 2.6E-04 |
| USS-Clairton-PA | Battery 14 | 244 | 0.0059% | 1.1E-04 | 4.7E-04 |
| USS-Clairton-PA | Battery 153 | 244 | 0.000% | 0.0E+00 | 0.0E+00 |
| USS-Clairton-PA | Battery 19 | 348 | 0.0083% | 2.2E-04 | 9.5E-04 |
| USS-Clairton-PA | Battery 20 | 348 | 0.0084% | 2.2E-04 | 9.6E-04 |
| USS-Clairton-PA | B Battery | 300 | 0.0029% | 6.5E-05 | 2.8E-04 |
| USS-Clairton-PA | C Battery | 420 | 0.013% | 4.0E-04 | 1.7E-03 |
| 1 From 2022Coke 114 request.  2 COElids = NL x (PLL/100) x (0.0075 lb/hr). Leaks are assumed to occur 8,760 hours per year.  3 USS-Clairton-PA Battery 15 was hot idled in 2021, values are from 2016. | | | | | | | |

**Table 39. 2016 Offtake COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NO = total number of offtakes on battery** | **Percent Leaking Offtakes (PLO) Determined by**  **Method 3031** | | **COE Emission Rate from Offtake Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 78 | 0.030% | 0.010% | 0.000176 | 7.7E-04 | 7.7E-04 |
| ABC-Tarrant-AL | Coke Battery #5 | 25 | 0.000% | 0.000000 | 0.0E+00 |
| ABC-Tarrant-AL | Coke Battery #6 | 29 | 0.000% | 0.000000 | 0.0E+00 |
| BLU-Birmingham-AL | Coke Battery No. 3 | 30 | 0.79% | 0.69% | 0.001778 | 7.8E-03 | 2.8E-02 |
| BLU-Birmingham-AL | Coke Battery No. 4 | 30 | 0.51% | 0.001148 | 5.0E-03 |
| BLU-Birmingham-AL | Coke Battery No. 5 | 60 | 0.76% | 0.003420 | 1.5E-02 |
| CC-Follansbee-WV | No. 1 Battery | 47 | 0.019% | 0.25% | 6.66E-05 | 2.9E-04 | 4.9E-02 |
| CC-Follansbee-WV | No. 2 Battery | 47 | 0.019% | 6.66E-05 | 2.9E-04 |
| CC-Follansbee-WV | No. 3 Battery | 51 | 0.019% | 7.23E-05 | 3.2E-04 |
| CC-Follansbee-WV | No. 8 Battery | 158 | 0.93% | 1.10E-02 | 4.8E-02 |
| CC-Middletown-OH | Coke Oven Battery | 152 | 0.014% | 0.014% | 0.000159 | 6.9E-04 | 6.9E-04 |
| CC-BurnsHarbor-IN | Battery #1 | 82 | 0.54% | 0.66% | 0.003321 | 1.5E-02 | 3.5E-02 |
| CC-BurnsHarbor-IN | Battery #2 | 82 | 0.77% | 0.004751 | 2.1E-02 |
| CC-Monessen-PA | Battery 1B | 74 | 0.48% | 0.34% | 0.002673 | 1.2E-02 | 1.4E-02 |
| CC-Monessen-PA | Battery 2 | 38 | 0.21% | 0.000591 | 2.6E-03 |
| CC-Warren-OH | No. 4 Battery | 170 | 0.80% | 0.80% | 0.010258 | 4.5E-02 | 4.5E-02 |
| EES-RiverRouge-MI | Coke Battery #5 | 170 | 0.015% | 0.015% | 0.000191 | 8.4E-04 | 8.4E-04 |
| USS-Clairton-PA | Battery 1 | 128 | 0.62% | 0.61% | 0.005952 | 2.6E-02 | 2.9E-01 |
| USS-Clairton-PA | Battery 2 | 128 | 0.56% | 0.005376 | 2.4E-02 |
| USS-Clairton-PA | Battery 3 | 128 | 0.72% | 0.006912 | 3.0E-02 |
| USS-Clairton-PA | Battery 13 | 122 | 0.57% | 0.005216 | 2.3E-02 |
| USS-Clairton-PA | Battery 14 | 122 | 0.72% | 0.006588 | 2.9E-02 |
| USS-Clairton-PA | Battery 15 | 122 | 0.39% | 0.003569 | 1.6E-02 |
| USS-Clairton-PA | Battery 19 | 174 | 1.24% | 0.016182 | 7.1E-02 |
| USS-Clairton-PA | Battery 20 | 174 | 1.05% | 0.013703 | 6.0E-02 |
| USS-Clairton-PA | B Battery | 150 | 0.17% | 0.001913 | 8.4E-03 |
| USS-Clairton-PA | C Battery | 84 | 0.08% | 0.000504 | 2.2E-03 |
| 1 From 2016 Coke 114 request.  2 COEofftakes = NO x (PLO/100) x (0.0075 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

**Table 40. 2022 Offtake COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NO = total number of offtakes on battery** | **Percent Leaking Offtakes (PLO) Determined by**  **Method 3031** | | **COE Emission Rate from Offtake Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| ABC-Tarrant-AL | Coke Battery #1 | 78 | 0.0026% | 0.0061% | 1.5E-05 | 6.7E-05 | 0.00020 |
| ABC-Tarrant-AL | Coke Battery #5 | 25 | 0.016% | 3.0E-05 | 1.3E-04 |
| ABC-Tarrant-AL | Coke Battery #6 | 29 | 0.0000% | 0.0E+00 | 0.0E+00 |
| CC-BurnsHarbor-IN | Battery #1 | 82 | 0.49% | 0.36% | 3.0E-03 | 1.3E-02 | 0.019 |
| CC-BurnsHarbor-IN | Battery #2 | 82 | 0.23% | 1.4E-03 | 6.3E-03 |
| CC-Monessen-PA | Battery 1B | 74 | 0.023% | 0.023% | 1.3E-04 | 5.7E-04 | 0.00084 |
| CC-Monessen-PA | Battery 2 | 38 | 0.022% | 6.3E-05 | 2.8E-04 |
| CC-Warren-OH | No. 4 Battery | 170 | 1.3% | 1.3% | 1.6E-02 | 7.2E-02 | 0.072 |
| EES-RiverRouge-MI | Coke Battery #5 | 170 | 0.068% | 0.068% | 8.6E-04 | 3.8E-03 | 0.0038 |
| USS-Clairton-PA | Battery 1 | 128 | 0.49% | 0.42% | 4.7E-03 | 2.1E-02 | 0.19 |
| USS-Clairton-PA | Battery 2 | 128 | 0.39% | 3.8E-03 | 1.7E-02 |
| USS-Clairton-PA | Battery 3 | 128 | 0.35% | 3.4E-03 | 1.5E-02 |
| USS-Clairton-PA | Battery 13 | 122 | 0.52% | 4.8E-03 | 2.1E-02 |
| USS-Clairton-PA | Battery 14 | 122 | 0.53% | 4.9E-03 | 2.1E-02 |
| USS-Clairton-PA | Battery 153 | 122 | 0.39% | 3.6E-03 | 1.6E-02 |
| USS-Clairton-PA | Battery 19 | 174 | 0.58% | 7.6E-03 | 3.3E-02 |
| USS-Clairton-PA | Battery 20 | 174 | 0.62% | 8.0E-03 | 3.5E-02 |
| USS-Clairton-PA | B Battery | 150 | 0.27% | 3.1E-03 | 1.3E-02 |
| USS-Clairton-PA | C Battery | 84 | 0.095% | 6.0E-04 | 2.6E-03 |
| 1 From 2022 Coke 114 request.  2 COEofftakes = NO x (PLO/100) x (0.0075 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

3 USS-Clairton-PA Battery 15 was hot idled in 2021, values are from 2016.

**Table 41. Summary of By-Product Facility 2016 Coke 114 Request Method 303 Performance and COE Emissions Data**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Method 303 Parameters** | | **2016 Coke 114 Request Method 303 Data by ByP Facility1 and Process** | | | | | | | | |
| **ABC-Tarrant-AL** | **BLU-Birmingham-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **EES-RiverRouge-MI** | **USS-Clairton-PA** |
| Regulatory Track1 | | LAER | LAER | LAER | MACT | LAER | LAER | LAER | LAER | LAER |
| No. Batteries | | 3 | 3 | 4 | 1 | 2 | 2 | 1 | 1 | 10 |
| No. Ovens | | 132 | 120 | 224 | 76 | 164 | 56 | 85 | 85 | 708 |
| ***Charging*** | | | | | | | | | | |
| Seconds per Charge | Limit | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Facility Average | 4.1 | 4.0 | 6.6 | 5.8 | 9.3 | 6.3 | 3.5 | 1.3 | 7.5 |
| Facility Average as % of Limit | | 34% | 34% | 55% | 49% | 78% | 53% | 29% | 11% | 63% |
| COE Emissions (TPY) | | 0.058 | 0.056 | 0.068 | 0.089 | 0.33 | 0.078 | 0.049 | 0.026 | 1.1 |
| ***Doors*** | | | | | | | | | | |
| Percent Leaking | Limit | 4.0% | 4.0% | 3.3% | 3.3% | 4.0% | 3.3% | 3.3% | 4.0% | 4.0% |
| Door Type2 | foundry | foundry | all other3 | all other | tall | all other | all other | tall | tall |
| Facility Average | 0.8% | 1.4% | 0.4% | 1.7% | 2.3% | 0.8% | 1.7% | 0.02% | 0.5% |
| Facility Average as % of Limit | | 21% | 36% | 11% | 52% | 57% | 23% | 53% | 0.5% | 13% |
| COE Emissions (TPY)  Existing Equation | | 2.2 | 2.0 | 3.2 | 1.4 | 3.3 | 0.81 | 1.5 | 1.0 | 9.8 |
| COE Emissions (TPY)  New Equation | | 0.95 | 0.87 | 0.71 | 0.70 | 2.0 | 0.21 | 0.80 | 0.0084 | 2.0 |
| ***Lids*** | | | | | | | | | | |
| Percent Leaking | Limit | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% |
| Facility Average | 0.0% | 0.09% | 0.002% | 0.01% | 0.10% | 0.0% | 0.04% | 0.001% | 0.003% |
| Facility Average as % of Limit | | 0.0% | 22% | 0.6% | 1.3% | 25% | 0.0% | 10% | 0.2% | 0.8% |
| COE Emissions (TPY) | | 0 | 0.016 | 0.00095 | 0.00040 | 0.021 | 0 | 0.0032 | 0.000093 | 0.0030 |
| ***Offtakes*** | | | | | | | | | | |
| Percent Leaking | Limit | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% |
| Facility Average | 0.01% | 0.7% | 0.2% | 0.01% | 0.7% | 0.3% | 0.8% | 0.02% | 0.6% |
| Facility Average as % of Limit | | 0.4% | 27% | 10% | 0.6% | 26% | 14% | 32% | 1% | 24% |
| COE Emissions (TPY) | | 0.00077 | 0.028 | 0.049 | 0.00069 | 0.035 | 0.014 | 0.045 | 0.00084 | 0.29 |
| 1All facilities except AKS Middletown-OH are subject to the LAER 1/1/2010 limits. AKS Middletown-OH is subject to the MACT 7/2005 limits.  2Tall doors are doors greater than 6 meters (20 ft) in height. “All other” doors are either not tall or not at a foundry coke facility. HNR facilities are not permitted to have any leaking doors and do not have lids or offtakes.  3 Three of 4 batteries at AKS Follansbee WV are “all other” and the fourth battery is “tall.” | | | | | | | | | | |

**Table 42. Summary of By-Product Facility 2022 Coke 114 Request Method 303 Performance and COE Emissions Data**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Method 303 Parameters** | | **2022 Coke 114 Request Method 303 Data by ByP Facility1 and Process** | | | | | | | | |
| **ABC-Tarrant-AL** | **BLU-Birmingham-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **EES-RiverRouge-MI** | **USS-Clairton-PA** |
| Regulatory Track1 | | LAER | LAER | LAER | MACT | LAER | LAER | LAER | LAER | LAER |
| No. Batteries | | 3 | 3 | 4 | 1 | 2 | 2 | 1 | 1 | 10 |
| No. Ovens | | 132 | 120 | 224 | 76 | 164 | 56 | 85 | 85 | 708 |
| ***Charging*** | | | | | | | | | | |
| Seconds per Charge | Limit | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Facility Average | 4.7 | 4.0 | 6.6 | 5.8 | 8.4 | 4.4 | 4.5 | 1.8 | 2.4 |
| Facility Average as % of Limit | | 39% | 34% | 55% | 49% | 70% | 36% | 38% | 15% | 20% |
| COE Emissions (TPY) | | 0.070 | 0.056 | 0.068 | 0.089 | 0.29 | 0.056 | 0.074 | 0.035 | 0.29 |
| ***Doors*** | | | | | | | | | | |
| Percent Leaking | Limit | 4.0% | 4.0% | 3.3%/4.0%3 | 3.3% | 4.0% | 3.3% | 3.3% | 4.0% | 3.3/4.0%4 |
| Door Type2 | foundry | foundry | all other/tall3 | all other | tall | all other | all other | tall | all other/tall4 |
| Facility Average | 0.85% | 1.4% | 0.44% | 1.7% | 1.8% | 0.11% | 1.2% | 0.12% | 0.46% |
| Facility Average as % of Limit | | 21% | 36% | 13%/11%3 | 52% | 46% | 3.4% | 36% | 2.9% | 14%/11%4 |
| COE Emissions (TPY)  Existing Equation | | 2.3 | 2.0 | 3.2 | 1.4 | 3.0 | 0.70 | 1.4 | 1.1 | 9.7 |
| COE Emissions (TPY)  New Equation | | 1.0 | 0.87 | 0.71 | 0.70 | 1.6 | 0.031 | 0.54 | 0.053 | 1.7 |
| ***Lids*** | | | | | | | | | | |
| Percent Leaking | Limit | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% |
| Facility Average | 0.014% | 0.087% | 0.0023% | 0.053% | 0.075% | 0.0% | 0.084% | 0.013% | 0.0054% |
| Facility Average as % of Limit | | 3.5% | 22% | 0.57% | 1.3% | 19% | 0.0% | 21% | 3.3% | 1.4% |
| COE Emissions (TPY) | | 0.0032 | 0.016 | 0.00095 | 0.00040 | 0.019 | 0 | 0.0070 | 0.0015 | 0.0057 |
| ***Offtakes*** | | | | | | | | | | |
| Percent Leaking | Limit | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% | 2.5% |
| Facility Average | 0.0061% | 0.69% | 0.25% | 0.014% | 0.36% | 0.023% | 1.3% | 0.068% | 0.42% |
| Facility Average as % of Limit | | 0.25% | 27% | 9.9% | 0.56% | 14% | 0.91% | 52% | 2.7% | 17% |
| COE Emissions (TPY) | | 0.00020 | 0.028 | 0.049 | 0.00069 | 0.019 | 0.00084 | 0.072 | 0.0038 | 0.19 |
| 1All facilities except CC Middletown-OH are subject to the LAER 1/1/2010 limits. CC Middletown-OH is subject to the MACT Track RTR 7/2005 limits.  2Tall doors are doors greater than 6 meters (20 ft) in height. “All other” doors are either not tall or not at a foundry coke facility. HNR facilities are not permitted to have any leaking doors and do not have lids or offtakes.  3 Three of 4 batteries at CC Follansbee WV are “all other” with door limits of 3.3% and the fourth battery is “tall” with door limit of 4.0%. Data presented for both.  4 Eight of the 10 batteries at USS Clairton PA are “all other” with door limits of 3.3% and two batteries are “tall” with door limits of 4.0%. Data presented for both. | | | | | | | | | | |

### 4.2.4 2017 Noncategory Sources

For the noncategory sources of coke ByP chemical recovery plants and excess coke oven gas flares, 2017 NEI/EIS data were used to develop average industry default “surrogate” emission values per pollutant. The HNR facilities do not have ByP chemical recovery plants or excess coke oven gas flares.

For more information on the EPA inventories used to obtain noncategory data, see

<https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data>, <https://www.epa.gov/air-emissions-inventories/emissions-inventory-system-eis-gateway>.

For the ByP chemical recovery plant, the 2017 NEI/EIS data were compiled for applicable ByP chemical recovery plant emission sources, by facility. The industry provided updated emissions for the ByP chemical recovery plant sources, as applicable, during their review. All emissions from the individual sources in the ByP chemical recovery plant were summed to create a total for the plant per HAP. The average of each HAP was calculated to create a default facility total per HAP to be used for facilities that did not have reported HAP values. **Table 43** summarizes the ByP chemical plant facility and default emissions.

For excess coke oven gas flares, 2017 NEI/EIS emission data were compiled for these sources at coke facilities. Because not all the coke facilities had flare data available, the average flare emissions for each HAP in the available coke facility data in the 2017 NEI/EIS were calculated. For facilities with more than one available HAP value in the 2017 NEI/EIS, the average emissions for each HAP from flares for the facility were calculated. The overall average emissions across all coke facilities with flare data were calculated for each HAP to create a default flare emission rate for each HAP per flare. The default flare emissions per HAP per flare were used in the Coke Ovens Emission Database for flares that did not have reported HAP data. For coke facilities with 2017 NEI/EIS HAP data for flare units, the facility flare data was used as reported. For mercury emissions from flares, the same Hg speciation factors were used for noncategory flare sources as were used for PQBS sources, as described above in **Section 2.5**. **Table 44** summarizes the flare emissions per facility and default emissions.

For the other miscellaneous units not related to coke manufacturing (*e.g.*, process heaters, metal finishing, steel pickling, annealing furnaces, coating line pot heaters, reheat furnaces, thermal coal dryers, etc.), the 2017 NEI/EIS data were compiled and used as the actual emissions for these sources at coke facilities. See **Appendix B** and **C** for the other miscellaneous coke sources included in the Coke Oven Emissions Database and Coke Oven Risk Modeling Database.

### 4.2.5 Co-located II&S sources

The CC-BurnsHarbor-IN, CC-Middletown-OH, and SC-EastChicago-IN coke facilities are co-located with the ArcelorMittal, Burns Harbor, IN; AK Steel Middletown, OH; and ArcelorMittal Indiana Harbor, East Chicago, IN II&S facilities, respectively. However, the ArcelorMittal Indiana Harbor, East Chicago, IN II&S facility has separate ownership from the co-located SunCoke Indiana Harbor Coke, East Chicago, IN, coke facility so is not included in this analysis. For the other co-located II&S sources, the actual emissions developed

**Table 43. Noncategory Actual Emissions: By-Product Chemical Plant Facility and Default Emissions**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HAP** | **Industry Average (Default) (TPY)** | **Facility Emissions (TPY)** | | | | | | | | |
| **ABC-Tarrant-AL** | **BLU-Birmingham-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **EES-RiverRouge-MI** | **USS-Clairton-PA** |
| Anthracene | 5.19E-03 | 2.00E-04 | 1.30E-03 | 2.29E-02 | 6.00E-03 | 5.19E-031 | 5.19E-031 | 4.96E-03 | 7.79E-09 | 1.00E-03 |
| Benzene | 1.04E+00 | 1.30E+00 | 3.76E-01 | 1.25E+00 | 9.55E-01 | 1.67E-01 | 7.90E-01 | 2.44E+00 | 7.22E-01 | 1.34E+00 |
| Benzo[a]Pyrene | 4.93E-04 | 4.93E-041 | 4.93E-041 | 6.07E-05 | 4.93E-041 | 4.93E-041 | 4.93E-041 | 1.71E-05 | 4.93E-041 | 1.40E-03 |
| Biphenyl | 3.40E-03 | 3.40E-031 | 3.40E-031 | 3.40E-031 | 3.40E-031 | 6.60E-03 | 3.40E-031 | 3.40E-031 | 3.40E-031 | 2.00E-04 |
| Cresol/Cresylic Acid2 | 3.85E-02 | 4.00E-03 | 9.05E-02 | 6.57E-02 | 3.21E-02 | 3.85E-021 | 3.85E-021 | 3.85E-021 | 3.85E-021 | 2.00E-04 |
| Cyanide | 7.73E-01 | 4.21E-01 | 1.85E-01 | 2.02E-01 | 1.10E-01 | 9.36E-01 | 1.74E-01 | 2.45E-01 | 4.12E-01 | 4.27E+00 |
| Dibenzofuran | 4.20E-03 | 1.60E-03 | 3.00E-04 | 5.66E-03 | 2.76E-03 | 1.97E-02 | 2.10E-04 | 4.20E-031 | 2.16E-03 | 1.20E-03 |
| Ethyl Benzene | 5.88E-03 | 3.00E-04 | 2.30E-03 | 5.88E-031 | 5.88E-031 | 6.60E-03 | 5.88E-031 | 5.88E-031 | 5.88E-031 | 1.43E-02 |
| Hydrochloric Acid | 1.77E+00 | 8.63E-01 | 5.33E-01 | 5.95E-01 | 3.24E-01 | 2.73E+00 | 5.12E-01 | 7.23E-01 | 1.21E+00 | 8.43E+00 |
| Naphthalene | 3.66E-01 | 2.50E-01 | 1.36E-01 | 1.75E+00 | 2.18E-01 | 1.32E-01 | 2.04E-01 | 4.32E-01 | 1.36E-01 | 4.02E-02 |
| PAH, total3 | 3.46E-02 | 7.10E-03 | 9.80E-03 | 1.54E-01 | 3.66E-02 | 3.46E-021 | 5.44E-03 | 4.50E-02 | 9.53E-03 | 8.80E-03 |
| Phenol | 1.11E+00 | 8.25E-02 | 6.05E-01 | 1.44E-01 | 3.53E-02 | 3.82E-02 | 1.63E-02 | 2.58E-02 | 1.32E-01 | 8.87E+00 |
| Quinoline | 2.36E-03 | 2.36E-031 | 2.36E-031 | 2.36E-031 | 2.36E-031 | 6.50E-03 | 5.20E-04 | 2.36E-031 | 7.48E-05 | 2.36E-031 |
| Styrene | 1.84E-02 | 1.13E-02 | 7.00E-03 | 7.91E-02 | 3.86E-02 | 1.52E-02 | 2.70E-04 | 3.13E-03 | 8.25E-03 | 2.60E-03 |
| Toluene | 1.61E-01 | 1.63E-01 | 8.47E-02 | 2.57E-01 | 1.70E-01 | 8.50E-03 | 6.43E-03 | 3.41E-01 | 7.32E-02 | 3.43E-01 |
| Xylenes2 | 4.73E-02 | 2.88E-02 | 1.77E-02 | 1.05E-01 | 4.39E-02 | 6.00E-03 | 5.20E-04 | 1.05E-01 | 1.09E-02 | 1.08E-01 |

1 Indicates default values developed from the average of facility-level industry data (shown in the first data column).

2 Includes mixed isomers.

3 Although naphthalene is also a PAH, naphthalene is listed separately here because it is a separately CAA-listed HAP.

**Table 44. Noncategory Actual Emissions: Flare Emissions by Facility and Default Emissions**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HAP** | **Industry Average (Default) (TPY)** | **Flare Emissions per Facility(TPY)** | | | | | | | |
| **ABC-Tarrant-AL** | **BLU-Birmingham-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **EES-RiverRouge-MI** |
| 1,3-Butadiene | 2.26E-01 | 2.26E-01 | 2.26E-011 | 2.26E-011 | 2.26E-011 | 2.26E-011 | 2.26E-011 | 2.26E-011 | 2.26E-011 |
| Benzene | 7.12E-01 | 8.28E-01 | 2.91E-01 | 4.20E-01 | 7.12E-011 | 7.12E-011 | 1.52E+00 | 7.12E-011 | 7.12E-011 |
| Carbon disulfide | 8.84E-03 | 8.84E-03 | 8.84E-031 | 8.84E-031 | 8.84E-031 | 8.84E-031 | 8.84E-031 | 8.84E-031 | 8.84E-031 |
| Cyanide | 2.17E-02 | 2.17E-021 | 2.17E-02 | 2.17E-021 | 2.17E-021 | 2.17E-021 | 2.17E-021 | 2.17E-021 | 2.17E-021 |
| Lead | 5.50E-03 | 5.50E-031 | 5.50E-031 | 5.50E-031 | 5.50E-031 | 5.50E-031 | 5.50E-031 | 5.50E-031 | 5.50E-03 |
| Total Mercury2 | 2.43E-04 | 2.43E-041 | 2.43E-041 | 4.85E-04 | 2.43E-041 | 2.43E-041 | 2.43E-041 | 2.43E-041 | 2.43E-041 |
| Elemental gaseous Hg |  | 1.94E-041 | 1.94E-041 | 3.88E-04 | 1.94E-041 | 1.94E-041 | 1.94E-041 | 1.94E-041 | 1.94E-041 |
| Gaseous divalent Hg |  | 3.64E-051 | 3.64E-051 | 7.28E-05 | 3.64E-051 | 3.64E-051 | 3.64E-051 | 3.64E-051 | 3.64E-051 |
| Particulate divalent Hg |  | 1.21E-051 | 1.21E-051 | 2.43E-05 | 1.21E-051 | 1.21E-051 | 1.21E-051 | 1.21E-051 | 1.21E-051 |
| Methyl chloride | 3.09E-01 | 3.09E-011 | 3.09E-011 | 3.09E-01 | 3.09E-011 | 3.09E-011 | 3.09E-011 | 3.09E-011 | 3.09E-011 |
| Naphthalene | 7.34E-02 | 7.34E-021 | 7.34E-02 | 7.34E-021 | 7.34E-021 | 7.34E-021 | 7.34E-021 | 7.34E-021 | 7.34E-021 |
| Phenol | 1.43E-04 | 1.43E-041 | 1.43E-041 | 1.43E-04 | 1.43E-041 | 1.43E-041 | 1.43E-041 | 1.43E-041 | 1.43E-041 |
| Styrene | 1.42E-02 | 1.42E-02 | 1.42E-021 | 1.42E-021 | 1.42E-021 | 1.42E-021 | 1.42E-021 | 1.42E-021 | 1.42E-021 |
| Toluene | 1.27E-01 | 1.38E-01 | 2.42E-02 | 1.85E-01 | 1.27E-011 | 1.27E-011 | 1.60E-01 | 1.27E-011 | 1.27E-011 |
| Xylenes3 | 2.56E-02 | 6.29E-02 | 3.88E-03 | 2.56E-021 | 2.56E-021 | 2.56E-021 | 1.00E-02 | 2.56E-021 | 2.56E-021 |

1Indicates default value developed by HAP from average of industry data from the 2017 NEI/EIS used for the facility values.

2 Provided for information purposes, only.

3 Mixed isomers.

## for II&S RTR modeling file were used in the Coke Emissions Database. See Appendix B and C for the co-located II&S sources included in the Coke Oven Emissions Database and Coke Oven Risk Modeling Database.

## 4.3 Opacity Data

As discussed in **Section 2.2**, the pushing, battery combustion, boiler, HRSG Main, HRSG bypass/waste heat, and HNR charging stacks and quench towers were required to conduct opacity observations for the 2016 and 2022 Coke 114 request. **Table 45** summarizes the average opacity observations for those sources.

**Table 45. Opacity Data for Pushing and Battery Combustion Stacks**

| **Facility ID** | **Unit ID** | **Test Method** | **Average Opacity %** |
| --- | --- | --- | --- |
| **ByP Battery Combustion Stack1** | | | |
| CC-Middletown-OH | Battery Combustion Stack | COMs | 7.4 |
| USS-Clairton-PA | Battery B Stack (S012) | COMs | <1 |
| CC-Burnsharbor-IN | Coke Battery No. 2 Underfire Stack | COMs | 3.7 |
| CC-Monessen-PA | Battery Combustion Stack #2 | EPA Method 9 | <1 |
| EC-Erie-PA | Battery Combustion Stack (805) | EPA Method 9 | 3.6 |
| **ByP and HNR Pushing2** | | | |
| CC-Middletown-OH | Pushing Baghouse | EPA Method 9 | 4.8 |
| CC-Burnsharbor-IN | #2 Battery Pushing Baghouse | EPA Method 9 | <1 |
| CC-Monessen-PA | Pushing Baghouse Stack | EPA Method 9 | 0 |
| EC-Erie-PA | Coke-Side Shed Baghouse 802 | EPA Method 9 | 0 |
| SC-Middletown-OH | Flat Push Hot Car | EPA Method 9 | 4.2 |
| **Boiler Stack** | | | |
| CC-Monessen-PA | Tampella Boilers / 032 | EPA Method 9 | <1 |
| EC-Erie-PA | Boiler #1 Stack | EPA Method 9 | 0 |
| **HRSG Main Stack** | | | |
| SC-Middletown-OH | P901- Coke Oven (Battery A-C) – Main Stack | EPA Method 9 | 0 |
| CE-IndianaHarbor-IN |  |  |  |
| **HRSG Bypass/Waste Heat Stack** | | | |
| SC-GraniteCity-IL | Coke Oven Battery C - Bypass Vent 5 | EPA Method 9 | 0 |
| SC-FranklinFurnace-OH | Bypass Vent Stack #6 | EPA Method 9 | 5.6 |
| **HNR Charging** | | | |
| SC-Middletown-OH | Pushing/Charging Machine (PCM) | EPA Method 9 | 2.0 |
| **Quench Tower** | | | |
| CC-Monessen-PA | Quench Tower | EPA Method 9 | <1 |

1 Of the 19 operating byproduct batteries at six facilities, 11 batteries are operating under normal coking and 8 batteries are operating under extended coking. Current battery stack opacity limits are: daily average of 15 percent opacity for a battery on a normal coking cycle and daily average of 20 percent opacity for a battery on batterywide extended coking.

2 Of the 19 operating byproduct batteries at six facilities, 5 batteries are short and 14 batteries are tall. Current by-product coke oven battery with vertical flues are: average opacity for any individual push is 30 percent opacity for any short battery or 35 percent opacity for any tall battery.

## 4.4 Allowable HAP Emissions for Coke PQBS and Noncategory Sources

“Allowable” emissions are the maximum emissions that a facility or unit could emit under the current applicable rule. For Coke PQBS sources (ByP pushing (CD), HNR pushing (CD), and fugitive pushing, the allowable HAP emissions were developed from the ratio of the PM standards to actual estimated PM emissions. For the ByP battery stack, the ratio of the opacity limits (§63.7296(a) and (b)) to opacity test data for each unit were used to develop allowable-to-actual ratios for battery stacks to estimate allowable HAP emissions. For quench towers, the ratios of the quench tower limit (§63.7295(a)(i)), expressed as the concentration of total dissolved solids (TDS) in the water (1,100 mg/L), to TDS test data from the 2016 Coke 114 request were used to develop allowable-to-actual emission ratios for each unit tested. For HRSG main stacks and HRSG bypass/waste heat stacks, allowable HAP emissions were set equal to actual HAP emissions because the Coke PQBS rule does not have HAP limits for these sources.

For the noncategory sources regulated under Coke Ovens subpart L (HNR charging and ByP charging, doors, lids, and offtakes, the Coke Ovens subpart L standards were used to develop allowable emissions of COE. For other noncategory sources (ByP chemical plant, flares, and “other source” process units), allowable HAP emissions were set equal to actual emissions. For ByP boiler stacks, the 2015 annual potential boiler usage (mmscf/yr) data (COETF, 2021b) were used to develop allowable HAP emissions for boilers. For co-located II&S sources, allowable HAP emissions developed for II&S RTR modeling were used.

The following sections describe the methodology used to estimate allowable HAP emissions for category and noncategory sources at PQBS Coke facilities. All allowable emission calculations and supporting files are included in **Appendix B.** See **Appendices B and C** for lists of the allowable HAP emissions in the Coke Oven Emissions and Risk Modeling Databases, respectively.

### 4.4.1 ByP Pushing (CD) and HNR Pushing (CD)

**Table 46** lists the type of pushing capture and control equipment used at the coke facilities. The pushing capture and controls were used to identify the applicable PM limit, to develop capture and control emissions estimates per push, and to calculate the allowable-to-actual PM and HAP ratios.

**Table 46. Pushing Capture and Controls at Coke Facilities**

| **Facility Name** | **City** | **State** | **Pushing Capture1** | **Pushing Controls2** | |
| --- | --- | --- | --- | --- | --- |
| ABC Coke | Tarrant | AL | hood, duct | stationary | 3 FF |
| Bluestone | Birmingham | AL | hood, duct | stationary | FF |
| Cleveland Cliffs | Follansbee | WV | hood, duct, guide; guide & shed | stationary | wet scrubber; FF |
| Cleveland Cliffs | Middletown | OH | hood, duct, guide | stationary | FF |
| Cleveland Cliffs Monessen | Monessen | PA | hood, duct, guide | stationary | FF |
| Cleveland Cliffs Burns Harbor | Burns Harbor | IN | hood, duct, guide | stationary | 2 FF |
| Cleveland Cliffs Warren | Warren | OH | guide, intake flow3 | mobile | wet scrubber car |
| EES Coke Battery | Detroit | MI | hood, duct, guide | stationary | FF |
| SunCoke Gateway Energy & Coke | Granite City | IL | hood, duct | mobile | multicyclone car |
| SunCoke Haverhill North Coke | Franklin Furnace | OH | hood, duct | mobile | multicyclone car |
| SunCoke Indiana Harbor Coke | East Chicago | IN | Hood | stationary | FF |
| SunCoke Jewell Coke and Coal | Vansant | VA | Shed | stationary | Shed, total enclosure |
| SunCoke Middletown Coke | Middletown | OH | hood, duct | mobile | multicyclone car |
| U.S. Steel Clairton Works | Clairton | PA | hood & duct; shed | stationary | 5 FF |

1 Moveable hood (hood), belt-sealed duct (duct), cokeside shed (shed), or enclosed coke guide (guide).

2 FF = fabric filter (baghouse).

3 Chemico™ System. *Envirotech/Chemico Pushing Emissions Control System Analysis Fina I Report*. EPA-340/ 1-83-019. Stationary Source Compliance Series. Office of Air Quality, Planning and Standards, Environmental Protection Agency, Washington DC 20460. April 1983.

The ratios of the Coke PQBS PM limits for pushing (§63.7290(a)) per category (as applicable) to the pushing PM test data from the 2016 Coke 114 request were used to develop allowable-to-actual ratios to estimate allowable HAP emissions for pushing units with test data. An average allowable-to-actual ratio was developed for each pushing category where multiple test data were available. The average allowable-to-actual ratios were used to assign default ratios for pushing categories to estimate allowable HAP emissions for facilities without HAP test data. **Table 47** summarizes the allowable-to-actual ratios calculated from PM test data and the average allowable-to-actual PM ratios used as default values, where appropriate.

**Table 47. Allowables-to-Actuals Ratios for Pushing Units with PM Test Data**

| **Facility and Unit ID** | **Pushing Category** | **Type of Coke** | **Coke PQBS**  **Pushing Limit** | **PM**  **Test Data** | **Limit and Data UOM** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- | --- | --- | --- |
| CC-Middletown-OH  Pushing Baghouse | Moveable shed/ hood&CD \_ | BF | 0.02 | 0.0035 | lb PM/ton Coke | 5.7 |
| CC-BurnsHarbor-IN  #2 Battery Pushing Baghouse | Moveable shed/ hood&CD | BF | 0.02 | 0.0022 | lb PM/ton Coke | 8.9 |
| CC-Monessen-PA  Pushing Baghouse Stack | Moveable shed/ hood&CD | BF | 0.02 | 0.0017 | lb PM/ton Coke | 11.6 |
|  | ***Average Moveable Shed/hood&CD – BF*** | | | |  | **8.7** |
| EC-Erie-PA  Coke-Side Shed Baghouse 802 | Cokeside shed  vented to CD | Foundry | 0.01 | 0.0010 | gr PM/ dscf | 9.8 |
|  | ***Average Cokeside Shed Vented to CD*** | | | |  | **9.8** |
| SC-GraniteCity-IL  Flat Push Hot Car | Mobile scrubber car Mobile CD | BF | 0.04 | 0.0530 | lb PM/ ton Coke | 0.8 |
| SC-Middletown-OH  Flat Push Hot Car | Mobile scrubber car Mobile CD | BF | 0.04 | 0.0262 | lb PM/ton Coke | 1.5 |
|  | ***Average Mobile scrubber car Mobile CD – BF*** | | | |  | **1.1** |

**Table 48** summarizes the allowable-to-actual ratios derived from either PM test data or the default ratios that were used to estimate allowable HAP emissions for the pushing categories.

**Table 48. Default Allowables-to-Actuals Ratios for Pushing**

| **Pushing Category and Type of Coke** | **Basis for Ratio** | **Ratio Allowable-to-Actual** |
| --- | --- | --- |
| Cokeside shed vented to CD foundry | limit / PM test data | 9.8 |
| Cokeside shed vented to CD blast furnace | default from foundry coke CD | 9.8 |
| Cokeside total enclosure shed (CD) blast furnace | default from foundry coke CD | 9.8 |
| Mobile scrubber car - Mobile CD blast furnace | limit / PM test data | 1.1 |
| Mobile scrubber car - Short battery blast furnace | default from mobile CD | 1.1 |
| Moveable shed/hood&CD blast furnace | limit / PM test data | 8.7 |
| Moveable shed/hood&CD foundry | default from blast furnace coke | 8.7 |

The allowable-to-actual PM ratios used for all coke oven units (based on either PM test data or default allowable-to-actual ratios) for calculating allowable HAP emissions from actual emissions for each pushing source are shown in **Table 49**. The same allowable-to-actual ratios developed for the pushing CD units were used to estimate fugitive pushing allowable HAP emissions from actual PM and HAP data.

**Table 49. Allowables-to-Actuals Ratios for Pushing Units (CD and Fugitive Emissions)**

| **Facility ID** | **Emission Unit(s)** | **Ratio**  **Allowable-to-Actual** |
| --- | --- | --- |
| ABC-Tarrant-AL | pushing for batteries 1, 5, 6 | 8.7 |
| BLU-Birmingham-AL | pushing for batteries 3, 4 ,5 | 8.7 |
| CC-Follansbee-WV | pushing for batteries 1, 2, 3 | 9.8 |
| CC-Follansbee-WV | pushing for battery 8 | 8.7 |
| CC-Middletown-OH | pushing for Wilputte coke oven battery | 5.7 |
| CC-BurnsHarbor-IN | pushing for battery 1 | 8.7 |
| CC-BurnsHarbor-IN | pushing for battery 2 | 8.9 |
| CC-Monessen-PA | pushing for batteries 1b, 2 | 11.6 |
| CC-Warren-OH | pushing for battery 4 | 1.1 |
| EES-RiverRouge-MI | pushing for battery 5 | 8.7 |
| SC-EastChicago-IN | pushing for batteries A, B, C, D | 8.7 |
| SC-FranklinFurnace-OH | pushing for batteries A, B, C, D | 1.1 |
| SC-GraniteCity-IL | pushing for batteries A, B, C | 0.8 |
| SC-Middletown-OH | pushing for batteries A, B, C | 1.5 |
| SC-Vansant-VA | pushing for batteries 2d, 2e, 3b, 3c, 3f, 3g | 9.8 |
| USS-Clairton-PA | pushing for batteries 1, 2, 3, 13, 14, 15, 19, 20, B, C | 8.7 |

### 4.4.2 EP-10 Quench Tower

The ratios of the quench tower limit (§63.7295(a)(i)), expressed as the concentration of total dissolved solids (TDS) in the water (1,100 mg/L), to TDS test data from the 2016 Coke 114 request were used to develop allowable-to-actual emission ratios for each unit tested. **Table 50** summarizes the allowable-to-actual ratios calculated for units with TDS test data . The average of the ratios was used as a default allowable-to-actual ratio for facilities that did not test. **Table 51** summarizes the allowable-to-actual ratios used to estimate allowable HAP emissions for all quench tower units.

**Table 50. Allowables-to-Actuals Ratios for Quench Towers with TDS Test Data**

| **Facility ID** | **Emission Unit(s)** | **Type of Facility** | **Type of Coke** | **TDS Average (mg/L)** | **TDS Limit (mg/L)** | **Ratio**  **Allowable-to-Actual** | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CC-Middletown-OH | quench tower / p043 | ByP | blast furnace | 948 | 1,100 | 1.2 | |
| CC-Monessen-PA | quench tower | ByP | blast furnace | 467 | 1,100 | 2.4 | |
| EC-Erie-PA | quench tower | ByP | foundry | 274 | 1,100 | 4.0 | |
| SC-Middletown-OH | quench tower | HNR | blast furnace | 428 | 1,100 | 2.6 | |
| USS-Clairton-PA | quench tower / 7a | ByP | blast furnace | 506 | 1,100 | 2.2 | |
| ***Quench Tower Default Allowable-to-Actual Ratio*** | | | | | | | **2.5** |

**Table 51. Allowables-to-Actuals Ratios for All Quench Tower Units**

| **Facility ID** | **Emission Unit(s)** | **Basis for Ratio** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- |
| ABC-Tarrant-AL | north and south quench towers | default | 2.5 |
| CC-Follansbee-WV | quench tower batteries 1-2-3; N&S quench towers battery #8 | default | 2.5 |
| CC-Middletown-OH | Wilputte coke oven quench tower p043 | limit/TDS test data | 1.2 |
| CC-BurnsHarbor-IN | quench #1 and #2 | default | 2.5 |
| CC-Monessen-PA | quench tower pro 803 | limit/TDS test data | 2.4 |
| CC-Warren-OH | quench tower with baffles p001 | default | 2.5 |
| BLU-Birmingham-AL | north and south coke quenching towers | default | 2.5 |
| EES-RiverRouge-MI | quench tower | default | 2.5 |
| SC-EastChicago-IN | quenching 206 and 207 | default | 2.5 |
| SC-FranklinFurnace-OH | quench tower AB and CD | default | 2.5 |
| SC-GraniteCity-IL | quench tower (battery A-C) | default | 2.5 |
| SC-Middletown-OH | quench tower stack (battery A-C) | limit / TDS test data | 2.6 |
| SC-Vansant-VA | s-21 & 22 coke quenching | default | 2.5 |
| USS-Clairton-PA | quench tower no. 1 (serves batteries 1, 2 and 3);  quench tower no. 5 (serves batteries 13, 14 & 15);  quench tower no. 5a/6 (alternate-serves batteries 13, 14 & 15);  quench tower no. 7 (serves batteries 19 & 20);  quench towers b and c | default | 2.5 |
| quench tower no. 7A/8 (alternate-serves batteries 19 & 20) | limit / TDS test data | 2.2 |

### 4.4.3 EP-3 ByP Battery (Combustion) Stack

The ratio of the opacity limits (§63.7296(a) and (b)) to opacity test data for each unit were used to develop allowable-to-actual ratios for battery stacks to estimate allowable HAP emissions. **Table 52** shows the allowable-to-actual ratios calculated from units with 2016 Coke 114 request opacity test data. The averages of the allowable-to actual ratios for each type of battery stack were used as default ratios for facilities that did not test. **Table 53** shows the default allowable-to-actual ratios for battery stacks, by coke and process type, that were developed from test data . **Table 54** shows the allowable-to actual ratios for all battery stack units.

**Table 52. Allowables-to-Actuals Ratios for Battery Stack Units with Opacity Test Data**

| **Facility ID** | **Unit ID** | **Type of Coke** | **Average Opacity (percent)** | **Normal / Extended Coking** | **Opacity Limit (percent)** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- | --- | --- | --- |
| CC-Middletown-OH | Battery Combustion Stack | BF | 7.4 | Extended | 20 | 2.7 |
| USS-Clairton-PA | Battery B Stack (S012) | BF | <1 | Extended | 20 | 20 |
| ***Average for Blast Furnace Coke – Extended Coking*** | | | | | | **11** |
| CC-BurnsHarbor-IN | Coke Battery No. 2 Underfire Stack | BF | 3.7 | Normal | 15 | 4.0 |
| CC-Monessen-PA | Battery Combustion Stack #2 | BF | <1 | Normal | 15 | 15 |
| ***Average for Blast Furnace Coke – Normal Coking*** | | | | | | **9.5** |
| CC-Middletown-OH | Battery Combustion Stack | BF | 7.4 | Extended | 20 | 2.7 |
| USS-Clairton-PA | Battery B Stack (S012) | BF | <1 | Extended | 20 | 20 |
| CC-BurnsHarbor-IN | Coke Battery No. 2 Underfire Stack | BF | 3.7 | Normal | 15 | 4.0 |
| CC-Monessen-PA | Battery Combustion Stack #2 | BF | <1 | Normal | 15 | 15 |
| ***Average for Blast Furnace Coke – Both: Extended & Normal Coking*** | | | | | | **10** |
| EC-Erie-PA | Battery Combustion Stack (805) | Foundry | 3.6 | Extended | 20 | 5.6 |
| ***Average for Foundry Coke – Extended Coking*** | | | | | | **5.6** |

**Table 53. Default Allowables-to-Actuals Ratios for Battery Stack Units**

**by Coking Status and Type of Coke Produced**

| **Type of Coke** | **Normal / Extended Coking** | **Ratio**  **Allowable-to-Actual** |
| --- | --- | --- |
| Blast Furnace | Extended | 11 |
| Blast Furnace | Normal | 9.5 |
| Blast Furnace | Both | 10 |
| Foundry | Extended | 5.6 |

**Table 54. Allowables-to-Actuals Ratios for Battery Stack Units**

| **Facility ID** | **Emission Unit(s)** | **Type of Coke** | **Basis for Ratio** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Underfiring Stack #1, serving Battery #1;  Underfiring Stack #4, serving Batteries #5 & #6 | Foundry | Default | 5.6 |
| BLU-Birmingham-AL | Underfiring Stack of Coke Batteries No. 3, 4, 5 | Foundry | default | 5.6 |
| CC-Follansbee-WV | Underfire Stack Battery #1,2,3,8 (Stack 01, 02, 03, 04) | Blast furnace | Default | 11 |
| CC-Middletown-OH | Wilputte Coke Oven Battery – B918-0 Combustion Stack | Blast furnace | limit/opacity data | 2.7 |
| CC-BurnsHarbor-IN | EU512-08 battery #1 underfire | Blast furnace | Default | 9.5 |
| EU512-16 battery #2 underfire | Blast furnace | limit/opacity data | 4.0 |
| CC-Monessen-PA | Coke Oven Battery 1B Underfiring (Combustion Stack) | Blast furnace | default | 9.5 |
| Coke Oven Battery 2 Underfiring (Combustion Stack) | Blast furnace | limit/opacity data | 15.0 |
| CC-Warren-OH | No. 4 Coke oven battery - Oven Underfiring | Blast furnace | default | 10 |
| EES-RiverRouge-MI | Battery Heating Stack | Blast furnace | default | 11 |
| USS-Clairton-PA | Coke Oven Battery 1, 2, 3, 13, 14, 15, 19, 20, C Underfiring; | Blast furnace | default | 11 |
| Coke Oven B Battery Underfiring | Blast furnace | limit/opacity data | 20 |

### 4.4.4 EP-8 HNR Charging (CD)

The ratio of the HNR PM charging limit to charging PM test data was used to develop an allowable-to-actual ratio for HNR charging for the facilities with test data. The average of these ratios was used for HNR charging units that were not tested. **Table 55** shows the allowable-to-actual ratios for each unit with test data. The average of the allowable-to-actual ratios was used as a default ratio for facilities that did not test.

**Table 55. Allowables-to-Actuals Ratios for HNR Charging (with PM Test Data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Facility ID** | **Run** | **Emission Factor (lb PM/ton**  **wet coal charged during test)** | **Ratio Wet Coal to Dry Coal** | **Emission Factor**  **(lb PM/ton dry coal charged during test))** | **Charging Limit (lb PM/ ton of dry coal charged)** | **Ratio Allowable-to-Actual** |
| SC-Middletown-OH | 4 | 0.0025 | 1.1 | 0.0027 | 0.0081 |  |
| SC-Middletown-OH | 5 | 0.0028 | 1.1 | 0.0030 | 0.0081 |  |
| SC-Middletown-OH | 6 | 0.0030 | 1.1 | 0.0033 | 0.0081 |  |
| ***Average for HNR Charging*** | | | | | | 2.7 |

**Table 56** shows the allowable-to-actual ratios for all HNR charging units. For the Vansant, SC, the allowable HAP emissions were set equal to the actual HAP emissions because this facility, an existing source in 2005, was not subject to the new source MACT limit established in 2005 (70 FR 19992).

**Table 56. Allowables-to-Actuals Ratios for HNR Charging Units**

| **Facility ID** | **Process Unit** | **Basis for Ratio** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- |
| SC-EastChicago-IN | Batteries A, B, C, D | default | 2.7 |
| SC-FranklinFurnace-OH | Batteries A&B and C&D | default | 2.7 |
| SC-GraniteCity-IL | Batteries A&B&C | default | 2.7 |
| SC-Middletown-OH | Batteries A&B&C | limit / PM data | 2.7 |
| SC-Vansant-VA | Battery 2D, 2E, 3B, 3C, 3F, 3G | Allowables = Actuals | 1.0 |

### 4.4.5 ByP Charging, Doors, Lids, and Offtakes

For ByP charging, and leaking doors, lids, and offtakes sources, the BSO estimating procedures from AP-42 (EPA, 2001b) were used to calculate COE for both actuals and allowables. **Tables 57-60** summarize the limits that were used to calculate allowable COE emissions for charging, doors, lids, and offtakes.

**Table 57. ByP Charging Limits**

| **Facility ID** | **Battery ID** | **Type of Coke** | **Charging (s/charge)1** | **Limit per Regulatory Track** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1,5,6 | Foundry | 12.00 | LAER Track Jan 1, 2010 Limits |
| BLU-Birmingham-AL | Coke Battery No. 3,4,5 | Foundry | 12.00 | LAER Track Jan 1, 2010 Limits |
| CC-Follansbee-WV | No. 1,2,3,8 Battery | BF | 12.00 | LAER Track Jan 1, 2010 Limits |
| CC-Middletown-OH | Coke Oven Battery | BF | 12.00 | MACT Track July 14, 2005 Limits |
| CC-BurnsHarbor-IN | Battery #1,2 | BF | 12.00 | LAER Track Jan 1, 2010 Limits |
| CC-Monessen-PA | Battery 1B,2 | BF | 12.00 | LAER Track Jan 1, 2010 Limits |
| CC-Warren-OH | No. 4 Battery | BF | 12.00 | LAER Track Jan 1, 2010 Limits |
| EES-RiverRouge-MI | Coke Battery #5 | BF | 12.00 | LAER Track Jan 1, 2010 Limits |
| USS-Clairton-PA | Battery 1,2,3,13,14,15,18,20,B,C | BF | 12.00 | LAER Track Jan 1, 2010 Limits |

Note:s/charge = seconds of visible emissions per charge of coal into the oven

**Table 58. ByP Door Leak Limits**

| **Facility ID** | **Battery ID** | **Type of Coke** | **Limit for Percent Leaking Doors** | **Regulatory Track1,2,3**  **forLimit** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1,5,6 | Foundry | 4.0 | LAER Track Jan 1, 2010 Limits - Foundry |
| BLU-Birmingham-AL | Coke Battery No. 3,4,5 | Foundry | 4.0 | LAER Track Jan 1, 2010 Limits - Foundry |
| CC-Follansbee-WV | No. 1, 2 ,3 Battery | BF | 3.3 | LAER Track Jan 1, 2010 Limits - All other |
| No. 8 Battery | BF | 4.0 | LAER Track Jan 1, 2010 Limits - Tall |
| CC-Middletown-OH | Coke Oven Battery | BF | 3.3 | MACT Track July 14, 2005 Limits - All other |
| CC-BurnsHarbor-IN | Battery #1,2 | BF | 4.0 | LAER Track Jan 1, 2010 Limits - Tall |
| CC-Monessen-PA | Battery 1B,2 | BF | 3.3 | LAER Track Jan 1, 2010 Limits - All other |
| CC-Warren-OH | No. 4 Battery | BF | 3.3 | LAER Track Jan 1, 2010 Limits - All other |
| EES-RiverRouge-MI | Coke Battery #5 | BF | 4.0 | LAER Track Jan 1, 2010 Limits - Tall |
| USS-Clairton-PA | Battery 1,2,3,13,14,15,19,20 | BF | 3.3 | LAER Track Jan 1, 2010 Limits - All other |
|  | Battery B,C | BF | 4.0 | LAER Track Jan 1, 2010 Limits - Tall |

1 Tall = doors six meters or more in height.

2 All other = all doors except for tall doors and foundry doors, *i.e.*, doors less than 6 meters on ovens that produce blast furnace coke.

3 Foundry = doors on ovens producing foundry coke.

**Table 59. ByP Lid Leak Limits**

| **Facility ID** | **Battery ID** | **Type of Coke** | **Limit for Percent Leaking Lids** | **Regulatory Track**  **for Limit** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1,5,6 | Foundry | 0.4 | LAER Track Jan 1, 2010 Limits |
| BLU-Birmingham-AL | Coke Battery No. 3,4,5 | Foundry | 0.4 | LAER Track Jan 1, 2010 Limits |
| CC-Follansbee-WV | No. 1,2,3,8 Battery | BF | 0.4 | LAER Track Jan 1, 2010 Limits |
| CC-Middletown-OH | Coke Oven Battery | BF | 0.4 | MACT Track July 14, 2005 Limits |
| CC-BurnsHarbor-IN | Battery #1,2 | BF | 0.4 | LAER Track Jan 1, 2010 Limits |
| CC-Monessen-PA | Battery 1B,2 | BF | 0.4 | LAER Track Jan 1, 2010 Limits |
| CC-Warren-OH | No. 4 Battery | BF | 0.4 | LAER Track Jan 1, 2010 Limits |
| EES-RiverRouge-MI | Coke Battery #5 | BF | 0.4 | LAER Track Jan 1, 2010 Limits |
| USS-Clairton-PA | Battery 1,2,3,13,14,15,19,20,B,C | BF | 0.4 | LAER Track Jan 1, 2010 Limits |

**Table 60. Offtake Leak Limits**

| **Facility ID** | **Battery ID** | **Type of Coke** | **Limit for Percent Leaking Offtakes** | **Regulatory Track**  **for Limit** |
| --- | --- | --- | --- | --- |
| ABC-Tarrant-AL | Coke Battery #1,5,6 | Foundry | 2.5 | LAER Track Jan 1, 2010 Limits |
| BLU-Birmingham-AL | Coke Battery No. 3,4,5 | Foundry | 2.5 | LAER Track Jan 1, 2010 Limits |
| CC-Follansbee-WV | No. 1,2,3,8 Battery | BF | 2.5 | LAER Track Jan 1, 2010 Limits |
| CC-Middletown-OH | Coke Oven Battery | BF | 2.5 | MACT Track July 14, 2005 Limits |
| CC-BurnsHarbor-IN | Battery #1,2 | BF | 2.5 | LAER Track Jan 1, 2010 Limits |
| CC-Monessen-PA | Battery 1B,2 | BF | 2.5 | LAER Track Jan 1, 2010 Limits |
| CC-Warren-OH | No. 4 Battery | BF | 2.5 | LAER Track Jan 1, 2010 Limits |
| EES-RiverRouge-MI | Coke Battery #5 | BF | 2.5 | LAER Track Jan 1, 2010 Limits |
| USS-Clairton-PA | Battery 1,2,3,13,14,15,19,20,B,C | BF | 2.5 | LAER Track Jan 1, 2010 Limits |

**Tables 61-64** summarize the allowable-to-actual ratios for ByP charging and leaking doors, lids, and offtakes.

**Table 61. Allowables-to-Actuals Ratios for ByP Charging**

| **Facility ID** | **Battery ID** | **Ratio Allowable-to-Actual for Charging Fugitives** |
| --- | --- | --- |
| ABC-Tarrant-AL | Battery No. 1 | 3.2 |
| Battery No. 5 & No. 6 | 2.8 |
| BLU-Birmingham-AL | Coke battery no. 3 & 4 | 2.8 |
| Coke battery no. 5 | 3.4 |
| CC-Follansbee-WV | Battery #1, 2, 8 | 1.6 |
| Battery #8 | 2.9 |
| CC-Middletown-OH | Battery | 2.1 |
| CC-BurnsHarbor-IN | Battery No. 1 | 1.3 |
| Battery No. 2 | 1.2 |
| CC-Monessen-PA | Battery No. 1B & 2 | 1.9 |
| CC-Warren-OH | Battery No. 4 | 3.4 |
| EES-RiverRouge-MI | Coke battery #5 | 9.2 |
| USS-Clairton-PA | Battery No. 1 | 2.7 |
| Battery No. 2 & 3 | 2.6 |
| Battery No. 13 | 3.3 |
| Battery No. 14 & 15 | 3.2 |
| Battery No. 19 | 2.7 |
| Battery No. 20 | 2.9 |
| Battery B | 2.8 |
| Battery C | 0.3 |

**Table 62. Allowables-to-Actuals Ratios for ByP Door Leaks**

| **Facility ID** | **Battery ID** | **Ratio Allowable-to-Actual for Leaking Doors** |
| --- | --- | --- |
| ABC-Tarrant-AL | Battery #1 | 1.3 |
| Battery #5 | 2.0 |
| Battery #6 | 2.1 |
| BLU-Birmingham-AL | Coke battery no. 3 & 4 | 1.5 |
| Coke battery no. 5 | 1.6 |
| CC-Follansbee-WV | Battery #1,2,3 | 1.9 |
| Battery #8 | 1.5 |
| CC-Middletown-OH | B918 | 1.3 |
| CC-BurnsHarbor-IN | EU512-05 #1 & 2 | 1.3 |
| CC-Monessen-PA | Coke Oven Battery (1B) | 1.7 |
| Coke Oven Battery (2) | 1.5 |
| CC-Warren-OH | No. 4 coke oven battery | 1.3 |
| EES-RiverRouge-MI | Coke battery #5 | 2.1 |
| USS-Clairton-PA | Battery 1 fugitives / battery #1 | 1.7 |
| Battery 2 fugitives / battery #2 | 1.8 |
| Battery 3 fugitives / battery #3 | 1.6 |
| Battery 13, 14, 15, 19 | 1.9 |
| Battery 20, b, c | 2.0 |

**Table 63. Allowables-to-Actuals Ratios for ByP Lid Leaks**

| **Facility ID** | **Battery ID** | **Ratio Allowable-to-Actual for Leaking Lids** |
| --- | --- | --- |
| ABC-Tarrant-AL | Battery #1, 5, 6 | N/A |
| CC-Follansbee-WV | Battery #1, 2, 3 | N/A |
| Battery #8 | 43.6 |
| BLU-Birmingham-AL | Coke battery no. 3 | 3.6 |
| Coke battery no. 4 | 5.0 |
| Coke battery no. 5 | 5.7 |
| CC-Middletown-OH | B918 | 75.4 |
| CC-BurnsHarbor-IN | EU512-03 l#1 | 6.7 |
| EU512-11 #2 | 2.9 |
| CC-Monessen-PA | Coke Oven Battery (1B & 2) | N/A |
| CC-Warren-OH | No. 4 Coke Oven Battery | 10.3 |
| EES-RiverRouge-MI | Coke Battery #5 | 480 |
| USS-Clairton-PA | Battery 1, 3, 13, 14, 15, 19, C | N/A |
| Battery 2, 20, B | 40 |
| Note: N/A = actual emissions were zero. | | |

**Table 64. Allowables-to-Actuals Ratios for ByP Offtakes Leaks**

| **Facility ID** | **Battery ID** | **Ratio Allowable-to-Actual for Offtake Leaks** |
| --- | --- | --- |
| ABC-Tarrant-AL | Battery #1 | 83.3 |
| Battery #5 & 6 | N/A |
| BLU-Birmingham-AL | Coke battery no. 3 | 3.2 |
| Coke battery no. 4 | 4.9 |
| Coke battery no. 5 | 3.3 |
| CC-Follansbee-WV | Battery #1, 2, 3 | 132 |
| Battery #8 | 2.7 |
| CC-Middletown-OH | B918 | 180 |
| CC-BurnsHarbor-IN | EU512-02 offtake #1 | 4.6 |
| EU512-10 offtake #2 | 3.2 |
| CC-Monessen-PA | Coke oven battery (1b) | 5.2 |
| Coke oven battery (2) | 12.0 |
| CC-Warren-OH | No. 4 coke oven battery | 3.1 |
| EES-RiverRouge-MI | Coke battery #5 | 167 |
| USS-Clairton-PA | Battery 1 fugitives / battery 1 | 4.0 |
| Battery 2 fugitives / battery 2 | 4.5 |
| Battery 3 fugitives / battery 3 | 3.5 |
| Battery 13 fugitives / battery 13 | 4.4 |
| Battery 14 fugitives / battery 14 | 3.5 |
| Battery 15 fugitives / battery 15 | 6.4 |
| Battery 19 fugitives / battery 19 | 2.0 |
| Battery 20 fugitives / battery 20 | 2.4 |
| Battery b fugitives / battery b | 14.7 |
| Battery c fugitives / battery c | 31.3 |
| Note: N/A = actual emissions were zero. | | |

### 4.4.6 EP-4 ByP Boiler stacks

The COETF provided the 2015 Plantwide Boiler COG usage (mmscf/yr); 2015 coke production (TPY); and annual coke production capacity (TPY) (COETF, 2021b). These values were used to calculate the 2015 annual potential boiler usage (mmscf/yr) per boiler using the following equation:

*2015 annual potential boiler usage (mmscf/yr) =*

*2015 plantwide boiler COG Usage (mmscf/yr) / 2015 coke production (TPY) \* annual coke production capacity (TPY)*

The 2015 annual potential boiler usage (mmscf/yr) was used with the industry default emission factors per HAP (lb HAP/mmscf) to calculate allowable TPY emissions. **Table 65** summarizes the ratio of allowable-to-actual emissions.

**Table 65. Allowables-to-Actuals Ratios for Boilers**

| **Facility ID** | **Emission Unit** | **Ratio Allowable-to-Actual**  **for Boilers** |
| --- | --- | --- |
| ABC-Tarrant-AL | boilers 7, 8, and 9 combined stack | 1.8 |
| BLU-Birmingham-AL | no. 1, 3, 4 steam generator | 1.8 |
| CC-Follansbee-WV | boilers 6, 7, 9, and 10 combined stack | 2.0 |
| CC-Follansbee-WV | boiler no. 8 | 1.0 |
| CC-Middletown-OH | boiler no.1, 3, 3, 4 | 1.2 |
| CC-Monessen-PA | boiler #1 and #2 combined stack | 1.1 |
| CC-BurnsHarbor-IN | power station boiler #07, 08, 09, 10, 11 12 | 1.1 |
| CC-Warren-OH | boiler B001, 002, 004 | 1.8 |
| USS-Clairton-PA | boiler #1, 2, r1&r2, T1, T2 | 1.7 |
| Note: The emission units are also the emission release points. | | |

### 4.4.7 Co-located II&S sources

For the co-located II&S sources, the EPA used the allowable emissions developed for II&S RTR modeling file that are described in the memorandum “*Integrated Iron and Steel Risk and Technology Review: Point Source Data Summary*” and shown in **Appendix B**. (See also II&S Docket Item ID EPA-HQ-OAR-2002-0083-0955).

## 4.5 Acute Emissions for Coke PQBS and Noncategory Sources

Acute emissions used in EPA risk modeling are the highest emissions that might be expected in any hour during the year. Coke oven charging, pushing, and quenching operations maintain largely consistent hour-to-hour pushing rates because plants are constrained by oven capacity, coking temperatures, coking times, and plant design/equipment. Coke plants may have small deviations in short-term emission rates from annual average emission rates.

Analysis of hourly pushing records at five coke plants showed that the hourly pushing rate does not deviate significantly from the annual average pushing rate, with multipliers ranging from 1.26 to 2.06 (COETF, 2020). The individual facility data are considered proprietary and company confidential information. Based on the multiplier range of the data, an acute factor of two (2) was used to estimate acute hourly emissions from actual hourly emissions for each HAP and unit in the Coke Oven Risk Modeling Database.

For the co-located II&S sources, the EPA used the acute emissions developed for II&S RTR modeling file, as described in the memorandum “*Integrated Iron and Steel Risk and Technology Review: Point Source Data Summary*” (II&S Docket Item ID EPA-HQ-OAR-2002-0083-0955) and shown in **Appendix B**. The acute factor was also 2.0 based on the ratio of opacity limits for normal operation vs. limits allowed for one-time excursions.

## 4.6 Coke Industry Review of the Coke Oven Emissions Database

In August 2020, the EPA sent all facility data to the industry with an example file of how the TPY emissions would be calculated for ByP and HNR pushing (EP-1 & EP-9), ByP battery combustion (EP-3), ByP Boilers, HNR HRSG main stacks (EP-6), HRSG bypass/waste heat stacks (EP-7), HNR charging (EP-8), and quenching (EP-10) and a writeup of assumptions and estimates for the calculation process in general. In November 2020, the EPA sent the industry several other emissions files for review including emissions developed for ByP chemical recovery plant, flares, fugitive pushing, and Method 303 data for Coke Ovens subpart L sources. The EPA continued to work with industry into early 2021 to verify the estimated emissions and calculations. All correspondence and review files are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085).

# 5.0 COKE OVEN RISK MODELING DATABASE

The emissions developed in the Coke Oven Emissions Database were combined with other facility and unit data needed for modeling to develop the Coke Oven Risk Modeling Database, as described in the sections below. Note that the Coke Oven Risk Modeling Database contains rounded values and, as such, the emissions in this database are slightly different from the adjusted for nondetected TPY values in the Coke Oven Emissions Database, which are unrounded.

## 5.1 Facility Qualifiers

### 5.1.2 Facility Location Qualifiers

**Table 66** summarizes the general facility location information compiled from the 2016 and 2022 Coke 114 request Enclosure 1 responses that were supplemented with NEI/EIS data, as necessary. All of the facilities are located in non-tribal areas and have a tribal code of 000.

### 5.1.2 Facility NAICS Codes

The primary North American Industry Classification System (NAICS) code for each facility was identified and included in the Coke Oven Risk Modeling Database. **Table 67** summarizes the primary NAICS code for each facility.

### 5.1.3 Facility Category

The facility category was identified based on whether the facility was a major source of HAP (only), both HAP and criteria air pollutants (CAP), or unknown. The facility category determinations were obtained from the NEI/EIS. **Table 68** summarizes the facility category for each coke facility.

**Table 66. Coke Facility Location Information in the Coke Oven Modeling Database**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SPPD Facility Identifier** | **Facility Name** | **Facility Registry Identifier** | **Location Address** | **City** | **State** | **Zip Code** | **County** | **State County FIPS** | **EPA Region** |
| ABC-Tarrant-AL | ABC Coke | 110000366817 | Pinson RD | Birmingham | AL | 35217 | Jefferson | 01073 | 4 |
| BLU-Birmingham-AL | Bluestone (previously ERP Compliance Coke) | 110000366657 | 3500 FL Shuttlesworth DR | Birmingham | AL | 35207 | Jefferson | 01073 | 4 |
| CC-Follansbee-WV | Mountain State Carbon, LLC | 110042081939 | 1851 Main Street | Follansbee | WV | 26037 | Brooke | 54009 | 3 |
| CC-Middletown-OH | AK Steel | 110000392557 | 1801 Crawford Street | Middletown | OH | 45043 | Butler | 39017 | 5 |
| CC-BurnsHarbor-IN | ArcelorMittal Burns Harbor LLC | 110000607558 | 250 W US Hwy 12 | Burns Harbor | IN | 46304 | Porter | 18127 | 5 |
| CC-Monessen-PA | ArcelorMittal Monessen LLC | 110000329118 | 345 DONNER AVE | Monessen | PA | 15062 | Westmoreland | 42129 | 3 |
| CC-Warren-OH | ArcelorMittal Warren | 110012566767 | 2234 Main Ave SW | Warren | OH | 44481 | Trumbull | 39155 | 5 |
| EES-RiverRouge-MI | EES Coke Battery LLC | 110064551159 | 1400 Zug Island Road | River Rouge | MI | 48209 | Wayne | 26163 | 5 |
| SC-EastChicago-IN | Indiana Harbor Coke | 110066942526 | 3210 Watling St MC 2 990 | East Chicago | IN | 46312 | Lake | 18089 | 5 |
| SC-FranklinFurnace-OH | Haverhill North Coke | 110030492651 | 2446 Gallia Pike | Franklin Furnace | OH | 45629 | Scioto | 39145 | 5 |
| SC-GraniteCity-IL | Gateway Energy & Coke | 110043807538 | 2585 Edwardsville Rd | Granite City | IL | 62040 | Madison | 17119 | 5 |
| SC-Middletown-OH | Middletown Coke | 110046371500 | 3353 Yankee Road | Middletown | OH | 45042 | Butler | 39017 | 5 |
| SC-Vansant-VA | Jewell Coke and Coal | 110060335524 | 1034 Dismal River Road | Vansant | VA | 24656 | Buchanan | 51027 | 3 |
| USS-Clairton-PA | US Steel Clairton Works | 110042043384 | 400 STATE ST | Clairton | PA | 15025 | Allegheny | 42003 | 3 |

**Table 67. Coke Facility NACIS Codes in the Coke Oven Modeling Database**

|  |  |  |
| --- | --- | --- |
| **Primary NAICS Code** | 331110 | 324199 |
| **NAICS Description** | Iron and Steel Mills and Ferroalloy Manufacturing | All Other Petroleum and Coal Products Manufacturing |
| **Facility IDs** | ABC-Tarrant-AL  BLU-Birmingham-AL  CC-Middletown-OH  CC-BurnsHarbor-IN  CC-Warren-OH  EES-RiverRouge-MI  USS-Clairton-PA | CC-Follansbee-WV  CC-Monessen-PA  SC-EastChicago-IN  SC-FranklinFurnace-OH  SC-GraniteCity-IL  SC-Middletown-OH  SC-Vansant-VA |

**Table 68. Facility Categories in the Coke Oven Modeling Database**

|  |  |  |  |
| --- | --- | --- | --- |
| **Facility Category** | **Facility Category Description** | **Facility Category Description Detail** | **Facility ID** |
| HAP | HAP major | Facility is major source based upon 40 CFR part 70 major source definition paragraph 1:10 TPY for individual HAP or 25 TPY combined HAPs. | ABC-Tarrant-AL  BLU-Birmingham-AL  CC-Follansbee-WV  CC-Middletown-OH  CC-BurnsHarbor-IN  CC-Warren-OH  SC-Vansant-VA |
| HAPCAP | HAP and CAP major | Facility meets both paragraph 1 and 2 of 40 CFR part 70 major source definitions:10/25 TPY HAPs and 100 TPY of any one CAP. | CC-Monessen-PA  EES-RiverRouge-MI  USS-Clairton-PA |
| UNK | Unknown | Facility category per 40 CFR part 70 major source definitions is unknown. | SC-EastChicago-IN  SC-FranklinFurnace-OH  SC-GraniteCity-IL  SC-Middletown-OH |

## 5.2 Unit Qualifiers

### 5.2.1 Unit Identifications

The emission unit IDs, emission unit descriptions, process IDs, process descriptions, and emission release point IDs developed for the Coke Oven Emissions Database were used for the Coke Oven Risk Modeling Database. Emission release points are discussed in more detail below in **Section 5.2.2**.

The Source Classification Code (SCC) for each unit was compiled in the Coke Oven Risk Modeling Database. A list of applicable SCCs and descriptions for the Coke PQBS source category and noncategory process units at coke facilities can be found in **Appendix E**.

### 5.2.2 Modeling Release Point Information by Unit

**Table 69** shows the modeling release points for the coke oven processes by their code and type used in the Coke Oven Risk Modeling Database. All sources with stacks (including quench towers) have modeling release points the same as stack emissions release points (vertical, release point type = 2). However, the release points for some emission units or collection of emission units were based on the expected aerodynamic behavior of emissions from the units (fugitive two-dimensional, release point type = 9).

The additional modeling parameters needed for stack release points are discussed below in **Section 5.2.4** and **5.2.5**. The additional modeling parameters needed for non-stack release points are discussed below in **Section 5.2.6**.

### 5.2.3 Unit Control Information

The 2016 Coke 114 request Enclosure 1 responses and NEI/EIS data, as necessary, were used to assign control status and control measure codes for each unit in the Coke Oven Risk Modeling Database. The control status was identified as either controlled, uncontrolled, or unknown. **Table 70** shows the specific control device codes and descriptions used for control devices at coke facilities.

The CAA part and section under which each unit is regulated is identified in the Coke Oven Risk Modeling Database. **Table 71** shows the regulatory codes by process ID.

### 5.2.4 Unit Stack Parameters

The stack parameters for each release point in the Coke Oven Risk Modeling Database, that include height (ft), gas temperature (°F), diameter (ft), gas velocity (ft/sec), and gas flow rate (cubic ft/sec), were compiled from information in the 2016 Coke 114 request, discussions with the COETF, and NEI/EIS data. The EPA conducted an internal, independent quality assurance check on the stack parameters, as per EPA RTR protocol. Stack “default flags” were used to indicate how the stack parameters were obtained or developed. **Table 72** summarizes the stack default flags used in the Coke Oven Risk Modeling Database.

### 5.2.5 Unit Stack Latitude and Longitude Coordinate QC

The latitude and longitude coordinates of coke facility stacks (modeling release point type = 2) and other nonstack HAP release points were mapped using the Google Maps™ program to verify their locations. For sources with a typical stack, the reported latitude and longitude coordinates for the base of the stack were verified visually or adjusted accordingly. In a few cases, the latitude and longitude coordinates of coke facility units submitted in the 2016 Coke 114 request were not within the facility property lines and/or were not located on operating equipment. Latitude and longitude coordinates also were missing for some of the units. In these cases, the EPA consulted directly with coke facility staff to accurately locate the units. The latitude and longitude coordinates for “Other” coke units whose data came from NEI/EIS were used as reported in the NEI/EIS. The latitude and longitude coordinates for co-located II&S sources were used as developed for the II&S RTR modeling file, which had already been through EPA review.

**Table 69. Release Points by Type for Coke Processes in the Coke Oven Modeling Database**

|  |  |  |
| --- | --- | --- |
| **Modeling Release Points** | | **Process IDs** |
| **Code** | **Type** |
| 2 | vertical | EP-1 ByP Pushing (stationary CD)  EP-3 ByP Battery (combustion) Stack  EP-6 HRSG Main Stacks  EP-7 HRSG Bypass/waste Heat Stacks  EP-9 HNR Pushing (stationary CD)  EP-10 Quench Tower  Flares |
| 3 | horizontal | Other |
| 7 | fugitive area | ByP Chemical Plant |
| 8 | fugitive vent | Other |
| 9 | fugitive two-dimensional | EP-1 ByP Pushing (mobile CD)  EP-2 ByP Charging (oven port only)  EP-8 HNR Charging (mobile CD)  EP-9 HNR Pushing (mobile CD)  EP-11 doors  EP-11 Lids  EP-11 Offtakes  Fugitive pushing |

**Table 70. Control Measure Codes and Descriptions**

**in the Coke Oven Modeling Database**

| **Control Measure Code** | **Description** |
| --- | --- |
| 0 | uncontrolled |
| 100 | baghouse |
| 121 | cyclones (multiple) |
| 127 | fabric filter / baghouse |
| 141 | wet scrubber |
| 202 | spray dryer adsorber |
| 207 | activated carbon injection |
| 209 | gravity collector |
| 23 | flaring |
| 53 | venturi scrubber |
| 58 | mat or panel filter |
| 78 | baffle |
| 99 | other control device |

**Table 71. Regulatory Codes by Process ID**

**in the Coke Oven Modeling Database**

| **Regulatory Code** | **Process ID** |
| --- | --- |
| 61L | ByP Chemical Recovery Plant  Flare |
| 63CCCCC | EP-1 ByP Pushing (CD)  EP-3 ByP Combustion (battery) Stack  EP-6 HRSG Main Stacks  EP-7 HRSG Bypass/waste Heat Stacks  EP-9 HNR pushing (CD)  EP-10 Quench Tower  Fugitive pushing |
| 63DDDDD | EP-4 ByP Boiler Stacks |
| 63FFFFF | Co-located II&s units |
| 63L | EP-2 ByP Charging (oven port only)  EP-8 HNR Charging (CD)  EP-11 Doors  EP-11 Lids  EP-11 Offtakes |
| Unknown | EP-4 ByP Boiler Stacks  Other |

**Table 72. Stack Default Flags in the Coke Oven Modeling Database**

| **Stack Default Flag** | **Stack Default Flag Description** |
| --- | --- |
| 00000 | All of the original stack values were retained. |
| 00004 | The exit gas flow rate was calculated from other stack parameters. |
| 00014 | The exit gas velocity was based on a default value for the SCC and the exit gas flow rate was calculated from this velocity. |
| 00040 | The exit gas velocity was calculated from other stack parameters. |
| 00400 | The diameter was calculated from other stack parameters. |
| 11111 | All of the parameters were based on default values for the SCC. |
| 77777 | All stack parameters were revised by the EPA. |

### 5.2.6 Unit Non-Stack Parameters

For the coke process modeled as fugitive two-dimensional sources (modeling release point type = 9), *i.e..*, mobile charging machines, mobile pushing machines, doors, lids, offtakes, and fugitive pushing, two sets of latitude and longitude coordinates were required. Using Google Maps,™ the pairs of coordinates were set at the vertical midpoints of opposing sides of the source The fugitive release heights were set at the battery (building) height (ft). The fugitive length and fugitive width were set at the battery (building) length and width, respectively. The fugitive width for mobile control devices were set at the width of the stack. The fugitive width for fugitive pushing were sat at 0.9 meters (EPA, 2003). (Note. exit gas velocity, flowrate, and temperature are not needed for fugitive two-dimensional sources). **Table 73** shows the fugitive two-dimensional line sources and the modeling parameters.

**Table 73. Fugitive Two-dimensional Line Source Modeling Parameters**

**in the Coke Oven Modeling Database**

| **Process ID** | **Fugitive Two-Dimensional Parameters** | |
| --- | --- | --- |
| **Lat/Long Coordinates** | **Length, Width, Height** |
| Mobile:  EP-1 ByP pushing (CD)  EP-9 HNR pushing (CD) | Battery, vertical center, coke side | building height (ft) width of stack (ft) building length (ft) |
| Fugitive pushing | Battery, vertical center, coke side | building height (ft) lateral width (0.9 m) building length (ft) |
| EP-2 ByP charging (oven port) | Battery, horizontal center, topside | building height (ft) building width (ft) building length (ft) |
| EP-8 HNR charging (CD) | Battery, horizontal center, coal side |
| EP-11 lids | Battery, horizontal center, topside |
| EP-11 offtakes | Battery, offtake, topside |
| EP-11 doors-push-side | Battery, vertical center, push side |
| EP-11 doors-coke-side | Battery, vertical center, coke side |
| Notes:  --Coke side: means the side of a battery from which the coke is discharged from ovens during pushing at the end of the coking cycle.  --Push side: means the side of the battery where the pushing equipment enters the ovens at the end of the coking cycle to push the coke out of the oven. For HNR ovens, this also is called the coal side because it is where the coal is placed in the ovens at the beginning of the coking cycle to make coke from coal.  --In charging, ByP plants charge into ovens from the top of the ovens/battery, whereas HNR charge into ovens/battery at the side (*e.g.*, coal side). | | |

For fugitive area sources with modeling release point type = 7 (*e.g.*, ByP chemical recovery plants) the latitude and longitude coordinates were derived from the southwest corner of the rectangle drawn around the collection of ByP chemical recovery plant units with Google MapsTM. (See **Figure 1**, below). The fugitive modeling release heights were set at the median stack height (ft) of the applicable equipment, which were provided by the COETF (supporting documents are included in Coke PQBS docket, EPA-HQ-OAR-2002-0085). The fugitive length and fugitive widths were determined from the rectangle drawn around the collection of ByP plant units with Google MapsTM. The fugitive angle, which is the angle between the side of the rectangle and due north on the southwest corner of the rectangle in **Figure 1** below, also was established with Google MapsTM. Note, exit gas velocity, flowrate, and temperature are not needed for fugitive area sources.

***5.2.7 Unit Location and North American Datum Information***

A location descriptor is required in EPA modeling databases to identify the source of location data for each unit. For all coke units beside “Other,” the flag of “RTR” was used in the Coke Oven Risk Modeling Database to signify that the locations were developed from 2016 Coke 114 request data for the RTR. For the “Other” coke units, the flag of “EIS” was used instead because their data and location information came directly from the NEI/EIS database. For the co-located II&S sources, the flag of “Industry” was used because the data came from industry via the II&S 114 request for the II&S RTR.

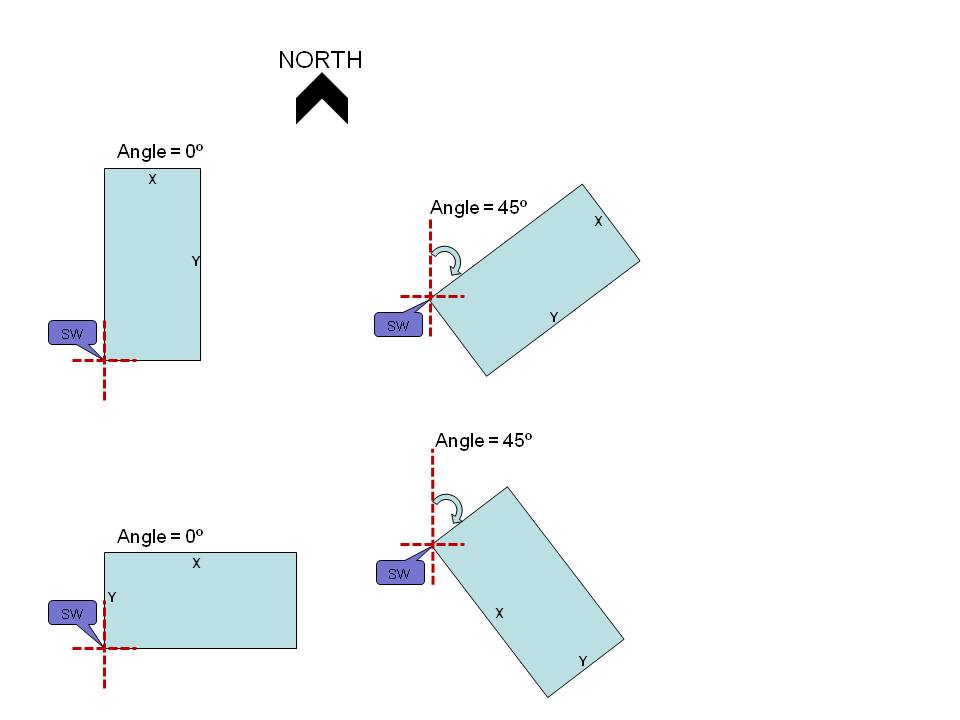
In addition, a North American Datum code was assigned for each unit’s location. For all the coke units besides “Other,” the code of “002 North American Datum of 1983” was used. For the “Other” coke units, the codes of “001 North American Datum of 1927” and “003 World Geodetic System of 1984” were used, as reported in the NEI/EIS where their unit information was obtained.

### 5.2.8 Unit Operating Hours

The hours per year were compiled for each unit from 2016 Coke 114 request responses or the COETF, and supplementing with NEI/EIS data, as needed. The EPA did not model any units/facilities that required a “Closed Year” to be identified in the modeling field included in the EPA’s RTR model file prototype.

## 5.3 Emissions Data Qualifiers

The start and end dates of the emissions data are required for the EPA’s RTR modeling databases. **Table 74** summaries the start and end dates per data source and process ID.in the Coke Oven Risk Modeling Database.

**Figure 1. How fugitive angles are determined.**

**Table 74. Data Start and End Dates in the Coke Oven Modeling Database**

| **Start Date** | **End Date** | **Data Source** | **Process IDs** |
| --- | --- | --- | --- |
| 20120101 | 20121231 | 2011 II&S Modeling File Data | Co-located II&S units |
| 20160101 | 20161231 | 2016 & 2022 Coke 114 request Enclosure 1 and 2 Data | EP-1 ByP pushing (CD)  Fugitive pushing  EP-2 ByP Charging (oven port only)  EP-3 ByP Combustion (Battery) stack  EP-4 ByP Boiler stacks  EP-6 HRSG Main stacks  EP-7 HRSG Bypass/waste heat stacks  EP-8 HNR Charging (CD)  EP-9 HNR Pushing (CD)  EP-10 Quench tower  EP-11 Doors  EP-11 Lids  EP-11 Offtakes |
| 20180101 | 20181231 | 2017 NEI/EIS | Byproduct chemical plant  Flare  Other units |

The emission calculation method is also required to be identified for the Coke Oven Risk Modeling Database. **Table 75** summarizes the emission calculation method code per process ID. Identification of the data source was required for the Coke Oven Risk Modeling Database. **Table 76** lists the data sources and type of data per process ID in the Coke Oven Risk Modeling Database.

## 5.4 Coke Industry Review of Coke Oven Risk Modeling Database

In October 2020, the EPA sent, a draft of the Coke Oven Risk Modeling Database, complete with unit sources and modeling release point parameters, to the coke industry, (via the COETF) for their review for accuracy. The EPA continued to work with the industry into early 2021 to finalize the emissions, TPY calculations, and modeling release point parameters. All correspondence and review files are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085).

**Table 75. Emission Calculation Method Codes in the Coke Ovens Risk Database**

| **Emission Calculation Method Code** | **Emission Calculation Method Code Description** | **Process IDs** |
| --- | --- | --- |
| 2 | Engineering judgment | Other |
| 3 | Material balance | Other;  Co-located II&S |
| 4 | Stack test (no control efficiency used) | EP-1 ByP Pushing (CD);  EP-2 ByP Charging (oven port only);  EP-3 ByP Combustion (Battery) stack;  EP-4 ByP Boiler stacks;  EP-6 HRSG Main stacks;  EP-7 HRSG Bypass/waste heat stacks;  EP-8 HNR Charging (CD);  EP-9 HNR Pushing (CD);  Co-located II&S |
| 5 | USEPA speciation profile | Other |
| 8 | USEPA emission factor  (no control efficiency used) | EP-1 ByP Pushing (CD)  EP-3 ByP Combustion (Battery) stack  EP-4 ByP Boiler stacks  EP-6 HRSG Main Stacks  EP-7 HRSG Bypass/waste heat stacks  EP-8 HNR Charging (CD)  EP-9 HNR Pushing (CD)  EP-10 Quench tower  Byproduct chemical plant  Flare  Other |
| 10 | Site-specific emission factor  (no control efficiency used) | Other;  Co-located II&S |
| 24 | Stack Test (pre-control) plus control efficiency | Fugitive pushing |
| 28 | USEPA emission factor (pre-control) plus control efficiency | Fugitive pushing  Other |
| 30 | Site-specific emission factor (pre-control) plus control efficiency | Other |

**Table 76. Data Sources and Types in the Coke Oven Risk Modeling Database.**

| **Data Source Entry** | **Type of Data** | **Process IDs** |
| --- | --- | --- |
| 2014\_NEI or DEFAULT SPECIATION PROFILE | NEI/EIS | Byproduct chemical plant |
| 2017NEI\_June2020\_PT | NEI/EIS | Other |
| 2017NEI\_June2020\_PT & 2018INDEM | NEI/EIS | Other |
| 2018Alleg | NEI/EIS | Other |
| 2018EPA\_HAPAug | NEI/EIS | Other |
| 2018ILEPA | NEI/EIS | Other |
| 2018INDEM | NEI/EIS | Other |
| 2018INDEM & 2017NEI\_June2020\_PT | NEI/EIS | Other |
| 2018OHEPA | NEI/EIS | Other |
| 2018VADEQ | NEI/EIS | Other |
| 2018WVDAQ | NEI/EIS | Other |
| RTR | 2016 & 2022Coke 114 request Enc. 2 stack test data;  Emission factors based on 2016 & 2022 Coke 114 request Enc. 2 Stack test data;  Subpart L Method 303 file;  1998 stack test EF for metal HAP and PAH;  2017 NEI/EIS industry averages | EP-1 ByP Pushing (CD)  EP-2 ByP Charging (oven port only)  EP-3 ByP Combustion (Battery) Stack  EP-4 ByP Boiler stacks  EP-6 HRSG Main Stacks  EP-7 HRSG Bypass/waste heat stacks  EP-8 HNR Charging (CD)  EP-9 HNR Pushing (CD)  EP-10 Quench Tower  EP-11 Doors-Coke-Side  EP-11 Doors-Push-Side  EP-11 Lids  EP-11 Offtakes  Flare  Fugitive Pushing |
| RTR 114 request Test | II&S RTR Modeling File | Co-located II&S |

# 6.0 COKE BY-PRODUCT RECOVERY PLANT

As discussed in Section 2.2, several sources from the coke by-product recovery plant were required to be tested under the 2022 Coke 114 Request Enclosure 2.

## 6.1 Cooling Tower Inlet

Three facilities received the 2022 coke 114 request for cooling tower inlet testing. **Table 77** summarizes the facilities and their submissions.

**Table 77. Cooling Tower Inlet Submissions**

|  |  |  |
| --- | --- | --- |
| **Facility ID** | **Cooling Tower Inlet**  **[**BTEX, TO-15A analytes, H2S, COS, CS2] | **Facility Comments** |
| ABC-Tarrant-AL | Data provided - No VOHAP | Due to the lack of commercially available TO-15A analysis, both accredited and unaccredited, the approach of reporting VOHAP as  BTEX determined by EPA Method 18, as described in the EPA Risk and Technology Review (RTR) text in reference to testing HRSG, HNR, and Oil Condenser stacks was used. The unavailability of laboratories to conduct further analysis deems this the most comprehensive available approach and concurrent MDL THC values, along  with non-detect BTEX values, indicate the lack of strippable volatile organics from this source. |
| CC-BurnsHarbor-IN | No Unit | N/A-Cleveland-Cliffs Burns Harbor does not have cooling tower inlet |
| CC-Monessen-PA | n/a |  |
| CC-Warren-OH | n/a |  |
| EES-RiverRouge-MI | n/a |  |
| USS-Clairton-PA | Data provided |  |

The average concentration per compound is summarized in **Table 78** for the facilities that conducted testing.

**Table 78. Cooling Tower Inlet Data Summary**

| **Compound Name** | **Concentration in Stripped Air (ppmv)** | | |
| --- | --- | --- | --- |
| **USS-Clairton-PA**  **East Side Cooling Tower Inlet** | **USS-Clairton-PA**  **West Side Cooling Tower Inlet** | **ABC-Tarrant-AL Cooling Tower Inlet** |
| Benzene | 0.33 | 0.34 | 0.39 |
| Toluene | 0.34 | 0.34 | 0.40 |
| Ethylbenzene | 0.35 | 0.35 | 0.43 |
| m-Xylene | 0.36 | 0.35 | 0.43  m/p-Xylene |
| p-Xylene | 0.36 | 0.36 |
| o-Xylene | 0.37 | 0.36 | 0.45 |
| Carbon disulfide | 0.036 | 0.037 | 0.064 |
| Hydrogen Sulfide | 0.12 | 0.12 | 0.13 |
| Carbonyl Sulfide | 0.13 | 0.13 | 0.13 |
| Total Hydrocarbons (as C3H8) | 1.8 | 0.078 | 0.48 |
| 1,1,1,2-Tetrachloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,1,1-Trichloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,1,2,2-Tetrachloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,1,2-Trichloroethene | 3.5E-05 | 3.5E-05 | None |
| 1,1,2-Trichlorotrifluoroethane | 3.5E-05 | 3.6E-05 | None |
| 1,1-Dichloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,1-Dichloroethene | 3.5E-05 | 3.5E-05 | None |
| 1,2,4-Trichlorobenzene | 3.5E-05 | 3.5E-05 | None |
| 1,2,4-Trimethylbenzene | 9.1E-05 | 0.00011 | None |
| 1,2-Dichloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,2-Dichloroethane | 3.5E-05 | 3.5E-05 | None |
| 1,2-Dichloropropane | 3.5E-05 | 3.5E-05 | None |
| 1,2-Dichlorotetrafluoroethane | 3.5E-05 | 3.7E-05 | None |
| 1,3,5-Trimethylbenzene | 3.5E-05 | 4.5E-05 | None |
| 1,3-Butadiene | 3.5E-05 | 5.9E-05 | None |
| 1,4-Dioxane | 3.5E-05 | 4.6E-05 | None |
| 2-Butanone | 0.00024 | 0.00039 | None |
| 2-Chlorotoluene | 3.5E-05 | 3.5E-05 | None |
| 2-Hexanone | 3.5E-05 | 3.5E-05 | None |
| 2-Methoxy-2-methylpropane | 3.5E-05 | 3.5E-05 | None |
| 2-Propanol | 0.00039 | 0.0009 | None |
| 2-Propanone | 0.063 | 0.063 | None |
| 2-Propenal | 0.00047 | 0.00063 | None |
| 2-Propenenitrile | 5.4E-05 | 6.2E-05 | None |
| 4-Ethyltoluene | 3.5E-05 | 0.00017 | None |
| 4-Methyl-2-pentanone | 4.6E-05 | 5.6E-05 | None |
| Acetonitrile | 0.0015 | 0.0014 | None |
| Bromodichloromethane | 0.0032 | 0.0028 | None |
| Bromomethane | 5.3E-05 | 0.00013 | None |
| Carbon tetrachloride | 3.5E-05 | 3.7E-05 | None |
| Chlorobenzene | 3.5E-05 | 3.5E-05 | None |
| Chloroethane | 3.5E-05 | 3.8E-05 | None |
| Chloroethene | 0.00068 | 0.0012 | None |
| Chloromethane | 0.00027 | 0.00056 | None |
| Chloromethylbenzene | 3.5E-05 | 3.5E-05 | None |
| cis-1,2-Dichloroethene | 3.5E-05 | 3.5E-05 | None |
| cis-1,3-Dichloropropene | 3.5E-05 | 3.5E-05 | None |
| Cyclohexane | 4.1E-05 | 0.00005 | None |
| Dibromochloromethane | 0.0051 | 0.0054 | None |
| Dichlorodifluoromethane | 3.5E-05 | 0.00017 | None |
| Dichloromethane | 0.00095 | 0.0014 | None |
| Ethanol | 0.0076 | 0.01 | None |
| Ethenyl acetate | 3.5E-05 | 3.5E-05 | None |
| Ethyl acetate | 0.00017 | 0.00019 | None |
| Heptane | 3.5E-05 | 8.9E-05 | None |
| Hexachlorobutadiene | 3.5E-05 | 3.5E-05 | None |
| Hexane | 0.00078 | 0.00059 | None |
| Isopropylbenzene | 3.5E-05 | 3.5E-05 | None |
| m-Dichlorobenzene | 3.5E-05 | 3.5E-05 | None |
| Methyl methacrylate | 4.1E-05 | 3.9E-05 | None |
| Naphthalene | 8.5E-05 | 0.00019 | None |
| n-Propylbenzene | 3.5E-05 | 3.9E-05 | None |
| o-Dichlorobenzene | 3.5E-05 | 3.5E-05 | None |
| p-Dichlorobenzene | 3.5E-05 | 3.5E-05 | None |
| Propene | 0.00012 | 0.00036 | None |
| Styrene | 6.8E-05 | 0.00015 | None |
| Tetrachloroethene | 4.1E-05 | 5.6E-05 | None |
| Tetrahydrofuran | 0.00022 | 0.00027 | None |
| trans-1,2-Dichloroethene | 3.5E-05 | 3.5E-05 | None |
| trans-1,3-Dichloropropene | 3.5E-05 | 3.5E-05 | None |
| Tribromomethane | 0.0032 | 0.0041 | None |
| Trichlorofluoromethane | 5.3E-05 | 0.00044 | None |
| Trichloromethane | 0.0017 | 0.0011 | None |

## 6.2 Light Oil Condenser (if venting to atmosphere)

Three facilities received the 2022 coke 114 request for light oil condenser (if venting to atmosphere) testing. All three facilities reported that they do not have light oil condensers venting to the atmosphere. **Table 79** summarizes the facilities and their submissions.

**Table 79. Cooling Tower Inlet Submissions**

|  |  |  |
| --- | --- | --- |
| **Facility ID** | **Light Oil Condenser (if venting to atmosphere)**  **[**BTEX, H2S, COS, CS2] | **Facility Notes** |
| ABC-Tarrant-AL | No Unit | ABC does operate a LO Condenser but it is a closed system and Enclosure 2 specified sampling only open systems. |
| CC-BurnsHarbor-IN | No Unit | N/A-Cleveland-Cliffs Burns Harbor does not have light oil condenser, |
| USS-Clairton-PA | No Unit | U. S. Steel will not conduct testing at the Light Oil Condenser because it does not vent to the atmosphere. |

## 6.3 Sulfur Recovery/Desulfurization

Three facilities received the 2022 coke 114 request for sulfur recovery/desulfurization testing. **Table 80** summarizes the facilities and their submissions.

**Table 80. Sulfur Recovery/Desulfurization Submissions**

|  |  |  |
| --- | --- | --- |
| **Facility ID** | **Sulfur Recovery/Desulfurization**  **[**SO2, H2S, COS, CS2] | **Facility Notes** |
| ABC-Tarrant-AL | No Unit | We do NOT operate a sulfur recovery system. |
| CC-BurnsHarbor-IN | No Unit | N/A-Cleveland-Cliffs Burns Harbor does not have Sulfur Recovery/Desulfurization. |
| USS-Clairton-PA | Data |  |

The average concentration and lb/hr emission rate per compound are summarized in **Table 81** for the facility that conducted testing.

**Table 81. Sulfur Recovery/Desulfurization Data Summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Facility ID** | **Source Name** | **Compound Name** | **Average Concentration**  **ppmdv** | **Average lb/hr** |
| USS-Clairton-PA | SCOT Plant Exhaust Stack (Source ID: P019) | SO2 | 32 | 4.3 |
| H2S | 3.7 | 0.29 |
| COS | 19 | 2.4 |
| CS2 | 0.91 | 0.16 |

## 6.4 Flares

|  |  |
| --- | --- |
| CBRP Flares  Emergency Battery Flare | Visible emissions, gas composition (proximate/ultimate analysis), flow rate, and heat content |

Six facilities received the 2022 coke 114 request for CBRP Flares and Emergency Battery Flare testing. **Table 82** summarizes the facilities and their submissions.

**Table 82. CBRP Flares and Emergency Battery Flare Submissions**

| **Facility ID** | **CBRP Flares and Emergency Battery Flare - Method 22 Data** | **Facility Notes** |
| --- | --- | --- |
| ABC-Tarrant-AL | Method 21 Data | As for the flare testing, ABC proposed that we submit Method 21 data from past actual emergency flare events (2019 to present) in lieu of testing our emergency flares during non-emergency conditions. |
| CC-BurnsHarbor-IN | Data |  |
| CC-Monessen-PA | Data |  |
| CC-Warren-OH | No Data | Between September 23, 2022, through November 15, 2022, Warren Coke's Emergency flares did not activate for a duration that required Method 22 readings per Cleveland-Cliffs' September 22, 2022 Enclosure 2 Stack Testing Schedule. Also, per the September 22, 2022 letter, Warren Coke, under typical operating conditions, does not utilize the Excess Coke Oven Gas Flare. Therefore, Cleveland-Cliffs Warren Coke does not have any Method 22 results to submit. |
| EES-RiverRouge-MI | Data | EES Coke does not have existing sample ports for COG at the inlets  of the BP Flare or any of the eight Emergency Bypass Bleeder Flares. EES Coke is providing COG analysis at a location previously communicated in the August 3, 2022 letter regarding stack testing issues. A COG sample was obtained on October 3, 2022, which coincided with two of the three BP Flare Visible Emissions (VE) observations. EES Coke obtained a sample of the COG on October 3, 2022 and had it analyzed using method T0-15. |
| USS-Clairton-PA | No Data | U. S. Steel will not intentionally activate the Battery emergency flares due to the  safety and operational concerns highlighted in our August 3, 2022 letter detailing  stack testing problems. |

**Visible Emissions**

The average Method 21 and 22 visible emissions are summarized in **Table 83** for the facilities that conducted testing.

**Table 83. CBRP Flares and Emergency Battery Flare Method 21 and 22 Data Summary**

| **Facility ID** | **Sampling location** | **Average Cumulative Duration of Visible Emissions (seconds)**  **Method 22** | **Average Method 21 Actual Readings (ppm)** |
| --- | --- | --- | --- |
| EES-RiverRouge-MI | Flare Stack | 0 |  |
| CC-Monessen-PA | #1B Coke Battery Emergency Flares | 135 |  |
| CC-Monessen-PA | #2 Coke Battery Emergency Flares | 300 |  |
| CC-Monessen-PA | Excess Coke Oven Gas Flare | 7 |  |
| CC-BurnsHarbor-IN | #1 Coke Battery Emergency Flares | 940 |  |
| CC-BurnsHarbor-IN | #2 Coke Battery Emergency Flares | 0 |  |
| CC-BurnsHarbor-IN | Excess Coke Oven Gas Flare | 0 |  |
| ABC-Tarrant-AL | Coke Oven Battery #1 North Flare |  | 59 |
| ABC-Tarrant-AL | Coke Oven Battery #1 South Flare |  | 66 |
| ABC-Tarrant-AL | Coke Oven Battery #5 Flare |  | 31 |
| ABC-Tarrant-AL | Coke Oven Battery #6 Flare |  | 25 |

**Flare composition**

The average flare composition concentrations are summarized in **Table 84** for the facility that conducted testing.

**Table 84. CBRP Flares and Emergency Battery Flare Composition Data Summary**

| **Facility ID** | **Sampling Location** | **Compound Name** | **Reported Concentration**  **(µg/m3)** |
| --- | --- | --- | --- |
| EES-RiverRouge-MI | BP flare stack | Propene | 735,000,000 |
| EES-RiverRouge-MI | BP flare stack | 1,3-Butadiene | 111,000,000 |
| EES-RiverRouge-MI | BP flare stack | Carbon disulfide | 39,400,000 |
| EES-RiverRouge-MI | BP flare stack | 2-Propenenitrile | 2,460,000 |
| EES-RiverRouge-MI | BP flare stack | Benzene | 2,630,000,000 |
| EES-RiverRouge-MI | BP flare stack | Toluene | 141,000,000 |
| EES-RiverRouge-MI | BP flare stack | Xylenes (total) | 26,980,000 |
| EES-RiverRouge-MI | BP flare stack | Styrene | 5,790,000 |

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# APPENDIX A:

# Coke 114 Request QUESTIONNAIRE RESPONSES

The Coke 114 request Questionnaire responses are provided in the accompanying Microsoft Excel® files. Copies of the Coke 114 request and responses received by EPA are included in dockets for both coke ovens rules, subparts CCCCC and L: Docket ID No. EPA-HQ-OAR-2002-0085 (subpart CCCCC); and Docket ID No. EPA-HQ-OAR-2003-0051 (subpart L).

Excel file A-1 includes the 2016 facility responses to the ten parts of the questionnaire, as follows:

* Part I Owner Information
* Part II General Facility Information
* Part III Regulatory Information
* Part IV Process Flow Diagrams and Plot Plans
* Part V Emission Points
* Part VI Process and Emission Unit Operations
* Part VII Air Pollution Control and Monitoring Equipment
* Part VIII Economics/Costs
* Part IX Startup and Shutdown
* Part X Management Practices

Excel file A-2 includes the 2022 facility responses to five parts of the questionnaire, as follows:

* Part A. Background Facility Information from 2016 114 Request – Verify and Update, or Provide New
* Part B. Coke By-Product Recovery Plants
* Part C. Coke Oven Doors, Lids, Offtakes, and Charging at By-product Coke Oven Facilities
* Part D. Coke By-product Battery Stack Opacity Data
* Part E. Miscellaneous: Emergency Battery Flares; Community Issues; Paperwork Reduction Act Estimates

# APPENDIX B:

# COKE OVEN EMISSIONS DATABASE

The Coke Oven Emissions Database is in the accompanying Microsoft Excel® files. This file includes the parameters and emission data compiled from each data source and the calculations of TPY emissions. All emission calculations and supporting files are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085). Additional summary emission information can be found in the “Coke Emissions Memorandum,” also in the docket to this rule.

Excel file B-1 includes only 2016 Coke CAA section 114 data.

Excel file B-2 includes only 2022 Coke CAA section 114 data.

Excel file B-3 includes 2016 and 2022 Coke CAA section 114 data for Bypass/waste heat stacks.

Excel file B-4 includes 2016 and 2022 Coke CAA section 114 data for HRSG main stacks.

**Tables B-1 through B-4** below summarize the total HAP emissions (adjusted for non-detected data) for each facility along with a breakdown between Coke PQBS and noncategory source emissions and coke production capacity. Note Table B-1 and B-3 use the existing (old) door COE equation while Table B-2 and Table B-4 use the new door COE equation.

**Table B-1. Coke Oven Total Facility Emissions (TPY)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Facility Name-City-State1** | **Facility Type2 and**  **Coke Type** | **Coke Capacity (TPY)** | **HAP Emissions (TPY) - Actuals3** | | |
| **Source Category CCCCC4** | **Non-Category5,6** | **Total Facility7** |
| ABC-Tarrant-AL | ByP-foundry coke | 699,967 | 9.3 | 14 | 23 |
| CC-Follansbee-WV | ByP-blast furnace coke | 1,346,000 | 11 | 10 | 21 |
| CC-Middletown-OH | ByP-blast furnace coke | 456,000 | 20 | 10 | 30 |
| CC-BurnsHarbor-IN | ByP-blast furnace coke | 1,900,000 | 26 | 89 | 116 |
| CC-Monessen-PA | ByP-blast furnace coke | 372,581 | 2.5 | 5.1 | 7.6 |
| CC-Warren-OH | ByP-blast furnace coke | 549,000 | 7.2 | 8.0 | 15 |
| BLU-Birmingham-AL | ByP-foundry coke | 596,775 | 6.3 | 11 | 17 |
| EES-RiverRouge-MI | ByP-blast furnace coke | 1,050,000 | 20 | 5.4 | 25 |
| USS-Clairton-PA | ByP-blast furnace coke | 6,422,997 | 37 | 37 | 74 |
| SC-EastChicago-IN | HNR-blast furnace coke | 1,300,000 | 524 | 0.0067 | 524 |
| SC-FranklinFurnace-OH | HNR-blast furnace coke | 1,100,000 | 389 | 0.66 | 389 |
| SC-GraniteCity-IL | HNR-blast furnace coke | 650,000 | 202 | 0.36 | 202 |
| SC-Middletown-OH | HNR-blast furnace coke | 550,000 | 49 | 0.0028 | 49 |
| SC-Vansant-VA | HNR-blast furnace coke | 745,000 | 965 | 11 | 976 |
| **Total** |  |  | **2,267** | **201** | **2,468** |

1 AKS = AK Steel. AM = ArcelorMittal. BLU = Bluestone. SC = SunCoke. USS = U.S. Steel.

2 ByP = By-product; HNR = heat and/or nonrecovery.

3 HAP emissions have been adjusted for nondetected values.

4 Includes category emissions from ByP pushing, ByP combustion (battery) stack, HNR operations (HNR pushing, HRSG main stack, HRSG bypass/waste heat stack), quench towers and fugitive pushing.

5 Includes non-category emissions from 40 CFR part 63 subpart L sources (ByP Charging, Doors (using existing equation), Lids, Offtakes, and HNR charging), ByP Boilers, Flares, 40 CFR part 60 subpart L ByP chemical plant, co-located II&S facilities, and other operations.

6 Co-located II&S (non-category) emissions: CC-Middletown-OH = 1.4 TPY; CC-BurnsHarbor-IN = 78 TPY (with sinter plant)

7 931 tpy emissions from HCl (out of 976 total HAP for the facility) are from 16 heat recovery steam generator (HRSG) bypass/waste heat stacks at SC-Vansant-VA, a HNR facility. The footprint of the SC-Vansant-VA facility, among other factors, does not allow for HRSGs. As such, all combusted flue gases are ducted continuously (8,760 hr/yr) to the HRSG bypass/waste heat stacks. Other HNR SunCoke facilities route combusted flue gas to HRSGs and then to a spray dryer absorber (SDA) and baghouse for SO2 and PM control. The SDA also controls HCl.

**Table B-2. Coke Oven Total Facility Emissions (TPY)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Facility Name-City-State1** | **Facility Type2 and**  **Coke Type** | **Coke Capacity (TPY)** | **HAP Emissions (TPY) - Actuals3** | | |
| **Source Category CCCCC4** | **Non-Category5,6** | **Total Facility7** |
| ABC-Tarrant-AL | ByP-foundry coke | 699,967 | 9.3 | 13 | 22 |
| CC-Follansbee-WV | ByP-blast furnace coke | 1,346,000 | 11 | 7.3 | 19 |
| CC-Middletown-OH | ByP-blast furnace coke | 456,000 | 20 | 10 | 29 |
| CC-BurnsHarbor-IN | ByP-blast furnace coke | 1,900,000 | 26 | 88 | 114 |
| CC-Monessen-PA | ByP-blast furnace coke | 372,581 | 2.5 | 4.4 | 6.9 |
| CC-Warren-OH | ByP-blast furnace coke | 549,000 | 7.2 | 7.2 | 14 |
| BLU-Birmingham-AL | ByP-foundry coke | 596,775 | 6.3 | 10 | 16 |
| EES-RiverRouge-MI | ByP-blast furnace coke | 1,050,000 | 20 | 4.4 | 24 |
| USS-Clairton-PA | ByP-blast furnace coke | 6,422,997 | 37 | 28 | 65 |
| SC-EastChicago-IN | HNR-blast furnace coke | 1,300,000 | 524 | 0.0067 | 524 |
| SC-FranklinFurnace-OH | HNR-blast furnace coke | 1,100,000 | 389 | 0.66 | 389 |
| SC-GraniteCity-IL | HNR-blast furnace coke | 650,000 | 202 | 0.36 | 202 |
| SC-Middletown-OH | HNR-blast furnace coke | 550,000 | 49 | 0.0028 | 49 |
| SC-Vansant-VA | HNR-blast furnace coke | 745,000 | 965 | 11 | 976 |
| **Total** |  |  | **2,267** | **183** | **2,451** |

1 AKS = AK Steel. AM = ArcelorMittal. BLU = Bluestone. SC = SunCoke. USS = U.S. Steel.

2 ByP = By-product; HNR = heat and/or nonrecovery.

3 HAP emissions have been adjusted for nondetected values.

4 Includes category emissions from ByP pushing, ByP combustion (battery) stack, HNR operations (HNR pushing, HRSG main stack, HRSG bypass/waste heat stack), quench towers and fugitive pushing.

5 Includes non-category emissions from 40 CFR part 63 subpart L sources (ByP Charging, Doors (using new equation), Lids, Offtakes, and HNR charging), ByP Boilers, Flares, 40 CFR part 60 subpart L ByP chemical plant, co-located II&S facilities, and other operations.

6 Co-located II&S (non-category) emissions: CC-Middletown-OH = 1.4 TPY; CC-BurnsHarbor-IN = 78 TPY (with sinter plant)

7 931 tpy emissions from HCl (out of 976 total HAP for the facility) are from 16 heat recovery steam generator (HRSG) bypass/waste heat stacks at SC-Vansant-VA, a HNR facility. The footprint of the SC-Vansant-VA facility, among other factors, does not allow for HRSGs. As such, all combusted flue gases are ducted continuously (8,760 hr/yr) to the HRSG bypass/waste heat stacks. Other HNR SunCoke facilities route combusted flue gas to HRSGs and then to a spray dryer absorber (SDA) and baghouse for SO2 and PM control. The SDA also controls HCl.

**Table B-3. Coke Oven Total Facility Emissions by Process (TPY)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Process ID** | **HAP Emissions (TPY) – Actuals1** | | | | | | | | | | | | | | |
| **ABC-Tarrant-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **BLU-Birmingham-AL** | **EES-RiverRouge-MI** | **SC-EastChicago-IN** | **SC-FranklinFurnace-OH** | **SC-GraniteCity-IL** | **SC-Middletown-OH** | **SC-Vansant-VA** | **USS-Clairton-PA** | **Process ID Total (TPY)** |
| ByP Pushing (CD) | 3.7 | 0.62 | 0.13 | 3.3 | 0.44 | 0.40 | 2.4 | 1.1 | -- | -- | -- | -- | -- | 4.2 | **16** |
| ByP Battery (Combustion) Stack | 5.1 | 10 | 20 | 22 | 1.8 | 6.6 | 3.4 | 18 | -- | -- | -- | -- | -- | 31 | **117** |
| HRSG Main Stacks2 | -- | -- | -- | -- | -- | -- | -- | -- | 242 | 353 | 177 | 24 | 0 | 0 | **796** |
| HRSG Bypass/waste heat stacks | -- | -- | -- | -- | -- | -- | -- | -- | 280 | 34 | 24 | 24 | 964 | -- | **1,326** |
| HNR Pushing (CD) | -- | -- | -- | -- | -- | -- | -- | -- | 1.2 | 0.61 | 0.39 | 0.31 | 0.48 | -- | **3.0** |
| Quench Tower | 0.29 | 0.31 | 0.22 | 1.0 | 0.19 | 0.20 | 0.19 | 0.55 | 0.72 | 0.38 | 0.24 | 0.20 | 0.39 | 2.1 | **7.0** |
| Fugitive Pushing | 0.19 | 0.045 | 0.019 | 0.13 | 0.014 | 0.031 | 0.27 | 0.087 | 0.068 | 0.036 | 0.022 | 0.019 | 0.037 | 0.019 | **1.0** |
| ByP Charging (oven port only) | 0.070 | 0.068 | 0.089 | 0.29 | 0.056 | 0.074 | 0.056 | 0.035 | -- | -- | -- | -- | -- | 0.29 | **1.0** |
| HNR Charging (CD) | -- | -- | -- | -- | -- | -- | -- | -- | 0.0067 | 0.0053 | 0.0033 | 0.0028 | 0.0032 | 0 | **0.021** |
| Doors-Coke-Side  Existing equation | 1.1 | 1.6 | 0.69 | 1.5 | 0.35 | 0.69 | 1.0 | 0.53 | -- | -- | -- | -- | -- | 4.8 | **12** |
| Doors-Push-Side  Existing equation | 1.1 | 1.6 | 0.69 | 1.5 | 0.35 | 0.69 | 1.0 | 0.53 | -- | -- | -- | -- | -- | 4.8 | **12** |
| Lids3 | 0.0032 | 0.00095 | 0.00040 | 0.019 | 0 | 0.0070 | 0.016 | 0.0015 | -- | -- | -- | -- | -- | 0.0057 | **0.054** |
| Offtakes | 0.00020 | 0.049 | 0.00069 | 0.019 | 0.00084 | 0.072 | 0.028 | 0.0038 | -- | -- | -- | -- | -- | 0.19 | **0.37** |
| ByP Boiler stacks4 | 7.0 | 0.57 | 0.18 | 1.8 | 0.23 | 0.47 | 5.8 | -- | -- | -- | -- | -- | -- | 1.8 | **18** |
| Flare5 | 1.7 | 1.3 | 1.5 | 1.5 | 2.3 | 1.5 | 1.0 | 1.5 | -- | -- | -- | -- | -- | -- | **12** |
| Byproduct chemical plant | 3.1 | 4.6 | 2.0 | 4.1 | 1.8 | 4.4 | 2.1 | 2.8 | -- | -- | -- | -- | -- | 23 | **48** |
| Co-located II&S6 | -- | -- | 1.4 | 78 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **80** |
| Other | 0 | 0.00036 | 3.7 | 0.47 | 0 | 0.080 | 0 | 0 | 0.0000075 | 0.65 | 0.36 | 0 | 11 | 0.17 | **16** |
| **Facility Total (TPY)** | **23** | **21** | **30** | **116** | **7.6** | **15** | **17** | **25** | **302** | **74** | **45** | **44** | **976** | **73** | **2,468** |

1 HAP emissions have been adjusted for non-detected values by using half of the MDL.

2 No HRSG Main Stacks at SC-Vansant-VA.

3 For Lids: ABC-Tarrant-AL and CC-Monessen-PA all batteries had no actual COG emissions.

4 No boiler at EES-RiverRouge-MI.

5 Flare: none at USS-Clairton-PA.

6 Co-located II&S at CC-Middletown-OH and CC-BurnsHarbor-IN.

**Table B-4. Coke Oven Total Facility Emissions by Process (TPY)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Process ID** | **HAP Emissions (TPY) – Actuals1** | | | | | | | | | | | | | | |
| **ABC-Tarrant-AL** | **CC-Follansbee-WV** | **CC-Middletown-OH** | **CC-BurnsHarbor-IN** | **CC-Monessen-PA** | **CC-Warren-OH** | **BLU-Birmingham-AL** | **EES-RiverRouge-MI** | **SC-EastChicago-IN** | **SC-FranklinFurnace-OH** | **SC-GraniteCity-IL** | **SC-Middletown-OH** | **SC-Vansant-VA** | **USS-Clairton-PA** | **Process ID Total (TPY)** |
| ByP Pushing (CD) | 3.7 | 0.62 | 0.13 | 3.3 | 0.44 | 0.40 | 2.4 | 1.1 | -- | -- | -- | -- | -- | 4.2 | **16** |
| ByP Battery (Combustion) Stack | 5.1 | 10 | 20 | 22 | 1.8 | 6.6 | 3.4 | 18 | -- | -- | -- | -- | -- | 31 | **117** |
| HRSG Main Stacks2 | -- | -- | -- | -- | -- | -- | -- | -- | 242 | 353 | 177 | 24 | -- |  | **796** |
| HRSG Bypass/waste heat stacks | -- | -- | -- | -- | -- | -- | -- | -- | 280 | 34 | 24 | 24 | 964 | -- | **1,326** |
| HNR Pushing (CD) | -- | -- | -- | -- | -- | -- | -- | -- | 1.2 | 0.61 | 0.39 | 0.31 | 0.48 | -- | **3.0** |
| Quench Tower | 0.29 | 0.31 | 0.22 | 1.0 | 0.19 | 0.20 | 0.19 | 0.55 | 0.72 | 0.38 | 0.24 | 0.20 | 0.39 | 2.1 | **7.0** |
| Fugitive Pushing | 0.19 | 0.045 | 0.019 | 0.13 | 0.014 | 0.031 | 0.27 | 0.087 | 0.068 | 0.036 | 0.022 | 0.019 | 0.037 | 0.019 | **1.0** |
| ByP Charging (oven port only) | 0.070 | 0.068 | 0.089 | 0.29 | 0.056 | 0.074 | 0.056 | 0.035 | -- | -- | -- | -- | -- | 0.29 | **1.0** |
| HNR Charging (CD) | -- | -- | -- | -- | -- | -- | -- | -- | 0.0067 | 0.0053 | 0.0033 | 0.0028 | 0.0032 | 0 | **0.021** |
| Doors-Coke-Side  New equation | 0.52 | 0.36 | 0.35 | 0.81 | 0.016 | 0.27 | 0.44 | 0.026 | -- | -- | -- | -- | -- | 0.86 | **3.6** |
| Doors-Push-Side  New equation | 0.52 | 0.36 | 0.35 | 0.81 | 0.016 | 0.27 | 0.44 | 0.026 | -- | -- | -- | -- | -- | 0.86 | **3.6** |
| Lids3 | 0.0032 | 0.00095 | 0.00040 | 0.019 | 0 | 0.0070 | 0.016 | 0.0015 | -- | -- | -- | -- | -- | 0.0057 | **0.054** |
| Offtakes | 0.00020 | 0.049 | 0.00069 | 0.019 | 0.00084 | 0.072 | 0.028 | 0.0038 | -- | -- | -- | -- | -- | 0.19 | **0.37** |
| ByP Boiler stacks4 | 7.0 | 0.57 | 0.18 | 1.8 | 0.23 | 0.47 | 5.8 | -- | -- | -- | -- | -- | -- | 1.8 | **18** |
| Flare5 | 1.7 | 1.3 | 1.5 | 1.5 | 2.3 | 1.5 | 1.0 | 1.5 | -- | -- | -- | -- | -- | -- | **12** |
| Byproduct chemical plant | 3.1 | 4.6 | 2.0 | 4.1 | 1.8 | 4.4 | 2.1 | 2.8 | -- | -- | -- | -- | -- | 23 | **48** |
| Co-located II&S6 | -- | -- | 1.4 | 78 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **80** |
| Other | 0 | 0.00036 | 3.7 | 0.47 | 0 | 0.080 | 0 | 0 | 0.0000075 | 0.65 | 0.36 | 0 | 11 | 0.17 | **16** |
| **Facility Total (TPY)** | **22** | **19** | **29** | **114** | **6.9** | **14** | **16** | **24** | **302** | **74** | **45** | **44** | **976** | **65** | **1,751** |

1 HAP emissions have been adjusted for non-detected values by using half of the MDL.

2 No HRSG Main Stacks at SC-Vansant-VA.

3 For Lids: ABC-Tarrant-AL and CC-Monessen-PA all batteries had no actual COG emissions.

4 No boiler at EES-RiverRouge-MI.

5 Flare: none at USS-Clairton-PA.

6 Co-located II&S at CC-Middletown-OH and CC-BurnsHarbor-IN.

**Tables B-3** through **B-7 s**ummarize the individual HAP emission factors for D/F, PAH, and VOHAP per coke type and process type.

**Table B-3. Pushing (CD) Default Emission Factors per Coke Type**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)1** | | |
| --- | --- | --- | --- |
| **ByP –**  **Blast Furnace Coke** | **ByP –**  **Foundry Coke** | **HNR –**  **Blast Furnace Coke** |
| Acenaphthene | 8.95E-07 | 1.58E-05 | 2.72E-08 |
| Acenaphthylene | 9.40E-07 | 3.20E-05 | 8.65E-08 |
| Anthracene | 9.15E-07 | 2.57E-05 | 1.25E-08 |
| Benz[a]anthracene | 8.92E-07 | 5.69E-07 | 2.06E-09 |
| Benzo[a]pyrene | 8.88E-07 | 5.69E-07 | 4.82E-09 |
| Benzo[b]fluoranthene | 8.94E-07 | 5.69E-07 | 1.00E-08 |
| Benzo[g,h,i]perylene | 1.03E-06 | 5.69E-07 | 8.08E-09 |
| Benzo[k]fluoranthene | 8.93E-07 | 5.69E-07 | 1.86E-09 |
| Chrysene | 9.00E-07 | 5.69E-07 | 1.16E-08 |
| Dibenz[a,h]anthracene | 8.87E-07 | 5.69E-07 | 5.71E-11 |
| Fluoranthene | 9.43E-07 | 3.78E-05 | 1.27E-07 |
| Fluorene | 9.53E-07 | 4.90E-05 | 1.23E-07 |
| Indeno[1,2,3-cd]pyrene | 8.91E-07 | 5.69E-07 | 4.70E-09 |
| Naphthalene | 2.14E-05 | 3.57E-04 | 2.89E-06 |
| Phenanthrene | 1.08E-06 | 1.03E-04 | 7.75E-07 |
| Perylene | 7.05E-07 | 5.69E-07 | 3.80E-09 |
| Pyrene | 9.13E-07 | 1.84E-05 | 2.39E-08 |
| 2,3,7,8-Tetrachlorodibenzo-p-Dioxin | 2.71E-13 | 6.91E-13 | 5.88E-14 |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | 2.69E-13 | 5.80E-13 | 1.76E-13 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | 2.61E-13 | 3.59E-13 | 1.41E-13 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | 3.29E-13 | 3.63E-13 | 2.41E-13 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | 3.15E-13 | 3.32E-13 | 1.94E-13 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin | 9.82E-13 | 1.41E-12 | 1.24E-12 |
| Total OCDD2 | 3.46E-12 | 1.11E-11 | 5.77E-12 |
| 2,3,7,8-Tetrachlorodibenzofuran | 1.51E-12 | 1.33E-11 | 3.71E-13 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 3.79E-13 | 6.76E-13 | 1.47E-13 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 4.61E-13 | 8.11E-13 | 1.87E-13 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 7.42E-13 | 1.34E-12 | 5.46E-13 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 3.72E-13 | 5.51E-13 | 2.67E-13 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 3.33E-13 | 5.09E-13 | 1.94E-13 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 2.95E-13 | 3.38E-13 | 2.32E-14 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 8.74E-13 | 2.46E-12 | 7.90E-13 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 2.50E-13 | 2.90E-13 | 1.42E-13 |
| Total OCDF2 | 2.17E-13 | 1.77E-12 | 1.62E-12 |
| Formaldehyde | 3.01E-06 | 7.58E-06 | 1.38E-05 |
| Acrylonitrile | 5.54E-06 | 1.02E-04 | 2.52E-07 |
| Benzene | 4.45E-05 | 4.08E-03 | 1.91E-06 |
| Bromoform | 2.91E-06 | 6.89E-05 | 9.28E-08 |
| Bromomethane | 2.24E-05 | 2.36E-04 | 1.43E-07 |
| Carbon disulfide | 5.30E-06 | 1.34E-04 | 1.15E-05 |
| Carbon tetrachloride | 3.57E-06 | 8.16E-05 | 3.40E-08 |
| Chlorobenzene | 3.50E-06 | 6.92E-05 | 1.12E-08 |
| Chloroethane | 6.98E-06 | 9.20E-05 | 4.40E-08 |
| Chloroform | 2.90E-06 | 5.98E-05 | 1.39E-08 |
| Chloromethane | 1.60E-05 | 1.75E-04 | 9.16E-07 |
| 1,2-Dichloroethane | 3.49E-06 | 5.36E-05 | 2.42E-08 |
| 1,1-Dichloroethene | 2.91E-06 | 5.98E-05 | 1.32E-08 |
| 1,2-Dichloropropane | 3.50E-06 | 6.60E-05 | 1.30E-08 |
| Ethylbenzene | 4.03E-06 | 2.02E-04 | 2.08E-08 |
| Iodomethane | 5.03E-06 | 8.50E-05 | 1.03E-07 |
| Methylene chloride3 | 2.79E-05 | 1.66E-03 | 2.23E-07 |
| Styrene | 1.52E-05 | 1.44E-04 | 1.93E-08 |
| 1,1,2,2-Tetrachloroethane | 6.99E-06 | 1.04E-04 | 1.40E-07 |
| Tetrachloroethene | 3.57E-06 | 9.41E-05 | 9.85E-09 |
| Toluene3 | 1.54E-04 | 2.29E-03 | 1.38E-07 |
| 1,1,1-Trichloroethane | 3.56E-06 | 7.54E-05 | 1.08E-08 |
| 1,1,2-Trichloroethane | 3.99E-06 | 6.81E-05 | 6.12E-08 |
| Trichloroethene | 3.50E-06 | 6.60E-05 | 1.63E-08 |
| Vinyl chloride | 3.33E-06 | 6.27E-05 | 4.99E-08 |
| Xylenes (total) | 7.90E-06 | 1.21E-03 | 9.24E-08 |

1 Estimated SC-Middletown-OH and SC-GraniteCity-IL Coke produced using the “Erie Coke wet coal charged capacity/coke produced” capacity ratio of 1.3, applied to the wet coal charged values reported by SunCoke.

2 ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**.

3 The CC-BurnsHarbor-IN SW 846 0031 data for methylene chloride and toluene were not used in the average. See **Section 3.1.4**

**Table B-4. ByP Battery Stack Default Emission Factors per Coke Type**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)** | |
| --- | --- | --- |
| **ByP & HNR –**  **Blast Furnace Coke** | **ByP –**  **Foundry Coke** |
| Acenaphthene | 2.41E-06 | 7.53E-06 |
| Acenaphthylene | 2.97E-05 | 8.81E-05 |
| Anthracene | 5.14E-06 | 7.53E-06 |
| Benz[a]anthracene | 3.38E-06 | 7.53E-06 |
| Benzo[a]pyrene | 1.80E-06 | 7.53E-06 |
| Benzo[b]fluoranthene | 5.36E-06 | 7.53E-06 |
| Benzo[g,h,i]perylene | 2.15E-06 | 7.53E-06 |
| Benzo[k]fluoranthene | 3.24E-06 | 7.53E-06 |
| Chrysene | 6.24E-06 | 7.53E-06 |
| Dibenz[a,h]anthracene | 1.79E-06 | 7.53E-06 |
| Fluoranthene | 2.83E-05 | 1.55E-04 |
| Fluorene | 7.89E-06 | 3.86E-05 |
| Indeno[1,2,3-cd]pyrene | 1.95E-06 | 7.53E-06 |
| Naphthalene | 4.38E-04 | 3.83E-03 |
| Phenanthrene | 5.23E-05 | 4.02E-04 |
| Perylene | 8.56E-07 | 7.53E-06 |
| Pyrene | 2.36E-05 | 7.53E-06 |
| 2,3,7,8-Tetrachlorodibenzo-p-Dioxin | 3.81E-12 | 9.75E-12 |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | 6.50E-12 | 7.82E-12 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | 4.36E-12 | 4.54E-12 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | 8.97E-12 | 1.82E-11 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | 5.78E-12 | 1.44E-11 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin | 4.08E-11 | 4.01E-11 |
| Total OCDD | 1.62E-10 | 1.62E-10 |
| 2,3,7,8-Tetrachlorodibenzofuran | 4.22E-11 | 2.34E-10 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 1.43E-11 | 5.77E-11 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 1.70E-11 | 3.07E-11 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 3.43E-11 | 7.37E-11 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 1.54E-11 | 2.23E-11 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 2.51E-11 | 5.22E-12 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 2.64E-12 | 1.24E-11 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 1.06E-10 | 5.72E-11 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 1.06E-11 | 1.52E-11 |
| Total OCDF | 9.90E-11 | 9.90E-11 |
| Formaldehyde | 9.62E-06 | 7.29E-05 |
| Acrylonitrile | 5.81E-05 | 3.31E-05 |
| Benzene | 5.91E-03 | 9.76E-04 |
| Bromoform | 1.06E-05 | 1.78E-05 |
| Bromomethane | 8.36E-05 | 2.54E-05 |
| Carbon disulfide | 1.31E-04 | 3.49E-05 |
| Carbon tetrachloride | 1.12E-05 | 2.05E-05 |
| Chlorobenzene | 1.07E-05 | 1.35E-05 |
| Chloroethane | 2.01E-05 | 1.34E-05 |
| Chloroform | 1.41E-05 | 1.46E-05 |
| Chloromethane | 6.24E-05 | 2.22E-05 |
| 1,2-Dichloroethane | 1.03E-05 | 1.20E-05 |
| 1,1-Dichloroethene | 1.07E-05 | 1.35E-05 |
| 1,2-Dichloropropane | 1.07E-05 | 1.35E-05 |
| Ethylbenzene | 2.53E-05 | 2.29E-05 |
| Iodomethane | 2.43E-05 | 1.94E-05 |
| Methylene chloride | 3.35E-04 | 7.75E-05 |
| Styrene | 8.38E-05 | 2.16E-05 |
| 1,1,2,2-Tetrachloroethane | 2.05E-05 | 1.91E-05 |
| Tetrachloroethene | 1.15E-05 | 2.48E-05 |
| Toluene | 1.46E-03 | 3.74E-04 |
| 1,1,1-Trichloroethane | 1.10E-05 | 1.79E-05 |
| 1,1,2-Trichloroethane | 1.66E-05 | 2.05E-05 |
| Trichloroethene | 1.07E-05 | 1.35E-05 |
| Vinyl chloride | 1.65E-05 | 1.79E-05 |
| Xylenes (total) | 2.77E-04 | 1.46E-04 |
| Note: ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**. | | |

**Table B-5. HRSG Main Stack and HRSG Bypass/Waste Heat Stack Default Emission Factors**

| **HAP** | **Default Emission Factor**  **(lb/hr)** | |
| --- | --- | --- |
| **HRSG Main Stack** | **HRSG Bypass/Waste Heat Stack** |
| Acenaphthene | 9.49E-06 | 2.21E-05 |
| Acenaphthylene | 5.27E-06 | 1.74E-05 |
| Anthracene | 1.28E-05 | 6.14E-05 |
| Benz[a]anthracene | 1.14E-05 | 2.69E-06 |
| Benzo[a]pyrene | 9.90E-06 | 2.84E-06 |
| Benzo[b]fluoranthene | 2.14E-05 | 1.35E-06 |
| Benzo[g,h,i]perylene | 5.78E-05 | 3.13E-06 |
| Benzo[k]fluoranthene | 7.79E-06 | 2.03E-06 |
| Chrysene | 2.21E-05 | 1.46E-06 |
| Dibenz[a,h]anthracene | 1.95E-06 | 9.00E-08 |
| Fluoranthene | 1.25E-04 | 1.43E-05 |
| Fluorene | 3.83E-05 | 1.27E-05 |
| Indeno[1,2,3-cd]pyrene | 1.09E-05 | 3.63E-07 |
| Naphthalene | 7.25E-04 | 4.60E-05 |
| Phenanthrene | 3.02E-04 | 8.90E-05 |
| Perylene | 1.57E-06 | 1.75E-06 |
| Pyrene | 1.26E-04 | 8.77E-06 |
| 2,3,7,8-Tetrachlorodibenzo-p-Dioxin | 8.60E-10 | 2.39E-10 |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | 1.01E-09 | 5.54E-11 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | 1.23E-09 | 3.76E-11 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | 1.06E-09 | 3.65E-11 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | 1.28E-09 | 3.59E-11 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin | 1.22E-08 | 1.19E-09 |
| Total OCDD | 3.51E-08 | 8.71E-09 |
| 2,3,7,8-Tetrachlorodibenzofuran | 1.35E-09 | 6.53E-10 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 1.70E-09 | 4.23E-11 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 1.05E-09 | 4.25E-11 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 1.10E-09 | 2.05E-10 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 1.14E-09 | 7.90E-11 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 1.07E-09 | 7.55E-10 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 9.78E-10 | 2.98E-11 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 2.32E-09 | 2.60E-10 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 1.88E-09 | 5.75E-11 |
| Total OCDF | 3.40E-09 | 4.13E-10 |
| Formaldehyde | 5.19E-01 | 9.11E-02 |
| Acrylonitrile | -- | 3.43E-04 |
| Benzene | 1.00E-01 | 3.07E-04 |
| Bromoform | -- | 1.27E-04 |
| Bromomethane | -- | 1.20E-03 |
| Carbon disulfide | -- | 3.07E-04 |
| Carbon tetrachloride | -- | 1.48E-05 |
| Chlorobenzene | -- | 1.18E-05 |
| Chloroethane | -- | 6.50E-05 |
| Chloroform | -- | 1.25E-05 |
| Chloromethane | -- | 2.10E-03 |
| 1,2-Dichloroethane | -- | 3.25E-05 |
| 1,1-Dichloroethene | -- | 1.82E-05 |
| 1,2-Dichloropropane | -- | 1.87E-05 |
| Ethylbenzene | 1.00E-01 | 2.63E-05 |
| Iodomethane | -- | 5.67E-04 |
| Methylene chloride | -- | 2.07E-04 |
| Styrene | -- | 3.90E-05 |
| 1,1,2,2-Tetrachloroethane | -- | 2.25E-04 |
| Tetrachloroethene | -- | 1.37E-05 |
| Toluene | 1.00E-01 | 6.47E-05 |
| 1,1,1-Trichloroethane | -- | 1.42E-05 |
| 1,1,2-Trichloroethane | -- | 9.67E-05 |
| Trichloroethene | -- | 2.40E-05 |
| Vinyl chloride | -- | 4.70E-05 |
| Xylenes (total) | 2.71E-01 | 9.83E-05 |

**Table B-6. Quench Tower Default Emission Factors**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)** |
| --- | --- |
| **ByP & HNR** |
| Acenaphthene | 2.00E-06 |
| Acenaphthylene | 2.00E-06 |
| Anthracene | 3.24E-06 |
| Benz[a]anthracene | 2.00E-06 |
| Benzo[a]pyrene | 2.00E-06 |
| Benzo[b]fluoranthene | 2.00E-06 |
| Benzo[g,h,i]perylene | 2.00E-06 |
| Benzo[k]fluoranthene | 2.00E-06 |
| Chrysene | 3.52E-06 |
| Dibenz[a,h]anthracene | 2.00E-06 |
| Fluoranthene | 8.78E-06 |
| Fluorene | 2.00E-06 |
| Indeno[1,2,3-cd]pyrene | 2.00E-06 |
| Naphthalene | 2.11E-05 |
| Phenanthrene | 1.06E-05 |
| Perylene | No data |
| Pyrene | 7.16E-06 |
| 2,3,7,8-Tetrachlorodibenzo-p-Dioxin | 1.86E-12 |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | 1.93E-12 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | 1.21E-12 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | 2.12E-12 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | 2.36E-12 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin | 6.45E-12 |
| Total OCDD | 1.66E-11 |
| 2,3,7,8-Tetrachlorodibenzofuran | 2.61E-11 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 4.42E-12 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 7.30E-12 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 7.70E-12 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 7.03E-12 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 6.79E-12 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 1.28E-12 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 2.43E-11 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 3.37E-12 |
| Total OCDF | 9.46E-12 |
| Formaldehyde | 1.28E-05 |
| Acrylonitrile | 2.10E-06 |
| Benzene | 5.78E-05 |
| Bromoform | 2.38E-06 |
| Bromomethane | 8.50E-06 |
| Carbon disulfide | 9.75E-05 |
| Carbon tetrachloride | 2.55E-06 |
| Chlorobenzene | 2.13E-06 |
| Chloroethane | 3.16E-06 |
| Chloroform | 1.89E-06 |
| Chloromethane | 1.02E-05 |
| 1,2-Dichloroethane | 1.79E-06 |
| 1,1-Dichloroethene | 2.13E-06 |
| 1,2-Dichloropropane | 2.13E-06 |
| Ethylbenzene | 7.51E-06 |
| Iodomethane | 2.71E-06 |
| Methylene chloride | 6.36E-05 |
| Styrene | 6.28E-06 |
| 1,1,2,2-Tetrachloroethane | 3.58E-06 |
| Tetrachloroethene | 3.39E-06 |
| Toluene | 2.33E-05 |
| 1,1,1-Trichloroethane | 2.38E-06 |
| 1,1,2-Trichloroethane | 1.34E-06 |
| Trichloroethene | 2.13E-06 |
| Vinyl chloride | 2.05E-06 |
| Note: USS-Clairton-PA did not have emission values for perylene (see **Section 3.1.2**). | |

**Table B-7. ByP Boiler Default Emission Factors per Coke Type**

| **HAP** | **Default Emission factor (lb/mmscf COG)** | |
| --- | --- | --- |
| **ByP –**  **Blast Furnace Coke** | **ByP –**  **Foundry Coke** |
| Acenaphthene | 3.62E-04 | 9.95E-04 |
| Acenaphthylene | 3.62E-04 | 9.95E-04 |
| Anthracene | 3.62E-04 | 9.95E-04 |
| Benz[a]anthracene | 3.62E-04 | 9.95E-04 |
| Benzo[a]pyrene | 3.62E-05 | 3.31E-03 |
| Benzo[b]fluoranthene | 1.81E-05 | 7.19E-03 |
| Benzo[g,h,i]perylene | 3.54E-04 | 9.95E-04 |
| Benzo[k]fluoranthene | 3.62E-05 | 8.52E-03 |
| Chrysene | 2.42E-04 | 9.95E-04 |
| Dibenz[a,h]anthracene | 1.81E-05 | 9.95E-04 |
| Fluoranthene | 3.62E-04 | 9.95E-04 |
| Fluorene | 3.62E-04 | 3.26E-03 |
| Indeno[1,2,3-cd]pyrene | 3.62E-05 | 9.95E-04 |
| Naphthalene | 3.62E-04 | 2.37E+00 |
| Phenanthrene | 3.62E-04 | 3.26E-03 |
| Perylene | 9.06E-05 | 9.95E-04 |
| Pyrene | 3.62E-04 | 9.95E-04 |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 6.27E-11 | 9.87E-10 |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 7.06E-11 | 5.92E-10 |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 6.03E-11 | 5.85E-10 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 6.08E-11 | 5.92E-10 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 5.60E-11 | 5.46E-10 |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 2.63E-10 | 2.82E-09 |
| Total OCDD | No data | No data |
| 2,3,7,8-Tetrachlorodibenzofuran | 1.70E-09 | 6.99E-09 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 1.36E-10 | 7.14E-10 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 3.71E-10 | 2.20E-09 |
| 1,2,3,4,7,8-Hexachlorodibenzofuran | 3.54E-10 | 3.10E-09 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 2.29E-10 | 1.13E-09 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 1.80E-10 | 9.42E-10 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 6.34E-11 | 5.95E-10 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 5.37E-10 | 4.22E-09 |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran | 6.57E-11 | 5.57E-10 |
| Total OCDF1 | No data | No data |
| Note: ForCC-Monessen-PA and EC-Erie-PA, data for some congeners were not available. See **Section 3.1.2**. | | |

# APPENDIX C:

# COKE OVEN RISK MODELING DATABASE

The Coke Oven Risk Modeling Database is provided in the accompanying Microsoft Excel® file. This file contains HAP emissions data from coke units (also located in the Coke Oven Emissions Database), along with modeling release point characteristics, operating data, and other information relevant to risk modeling. All information and supporting files are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085).

Excel file C-1 modeling file with door COE using old equation

Excel file C-2 modeling file with door COE using new question

|  |
| --- |
| ***Note*: If you have comments on these data files, please see *section VII* of the Coke Ovens *proposal preamble* titled “*Submitting Data Corrections*” for directions on how to submit your comments. The data files used in the Coke Ovens source category risk and demographic analyses and instructions for making comments are available for download on the *EPA’s Risk and Technology Review* website at** [***https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html***](https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html)**.**  ***To submit comments on specific data*:**  1) Go to the EPA Risk and Technology Review website at [*https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html*](https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html).  2) Scroll down to the list of Source Categories and click on the “*Coke Ovens: Pushing, Quenching and Battery Stacks*” link.  3) Scroll down to the “*Additional Resources*” section and click on the “Public Comment Review Tool” link.  4) You will be prompted to open/save a zip file containing pdf instructions and a Microsoft Access Database file.  5) Review the pdf instructions for making and submitting data corrections in this file.  6) You can enter your suggested revisions or add comments in the appropriate data fields. You also will be asked to provide identifying information.  7) You must then submit the file with your comments to Coke PQBS Docket ID No. EPA-HQ-OAR-2002-0085 by any of the following methods:   * Federal eRulemaking Portal: [*https://www.regulations.gov/*](https://www.regulations.gov/)(*our preferred method*). Follow the online instructions for submitting comments.   + - * Email: *a-and-r-docket@epa.gov*. Include Docket ID No. EPA-HQ-OAR-2002-0085 in the subject line of the message.       * Fax:(202) 566-9744. Attention Docket ID No. EPA-HQ-OAR-2002-0085.       * Mail:U.S. Environmental Protection Agency, EPA Docket Center, Docket ID No. EPA-HQ-OAR-2002-0085, Mail Code 28221T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.       * Hand/Courier Delivery:EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue, NW, Washington, DC 20004. The Docket Cenetr’s hours of operation are 8:30 a.m. – 4:30 p.m., Monday – Friday (except Federal holidays). |

# APPENDIX D:

# ERIE COKE DATA

The following tables summarize the 2016 Coke 114 request data received from Erie Coke. All Erie Coke 114 request submissions are included in the Coke PQBS docket (EPA-HQ-OAR-2002-0085).

**Table D-1. Erie Coke Facility Information and 114 Request Status**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Facility Name** | **Company Name** | **Facility ID** | **City** | **State** | **Type of Coke and Facility1** | **Coke 114 Request Submissions2** | **Actual Production**  **(TPY Coke)3** |
| Erie Coke Corporation4 | Erie Coke Corporation | EC-Erie-PA | Erie | PA | Foundry | Yes (T) | 122,387 |

1 BF = blast furnace. ByP = by-product. HNR = heat and/or nonrecovery.

2 T = Facility also performed testing as part of Coke 114 request.

3 Typical production as estimated by: the facilities in their Coke 114 request Enclosure 1 responses; at 55 percent capacity utilization of coke production design capacity from Coke 114 request Enclosure 1 responses for facilities that did not provide actual coke production values; industry during the Coke 114 request review process; and using 1998 coke production values from the NESHAP for Coke Ovens: Pushing, Quenching, and Battery Stacks – Background Information for Proposed Standards, February 2001, EPA-453/R01-006 (EPA, 2001a).

4 The Erie Coke facility closed in 2019; however, the data were used in the Coke Oven Emissions Database to estimate emission for other foundry coke facilities.

**Table D-2. Erie Coke Units Tested for the Coke 114 Request**

| **Facility ID** | **Unit ID** | **Type of Coke** |
| --- | --- | --- |
| ***EP-1 ByP Pushing (CD)*** | | |
| EC-Erie-PA | Coke Side Shed Baghouse (802) | Foundry |
| ***EP-3 ByP Battery Stack*** | | |
| EC-Erie-PA | Battery Combustion Stack (805) | Foundry |
| ***EP-4 ByP Boiler Stacks*** | | |
| EC-Erie-PA | Boiler #1 Stack | Foundry |

**Table D-3. Pushing (CD) Default Emission Factors1 per Coke Type**

**Developed from Erie Coke 114 Request Test Data**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)** |
| --- | --- |
| **ByP - Foundry Coke** |
| **HAP Metals** | |
| Antimony | 1.54E-07 |
| Arsenic | 2.10E-07 |
| Beryllium | 3.86E-08 |
| Cadmium | 1.27E-07 |
| Chromium (total)2 | 3.53E-06 |
| Chromium III2 | 3.43E-06 |
| Chromium VI2 | 1.06E-07 |
| Cobalt | 1.15E-07 |
| Lead | 4.36E-07 |
| Manganese | 4.58E-05 |
| Mercury (total)2 | 1.01E-07 |
| Elemental gaseous Hg2 | 8.08E-08 |
| Gaseous divalent Hg2 | 1.51E-08 |
| Particulate divalent Hg2 | 5.05E-09 |
| Nickel | 3.54E-06 |
| Selenium | 6.70E-07 |
| **Other (Gaseous) HAP** | |
| Carbon disulfide | 1.34E-04 |
| Formaldehyde | 7.58E-06 |
| Hydrogen chloride | 1.00E-03 |
| Hydrogen cyanide | 4.49E-04 |
| Hydrogen fluoride | 4.37E-04 |
| Total D/F3 | 3.68E-11 |
| Total PAH3 | 6.44E-04 |
| Total VOHAP3,4,5 | 1.12E-02 |
| 1 See **Table 14** for the data source for each type of emissions factor.  2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.  3 See **Appendix B** for the individual HAP in the groups.  4 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately  5 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately. | |

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**Table D-4. ByP Battery Stack Default Emission Factors1 per Coke Type**

**Developed from Erie Coke 114 Request Test Data**

| **HAP** | **Default Emission Factor**  **(lb/ton coke produced)** |
| --- | --- |
| **ByP – Foundry Coke** |
| **HAP Metals** | |
| Antimony | 1.97E-06 |
| Arsenic | 2.87E-05 |
| Beryllium | 4.92E-07 |
| Cadmium | 7.34E-07 |
| Chromium (total)2 | 1.20E-04 |
| Chromium III2 | 1.16E-04 |
| Chromium VI2 | 3.59E-06 |
| Cobalt | 7.41E-06 |
| Lead | 3.01E-05 |
| Manganese | 7.71E-05 |
| Mercury (total)2 | 4.99E-06 |
| Elemental gaseous Hg2 | 3.99E-06 |
| Gaseous divalent Hg2 | 7.49E-07 |
| Particulate divalent Hg2 | 2.50E-07 |
| Nickel | 1.52E-04 |
| Selenium | 1.79E-05 |
| **Other (Gaseous) HAP** | |
| Carbon disulfide | 3.49E-05 |
| Formaldehyde | 7.29E-05 |
| Hydrogen chloride | 8.29E-03 |
| Hydrogen cyanide | 3.77E-03 |
| Hydrogen fluoride | 2.69E-04 |
| Total D/F3 | 8.63E-10 |
| Total PAH3 | 4.60E-03 |
| Total VOHAP3,4,5 | 1.95E-03 |
| 1 See **Table 14** for the data source for each type of emissions factor.  2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.  3 See **Appendix B** for the individual HAP in the groups.  4 Although formaldehyde is a VOHAP, because formaldehyde is a separately CAA-listed HAP and was measured in a separate and different test method than VOHAP, it is listed here separately  5 Although carbon disulfide was measured with the same test method as the VOHAP, it is an inorganic HAP and, as such, is listed here separately. | |

**Table D-5. ByP Boiler Default Emission Factors1 per Coke Type**

**Developed from Erie Coke 114 Request Test Data**

| **HAP** | **Default Emission factor**  **(lb/mmscf COG)** |
| --- | --- |
| **ByP - Foundry Coke** |
| **HAP Metals** |  |
| Antimony | 2.58E-04 |
| Arsenic | 1.61E-02 |
| Beryllium | 6.44E-05 |
| Cadmium | 1.31E-03 |
| Chromium (total)2 | 4.27E-02 |
| Chromium III2 | 4.14E-02 |
| Chromium VI2 | 1.28E-03 |
| Cobalt | 1.62E-03 |
| Lead | 4.56E-03 |
| Manganese | 2.25E-02 |
| Mercury (total)2 | 5.42E-04 |
| Elemental gaseous Hg2 | 4.34E-04 |
| Gaseous divalent Hg2 | 8.13E-05 |
| Particulate divalent Hg2 | 2.71E-05 |
| Nickel | 1.06E-01 |
| Selenium | 5.59E-03 |
| **Other (Gaseous) HAP** |  |
| Hydrogen chloride | 2.33E+00 |
| Hydrogen cyanide | 3.59E-01 |
| Hydrogen fluoride | 6.29E-02 |
| Total D/F3,4 | 2.66E-08 |
| Total PAH3 | 2.40E+00 |
| 1 See **Table 25** for the data source for each type of emissions factor.  2 ForHg and Cr speciation factors, see **Section 2.5**. Total Hg and Cr provided for information purposes only.  3 See **Appendix B** for the individual HAP in the groups.  4 ForEC-Erie-PA, data for some congeners were not available. See **Section 3.1.2** | | |

**Table D-6. Erie Coke Annual Coke Production by Battery**

| **Facility ID** | **Battery ID** | **Coke Production Value Used for "Actuals" TPY** |
| --- | --- | --- |
| EC-Erie-PA | Battery A | 48,533 |
| EC-Erie-PA | Battery B | 73,854 |
| Note: Values as reported by facility in Coke 114 request Enclosure 1 (Q29.b-pt.8) for total production for 2015. | | |

**Table D-7. Erie Coke PQBS Noncategory Unit Counts - Coke Ovens Subpart L**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Facility ID** | **Battery ID** | **#Ovens Per Battery** | **Type of Coke** | **Per Oven** | | **Per Battery** | | |
| **Lids** | **Offtakes** | **Doors** | **Lids** | **Offtakes** |
| EC-Erie-PA | Battery A | 23 | Foundry | 1 | 5 | 23 | 115 | 23 |
| EC-Erie-PA | Battery B | 35 | Foundry | 1 | 5 | 35 | 175 | 35 |

**Table D-8. Erie Coke Charging COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Visible Emissions per Charge (sec)1** | | **Charges/**  **year1** | **COE Emission Rate from Charging2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **lb/yr** | **TPY** | |
| **By Battery** | **Facility Average** | **By Battery** | **By Facility** |
| EC-Erie-PA | Battery A | 3.7 | 3.7 | 4,001 | 13.67 | 0.0068 | 0.017 |
| EC-Erie-PA | Battery B | 3.7 | 6,088 | 20.81 | 0.010 |
| 1 Data from the Coke 114 request.  2 COE from charging (lb) = VE x (charges/year) x (0.0093 lb COE/10 seconds). | | | | | | | |

**Table D-9. Erie Coke Doors COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **Total Number of Battery Doors (ND)1** | **Percent Leaking Doors (PLD) Determined by**  **Method 3031** | | **COE Emission Rate from Door Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| EC-Erie-PA | Battery A | 23 | 0.36% | 0.43% | 0.04 | 0.15 | 0.40 |
| EC-Erie-PA | Battery B | 35 | 0.50% | 0.06 | 0.24 |
| 1 From Coke 114 request.  2 COEdoors (lb/hr) = ND x (PLDYARD/100) x (0.04 lb/hr) + ND x (6% PLDBENCH/100) x (0.023 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

**Table D-10. Erie Coke Lids COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NL = total number of lids on battery** | **Percent Leaking Lids (PLL) Determined by**  **Method 3031** | | **COE Emission Rate from Lid Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| EC-Erie-PA | Battery A | 115 | 0.022% | 0.019% | 0.000187 | 8.2E-04 | 1.8E-03 |
| EC-Erie-PA | Battery B | 175 | 0.017% | 0.000219 | 9.6E-04 |
| 1 From Coke 114 request.  2 COElids = NL x (PLL/100) x (0.0075 lb/hr). Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

**Table D-11. Erie Coke Offtakes COE Emission Calculation Elements and Results**

| **Facility ID** | **Battery ID** | **NO = total number of offtakes on battery** | **Percent Leaking Offtakes (PLO) Determined by**  **Method 3031** | | **COE Emission Rate from Offtake Leaks2** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **By Battery** | **Facility Average** | **lb/hr** | **TPY** | |
| **By Battery** | **By Facility** |
| EC-Erie-PA | Battery A | 23 | 0.14% | 0.14% | 0.000234 | 1.0E-03 | 2.7E-03 |
| EC-Erie-PA | Battery B | 35 | 0.15% | 0.000392 | 1.7E-03 |
| 1 From Coke 114 request.  2 COEofftakes = NO x (PLO/100) x (0.0075 lb/hr. Leaks are assumed to occur 8,760 hours per year. | | | | | | | |

**Table D-12. Development of Default Allowables-to-Actuals Ratios for Pushing Units**

**from PM Test Data (Actuals)**

| **Facility and Unit ID** | **Pushing Limit Category** | **Type of Coke** | **Coke PQBS**  **Pushing Limit** | **PM**  **Test Data** | **Data and Limit UOM** | **Ratio Limit/Actual** |
| --- | --- | --- | --- | --- | --- | --- |
| EC-Erie-PA  Coke-Side Shed Baghouse 802 | Cokeside shed  vented to CD | Foundry | 0.01 | 0.0010 | gr PM/ dscf | 9.8 |
|  | ***Average Cokeside Shed Vented to CD*** | | | |  | **9.8** |

**Table D-13. Development of Default Allowables-to-Actuals Ratios for Battery Stack Units**

**from Opacity Test Data (Actuals)**

| **Facility ID** | **Unit ID** | **Type of Coke** | **Average Opacity (percent)** | **Normal / Extended Coking** | **Opacity Limit (percent)** | **Ratio Allowable-to-Actual** |
| --- | --- | --- | --- | --- | --- | --- |
| EC-Erie-PA | Battery Combustion Stack (805) | Foundry | 3.6 | Extended | 20 | 5.6 |
| ***Average for Foundry Coke – Extended Coking*** | | | | | | **5.6** |

# APPENDIX E:

# SOURCE CLASSIFICATION CODES

The Source Classification Codes (SCC) and descriptions for Coke PQBS source category and noncategory process units at coke facilities are shown in **Table E-1** and **Table E-2**. These codes are used in the Coke Oven Risk Modeling Database.

**Table E-1. SCC for Coke PQBS Sources at Coke Oven Facilities**

| **SCC** | **SCC level one** | **SCC level two** | **SCC level three** | **SCC level four** |
| --- | --- | --- | --- | --- |
| 30300303 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Oven Pushing |
| 30300304 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Quenching |
| 30300317 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Combustion Stack: Coke Oven Gas (COG) |
| 30300371 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Heat/No Chemical Recovery Process: Pushing |
| 30300372 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Heat/No Chemical Recovery Process: Quenching |
| 30300376 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Heat/No Chemical Recovery Process: Main Stack |
| 30300381 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Nonrecovery Process: Pushing |
| 30300382 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Nonrecovery Process: Quenching |
| 30300384 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Nonrecovery Process: Waste Heat Stack |

**Table E-2. SCC for Noncategory Sources at Coke Facilities**

| **SCC** | **SCC Level One** | **SCC Level Two** | **SCC Level Three** | **SCC Level Four** |
| --- | --- | --- | --- | --- |
| 10200602 | External Combustion | Industrial: Boilers | Natural Gas | 10-100 Million BTU/hr |
| 10200603 | External Combustion | Industrial: Boilers | Natural Gas | < 10 Million BTU/hr |
| 10200707 | External Combustion | Industrial: Boilers | Process Gas | Coke Oven Gas |
| 10300601 | External Combustion | Commercial/Institutional: Boilers | Natural Gas | > 100 Million BTU/hr |
| 10500106 | External Combustion | Space Heaters | Industrial | Natural Gas |
| 20200102 | Internal Combustion Engines | Industrial | Distillate Oil (Diesel) | Reciprocating |
| 30300302 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Oven Charging |
| 30300308 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Oven/Door Leaks |
| 30300314 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Topside Leaks, Lid Leaks |
| 30300315 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Gas By-product Plant |
| 30300320 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Offtake Leaks |
| 30300331 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: General |
| 30300375 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Heat/No Chemical Recovery Process: Oven Charging |
| 30300385 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | Nonrecovery Process: Oven Charging |
| 30300399 | Industrial Processes | Primary Metal Production | Metallurgical Coke Manufacturing | By-product Process: Not Classified |
| 30301503 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Sintering: Windbox |
| 30301504 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Sintering: Discharge End |
| 30301509 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Ladle Metallurgy: Non-electric Heating and/or Chemical |
| 30301513 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Blast Furnace: Casting/Tapping: Local Evacuation |
| 30301516 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Hot Metal Transfer, Skimming, Desulfurization: Combined System |
| 30301518 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Hot Metal Desulfurization |
| 30301522 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Basic Oxygen Furnace (BOF): Top Blown Furnace: Primary |
| 30301525 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Basic Oxygen Furnace (BOF), Top Blown: Charging and Tapping |
| 30301576 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Steel Pickling |
| 30301577 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Pickling: Continuous |
| 30301581 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Blast Furnace Stove |
| 30301587 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Heat Treating Furnace: Annealing |
| 30301597 | Industrial Processes | Primary Metal Production | Integrated Iron and Steel Manufacturing | Wastewater Treatment System: Cooling Tower |
| 30390003 | Industrial Processes | Primary Metal Production | Fuel Fired Equipment | Natural Gas: Process Heaters |
| 30390024 | Industrial Processes | Primary Metal Production | Fuel Fired Equipment | Process Gas: Flares |
| 30399999 | Industrial Processes | Primary Metal Production | Other Not Classified | Other Not Classified |
| 30501001 | Industrial Processes | Mineral Products | Coal Mining, Cleaning, and Material Handling | Fluidized Bed Reactor |
| 39000699 | Industrial Processes | In-process Fuel Use | Natural Gas | General |
| 39900601 | Industrial Processes | Miscellaneous Manufacturing Industries | Process Heater/Furnace | Natural Gas |

1. This facility was later closed. See **Section 3.1.3** for further information. [↑](#footnote-ref-2)
2. Some test reports used reportable detection limit (RDL), minimum detection limit, or EDL instead of MDL to classify data as BDL. [↑](#footnote-ref-3)
3. The EDL is a value similar to the MDL that is determined by procedures described in EPA Method 23, section 9.8. [↑](#footnote-ref-4)