Economic Impact Analysis for the Proposed National Emission Standards for Hazardous Air Pollutants for Coke Ovens: Pushing, Quenching, and Battery Stacks, Residual Risk and Technology Review; National Emission Standards for Hazardous Air Pollutants for Coke Oven Batteries Technology Review

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1 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is proposing amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for the coke ovens industry. The proposed rule updates two NESHAP that regulate emissions from coke oven source categories: Coke Oven Batteries (COB) (40 CFR part 63, subpart L) and Pushing, Quenching, and Battery Stacks (PQBS) (40 CFR part 63, subpart CCCCC, or "5C"). This document presents the Economic Impact Analysis (EIA) for the proposed rule, which affects the standards for both source categories.

A coke oven battery consists of a group of ovens connected by common walls and is used to convert coal to coke. Coke is used in blast furnaces for the conversion of iron ore to iron, which can be further refined to produce steel. The 40 CFR part 63, subpart L (COB) NESHAP addresses leaks from coke oven doors, lids, offtake systems[1], and charging for two groups of facilities based on whether chemicals are recovered from the coke process exhaust. The 40 CFR part 63, subpart 5C (PQBS) NESHAP regulates emissions from coke oven processes known as pushing and quenching in addition to emissions from battery stacks. Pushing is the process of removing the coke from the oven after the coal has been coked. During quenching, the coke is cooled with water.

The proposed rule completes the technology review for the COB source category and the residual risk and technology review (RTR) for the PQBS source category. The proposed amendments update some of the emissions standards and add fenceline monitoring requirements under the COB source category NESHAP and address regulatory gaps under the PQBS source category NESHAP. For both the COB and PQBS source category NESHAP, the EPA is also proposing revisions to startup, shutdown, and malfunction (SSM) provisions and requiring electronic reporting. Coke plants primarily emit coke oven emissions, which is a separately listed HAP under CAA section 112(b)(1). Coke oven emissions are a mixture of coal tar, coal tar pitch, volatiles (benzene, toluene, xylenes, napthalene), creosote, polycyclic aromatic hydrocarbons (PAHs), and particulate matter (PM).[2] Coke ovens also emit acid gases (hydrogen fluoride and

[1] Offtake systems include the standpipe and standpipe caps, goosenecks, stationary jumper pipes, mini-standpipes, and standpipe and gooseneck connections.

[2] U.S. EPA. 2016. *Coke Oven Emissions*. Available at: https://www.epa.gov/sites/default/files/2016-09/documents/coke-oven-emissions.pdf.

hydrogen chloride), hydrogen cyanide, formaldehyde, mercury, and other PM HAP metals (such as lead and arsenic).

The proposed rule is not a significant regulatory action under E.O. 12866 Section 3(f)(1), as amended by E.O. 14094, since it is not likely to have an annual effect on the economy of $200 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, territorial, or tribal governments or communities. This EIA analyzes the projected cost and emissions impact under the proposed requirements for the 2025-2036 time period. This EIA analyzes the projected impacts of the proposed rule in order to better inform the public about its potential effects.

1.1.1 *Legal Basis for this Rulemaking*

Section 112 of the Clean Air Act (CAA), which Congress modified as part of the 1990 CAA Amendments, provides the legal authority for this proposed rule. Section 112 of the CAA establishes a two-stage process to develop standards for emissions of HAP from new and existing stationary sources in various industries or sectors of the economy (*i.e.*, source categories). Generally, the first stage involves establishing technology-based standards and the second stage involves assessing whether additional standards are needed to address any remaining risk associated with HAP emissions from the source category. This second stage is referred to as the “residual risk review.” In addition to the residual risk review, the CAA requires the EPA to review standards set under CAA section 112 every eight years and revise them as necessary, taking into account any “developments in practices, processes, or control technologies.” This review is commonly referred to as the “technology review.”

In the first stage of the CAA section 112 standard setting process, the EPA promulgates technology-based standards under CAA section 112(d) for categories of sources identified as emitting one or more of the HAP listed in CAA section 112(b). Sources of HAP emissions are classified as either major sources or area sources depending on the amount of HAP the source has the potential to emit.[3]

[3] “Major sources” are those that emit or have the potential to emit 10 tons per year (tpy) or more of a single HAP or 25 tpy or more of any combination of HAP. All other sources are “area sources.”

Major sources are required to meet the levels of reduction achieved in practice by the best-performing similar sources. CAA section 112(d)(2) states that the technology-based NESHAP must reflect the maximum degree of HAP emissions reduction achievable after considering cost, energy requirements, and non-air quality health and environmental impacts. These standards are commonly referred to as maximum achievable control technology (MACT) standards. MACT standards are based on emissions levels that are already being achieved by the best-controlled and lowest-emitting existing sources in a source category or subcategory. CAA section 112(d)(3) establishes a minimum stringency level for MACT standards, known as the MACT "floor." For area sources, CAA section 112(d)(5) gives the EPA discretion to set standards based on generally available control technologies (GACT) or management practices in lieu of MACT standards. In certain instances, CAA section 112(h) states that the EPA may set work practice standards in lieu of numerical emission standards.

The EPA must also consider control options that are more stringent than the MACT floor. Standards more stringent than the floor are commonly referred to as beyond-the-floor (BTF) standards. CAA section 112(d)(2) requires the EPA to determine whether the more stringent standards are achievable after considering the cost of achieving such standards, any non-air-quality health and environmental impacts, and the energy requirements of additional control.

For major sources and any area source categories subject to MACT standards, the second stage in the standard-setting process focuses on identifying and addressing any remaining (*i.e.*, "residual") risk pursuant to CAA section 112(f) and concurrently conducting a technology review pursuant to CAA section 112(d)(6). The EPA is required under CAA section 112(f)(2) to evaluate residual risk within eight years after promulgating a NESHAP to determine whether risks are acceptable and whether additional standards beyond the MACT standards are needed to provide an ample margin of safety to protect public health or prevent adverse environmental effects.[4] For area sources subject to GACT standards, there is no requirement to address residual risk, but technology reviews are required. Technology reviews assess developments in practices, processes, or control technologies and revise the standards as necessary without regard to risk,

[4] If risks are unacceptable, the EPA must determine the emissions standards necessary to reduce risk to an acceptable level without considering costs. In the second step of the approach, the EPA considers whether the emissions standards provide an ample margin of safety to protect public health in consideration of all health information as well as other relevant factors, including costs and economic impacts, technological feasibility, and other factors relevant to each particular decision.

considering factors like cost and cost-effectiveness. The EPA is required to conduct a technology review every eight years after a NESHAP is promulgated. Thus, the first review after a NESHAP is promulgated is a residual risk and technology review (RTR) and the subsequent reviews are just technology reviews.

The EPA is also required to address regulatory gaps (*i.e.*, “gap-filling”) when conducting NESHAP reviews, meaning it must establish missing standards for listed HAP that are known to be emitted from the source category (*Louisiana Environmental Action Network (LEAN) v. EPA*, 955 F.3d 1088 (D.C. Cir. 2020)). Any new MACT standards related to gap-filling must be established under CAA sections 112(d)(2) and (d)(3), or, in specific circumstances, under CAA sections 112(d)(4) or (h).

1.1.2 *Regulatory History*

The COB source category NESHAP was promulgated in 1993. The rule addresses emissions from oven doors, lids, offtake systems, and charging for two groups of facilities based on whether chemicals are recovered from the coke process exhaust. The two types of facility are byproduct recovery facilities and heat and nonrecovery (HNR) facilities. These facilities are described in Section 1.2. The COB source category NESHAP includes two compliance “tracks” that facilities can choose from: (1) the MACT track and (2) the lowest achievable emissions rate (LAER) track. The LAER track provides an extended compliance timeline but requires steeper emissions reductions. The EPA finalized the RTR for the MACT track in 2005 but has not completed the RTR for the LAER track. The 2005 RTR for the MACT track identified unacceptable levels of remaining risk and increased the stringency of the standards for battery doors, lids, and offtake systems.

The PQBS source category NESHAP was promulgated in 2003 and applies to coke plants that are major sources of HAP emissions. For pushing processes (when coke is removed from the oven), the rule sets opacity limits and control device PM emissions limits. During quenching processes (when coke is cooled with water), the rule requires facilities to use water meeting certain criteria, meet limits for total dissolved solids in the quench water, equip quench towers with control devices known as baffles, and inspect and repair baffles on an ongoing basis. For battery stacks, the rule established opacity limits and requires the installation and operation of continuous opacity monitors. In addition, all batteries and battery controls are required to follow an operation and maintenance plan.

1.1.3 *Economic Basis for this Rulemaking*

Many regulations are promulgated to correct market failures, which otherwise lead to a suboptimal allocation of resources within a market. Air quality and pollution control regulations address “negative externalities” whereby the market does not internalize the full opportunity cost of production borne by society as public goods such as air quality are unpriced.

While recognizing that the optimal social level of pollution may not be zero, HAP emissions impose costs on society, such as negative health and welfare impacts, that are not reflected in the market price of the goods produced through the polluting process. For this regulatory action the good produced is coke for use in steel manufacturing. If the process of making coke pollutes the atmosphere, the social costs imposed by the pollution will not be borne only by the polluting firm but rather by society as a whole. Thus, the producer is imposing a negative externality, or generating a social cost on society through these emissions. The equilibrium market price of coke may, consequently, fail to incorporate the full opportunity cost to society of consuming it. Absent a regulation or some other action to limit emissions, producers will likely not internalize the negative externality of their emissions and will impose external social costs. This proposed regulation works towards addressing this potential market failure by causing affected producers to reduce emissions and thus begin internalizing the social costs associated with their HAP emissions.

1.2 Industry Background[5]

Coke is metallurgical coal that has been baked into a charcoal-like substance that burns more evenly and has more structural strength than coal. Coke is primarily used as an input for producing steel in blast furnaces at integrated iron and steel mills. The U.S. produced 12.5 million short tons of coke in 2021.[6]

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[5] This section is partially adapted from:
U.S. EPA. (2002). *Economic Impact Analysis of Final Coke Ovens NESHAP: Final Report.* Available at: https://www.epa.gov/sites/default/files/2020-07/documents/coke-ovens_eia_neshap_final_08-2002.pdf.

[6] U.S. Energy Information Administration (2022). *Quarterly Coal Report*. Available at: https://www.eia.gov/coal/production/quarterly/.

1.2.1 *Production Overview*

There are two types of coke facilities: byproduct recovery (which recover chemicals from coke oven gas it in an on-site chemical plant) and heat and non-recovery (HNR). HNR facilities do not process chemicals from coke oven gas. Heat recovery facilities use coke oven gas to produce electricity in on-site heat-recovery steam generators (HRSG). These facilities use bypass/waste (B/W) heat stacks when HRSG are bypassed for maintenance, whereas non-recovery facilities use the B/W stack whenever the facility is operational. Coke facilities are either integrated into a larger iron and steel manufacturing facility or as stand-alone “merchant coke” facilities. Merchant facilities sell their product to steel manufacturers nationally.

Cokemaking involves heating coal in the absence of air, resulting in the separation of the non-carbon elements of the coal. The process bakes the coal into a charcoal-like substance for use as fuel in blast furnaces at integrated iron and steel manufacturing facilities and cupolas at iron foundries. The cokemaking process includes the following steps: (1) coal preparation and charging, (2) coking and pushing, (3) quenching, and (4) byproduct or heat recovery (depending on the type of facility). Figure 1-1 summarizes the process for by-product cokemaking. The HNR process is similar, except that instead of recovering and processing coke exhaust by-products, the exhaust is sent to an HRSG to produce electricity or to a B/W stack.

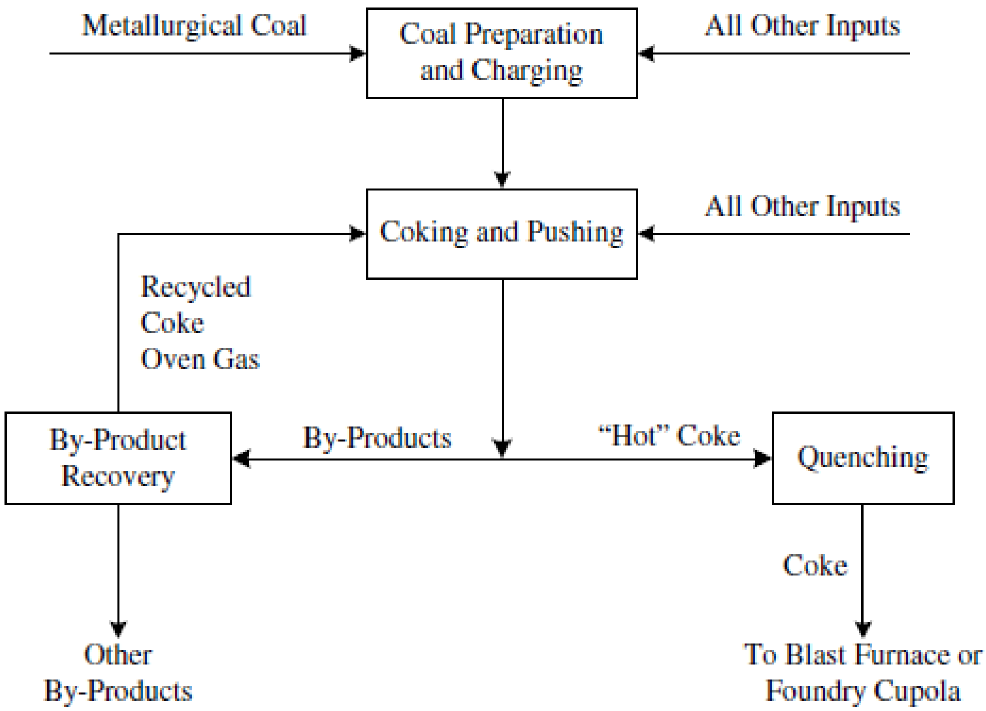

Figure 1-1: The Byproduct Coke Production Process

Source: U.S. EPA. (2002). *Economic Impact Analysis of Final Coke Ovens NESHAP: Final Report.* Available at: https://www.epa.gov/sites/default/files/2020-07/documents/coke-ovens_eia_neshap_final_08-2002.pdf.

1.2.1.1 Byproduct Cokemaking

In by-product cokemaking, coal is converted to coke in long, narrow coke ovens that are constructed in groups with common side walls, called batteries (typically consisting of 10 to 100 ovens). Figure 1-2 provides a schematic of a by-product coke battery. Metallurgical coal is pulverized and fed into the oven through ports at the top of the oven, which are then covered. The coal undergoes destructive distillation in the oven at 1,650 to 2,000 degrees Fahrenheit for 15 to 30 hours. A slight positive back-pressure maintained on the oven prevents air from entering the oven during the coking process. After coking, the hot coke is then pushed from the coke oven into a railroad car and transported to a quench tower at the end of the battery where it is cooled with water ("quenched") and screened to a uniform size. The raw coke oven gas is removed through an offtake system to a separate byproduct (chemical) recovery plant regulated under 40 CFR part 61, subpart L, where byproducts, such as benzene, toluene, and xylene are recovered. The cleaned gas is then used to underfire the coke ovens and for fuel elsewhere in the plant.

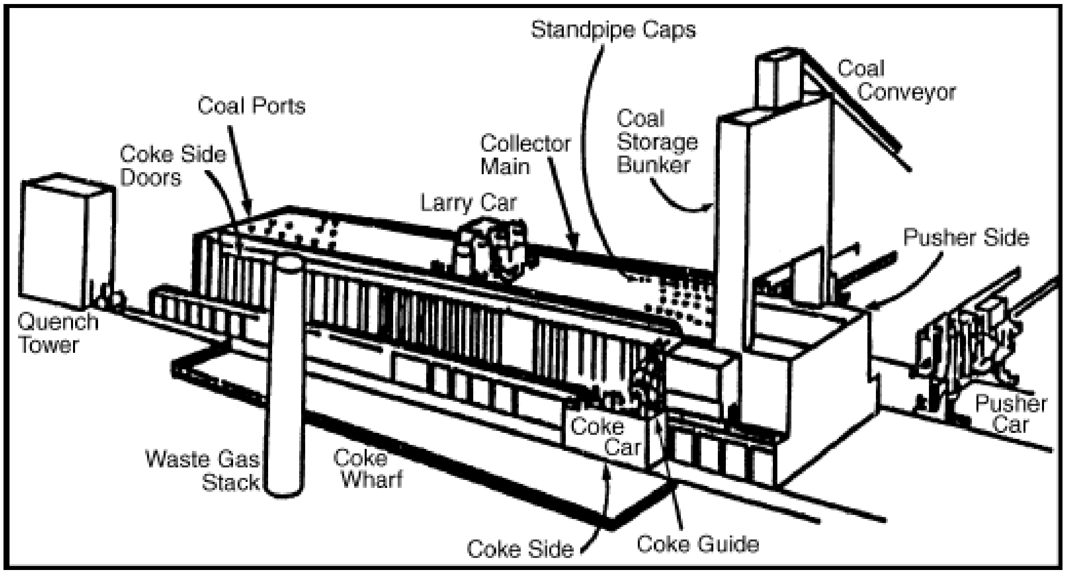

Figure 1-2: Schematic of a Byproduct Recovery Coke Battery

Source: U.S. International Trade Commission. (1994). *Metallurgical Coke: Baseline Analysis of the U.S. Industry and Imports*. Publication No. 2745. Washington, DC: U.S. ITC.

1.2.1.2 Heat and Non-recovery (HNR) Cokemaking[7]

In an HNR facility, the oven is horizontal and operates under negative pressure. All of the volatiles in the coal are burned and provide heat to fuel the coking process. Primary air is introduced through ports in the oven doors and partially combusts the volatiles in the oven. Other air is introduced through sole flues which run under the coal bed. A cross-section of an HNR coke oven is shown in Figure 1-3. Hot gasses are sent through a tunnel to an HRSG, in the case of a heat recovery plant (where high-pressure steam is produced for heating purposes or electricity generation), or to a B/W stack.

[7] This section is adapted from:
Towsey et al. (2013). *Comparison of Byproduct and Heat-Recovery Cokemaking Technologies*. Association for Iron and Steel Technology. Available at: https://accci.org/wp-content/uploads/2021/07/comparison-of-byproduct-and-heat-recovery-cokemaking-technologies-07-22-2021.pdf

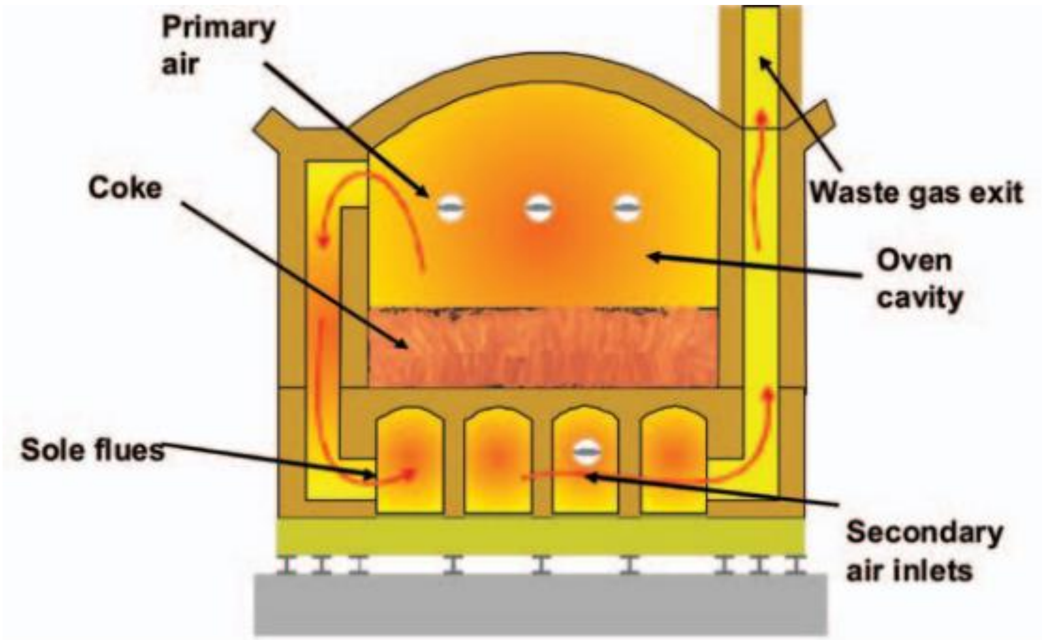

Figure 1-3: Cross-section of HNR Coke Oven

Source: Towsey et al. (2013). *Comparison of Byproduct and Heat-Recovery Cokemaking Technologies*. Association for Iron and Steel Technology. Available at: https://accci.org/wp-content/uploads/2021/07/comparison-of-byproduct-and-heat-recovery-cokemaking-technologies-07-22-2021.pdf.

1.2.2 *Use of Coke in Steel Production*

Coke is charged into the top of an iron-smelting blast furnace along with iron ore, limestone and other flux products.[8] Hot air is blasted into the bottom of the furnace which ignites the coke. The burning coke melts the iron and provides fuel for the chemical reaction in the furnace. Coke releases carbon as it burns, which combines with the iron. Carbon bonds with oxygen in the iron ore to reduce the iron oxide to pure iron.[9] The molten iron fed (along with steel scrap and other raw materials) to a basic oxygen furnace to produce steel. Producing steel in an integrated iron and steel (II&S) manufacturing facility requires about 630 kg of coke per ton

[8] "Flux" is a name for any substance introduced in the blast furnace to remove impurities in the molten iron in the form of slag. Typical flux materials in the blast furnace include limestone, silica, and dolomite. (https://www.britannica.com/technology/flux-metallurgy, accessed 3/16/2023.)

[9] U.S. EPA. (2002). *Economic Impact Analysis of Final Integrated Iron and Steel NESHAP*. Available at: https://www.epa.gov/sites/default/files/2020-07/documents/iron-steel_eia_neshap_final_09-2002.pdf.

of metric steel produced.[10] II&S facilities manufactured 29 percent of steel produced in the U.S. in 2021.[11] Electric arc furnaces (EAFs, sometimes referred to as mini-mills) produced the rest.

EAFs produce steel using scrap steel as the main input and eliminate the need for coke in the production of steel. The EAF process has been gaining prevalence, especially domestically. EAFs produce fewer emissions, have lower initial costs, use generally smaller operations, and are more efficient than the traditional process. The U.S. has a long history of steelmaking and steel consumption, and a mature stock of steel and steel scrap that has supported the transition to EAF production. Developing regions (China and India, for instance) tend to have newer infrastructure and less steel recycling, often along with a greater supply of iron ore or cheap coal, which favors the continued investment in integrated steelmaking. The integrated process is still the dominant steelmaking process globally, accounting for 70 percent of global production.[12] Figure 1-4 shows the shift in the U.S. towards EAF steelmaking over the last 20 years. EAFs produced about 70 percent of U.S. steel in 2021 compared to less than 50 percent in 2000. This trend is expected to continue: a 2021 International Energy Administration (IEA) report projects that, by 2050, EAFs in the United States will make up about 90 percent of steel production.[13] The increased usage of EAF in U.S. steel manufacturing over time will likely continue to reduce the need for coke in U.S. steel manufacturing.

[10] https://corsacoal.com/about-corsa/coal-in-steelmaking/#:~:text=On%20average%2C%20about%20630%20kilograms,quality%20of%20raw%20materials%20usedhttps://corsacoal.com/about-corsa/coal-in-steelmaking/#:~:text=On%20average%2C%20about%20630%20kilograms,quality%20of%20raw%20materials%20used. Accessed 2/1/2023.

[11] USGS (2022). USGS Mineral Commodity Summary 2022. Available at: https://pubs.usgs.gov/periodicals/mcs2022/mcs2022-iron-steel.pdf.

[12] World Steel Association. (2022). *2022 World steel in Figures*. Available at: https://worldsteel.org/wp-content/uploads/World-Steel-in-Figures-2022-1.pdf.

[13] IEA. (2020). *Iron and Steel Technology Roadmap: Towards more sustainable steelmaking.* Paris, France: OECD Publishing, https://doi.org/10.1787/3dcc2a1b-en.

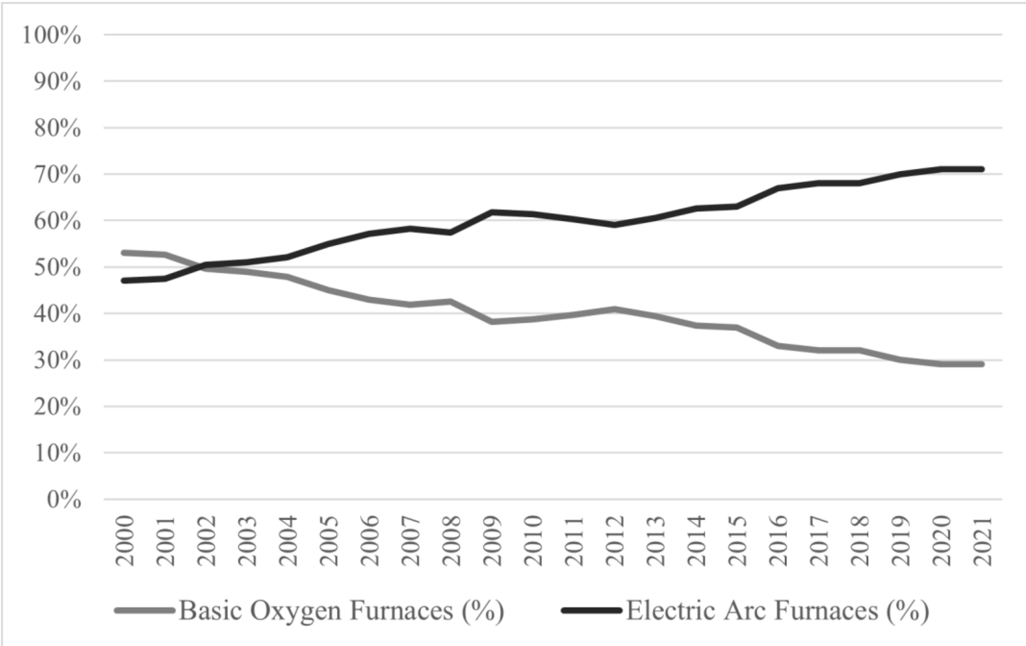

Figure 1-4: Share of BF/BOF and EAF Steel in the U.S., 2001-2021

1.2.3 *Coke Facilities in the United States*

Table 1-1 lists the coke facilities in the U.S. There are 14 total facilities owned by six parent companies. Of these 14 facilities, three are idle or closed: Cleveland-Cliffs Inc.'s Follansbee, WV plant (closed)[14] and Middletown, OH plant (located within a steel manufacturing facility)[15] and Bluestone Coke[16] (owned by the holding company James C. Justice Company, Inc.). Bluestone Coke recently entered into a consent decree that could allow it to resume operations conditional on paying fines and upgrading the facility to control air emissions (industry experts estimate Bluestone may need capital improvements in excess of $150 million in order to reopen).[17] Of the 11 active coke facilities, six are by-product recovery facilities and five are HNR. All five HNR facilities are owned by SunCoke Energy, Inc., and all but one (Vansant) use a heat-recovery steam generator. The total active U.S. coke-making capacity is about 12.4 million short tons per year, with about 66 percent coming from by-product recovery facilities.

[14] https://wvmetronews.com/2022/02/11/cleveland-cliffs-closing-follansbee-coke-plant/. Accessed 2/1/2023.

[15] https://www.daytondailynews.com/news/coke-oven-at-middletown-works-idle-may-be-torn-down-no-layoffs-planned-according-to-union/KAWMIEUK2VHSHCIQHKDGACBBXM/. Accessed 2/1/2023.

[16] https://www.alreporter.com/2022/12/12/bluestone-coke-plant-that-polluted-north-birmingham-for-decades-agrees-to-925k-fine/. Accessed 2/1/2023.

[17] https://www.propublica.org/article/bluestone-jim-justice-north-birmingham-consent-decree. Accessed 1/31/2023.

Table 1-1: U.S. Coke Facilities

Ultimate Parent Company	Facility	Facility Type	Capacity (million short tons)	Status
Cleveland-Cliffs Inc.	Burns Harbor, IN	By-product Recovery	1.4	Active
	Follansbee, WV		N/A	Closed
	Monessen, PA		0.35	Active
	Middletown, OH		0.35	Idle
	Warren, OH		0.55	Active
DTE Energy Company	EES-River Rouge, MI	By-product Recovery	0.8	Active
Drummond Company	ABC-Tarrant, AL	By-product Recovery	0.73	Active
James C. Justice Companies Inc.	Bluestone-Birmingham, AL	By-product Recovery	0.35	Idle
SunCoke Energy, Inc.	East Chicago, IN	Heat and Non-recovery; Heat Recovery Steam Generator	1.22	Active
	Franklin Furnace, OH		1.1	Active
	Granite City, IL		0.65	Active
	Middletown, OH		0.55	Active
	Vansant, VA	Non-recovery	0.72	Active
U.S. Steel	Clairton, PA	By-product Recovery	4.3	Active

Source: Company websites.

1.2.4 *Trends and Projections*

As discussed in Section 1.2.2, U.S. steel production has shifted substantially from integrated iron and steel manufacturing (that use coke as an input) to EAF facilities over the last 20 years, and this trend is expected to continue in the future. However, integrated iron and steel facilities are still the predominant method of steel production globally. Table 1-2 shows trends in U.S. coke production, consumption, imports and exports from 2011 to 2021. U.S. coke consumption has dropped by a third over the last ten years and imports have fallen by an order of magnitude. U.S. production has fallen by less than consumption as exports have increased to make up part of the difference. As U.S. coke demand continues to fall as steel production shifts further to EAFs, coke exports may continue to rise to absorb some of the excess coke production capacity.

Table 1-2: U.S. Coke Production, Consumption, Imports, and Exports (thousand short tons), 2011-2021

Year	Production	Consumption	Imports	Exports
2011	15,000	16,000	1,400	970
2012	15,000	15,000	1,100	970
2013	15,000	14,000	140	840
2014	15,000	14,000	77	950
2015	14,000	13,000	140	860
2016	12,000	11,000	230	1,000
2017	13,000	12,000	58	1,200
2018	14,000	13,000	120	1,200
2019	13,000	12,000	120	970
2020	10,000	10,000	160	680
2021	13,000	11,000	120	2,100

Source: EIA. *Quarterly Coal Reports, 2011-2022*. Available at: https://www.eia.gov/coal/production/quarterly/.
Note: Numbers rounded to two significant digits.

1.3 Proposed Amendments

The proposed rule completes the technology review for the 40 CFR part 63, subpart L (COB) NESHAP and the RTR for the 40 CFR part 63, subpart 5C (PQBS) NESHAP. The risk review for the LAER track of the COB source category NESHAP will be completed in a separate forthcoming action and its impacts will be assessed at that time. This section summarizes the proposed amendments to the COB and PQBS source category NESHAP.

1.3.1 *40 CFR Part 63, Subpart L (COB) Technology Review*

The COB source category NESHAP addresses leaks from coke oven doors, lids, offtake systems, and charging. Work practices minimize leaks from coke oven doors, lids, offtakes, and charging at byproduct recovery coke facilities. The EPA has not identified cost-effective options to further reduce HAP from the COB source category. However, the EPA is proposing revised emissions limits to reflect current performance of the affected facilities (discussed in the next paragraph). The EPA is also proposing to use a different equation than has historically been used to estimate coke oven emissions from leaking oven doors, changing HNR coke oven door leak monitoring standards, and requesting comment on a variety of issues. These changes are not expected to result in incremental cost or emission impacts and are discussed in the preamble to the proposed action.

The EPA is proposing revised leak limits for doors, lids, and offtakes (where leaks are determined by visible emissions observed using EPA Method 303). For door leak limits, EPA is proposing limits for two sub-categories of facilities. The current leak limit for coke oven doors is 3.3-4 percent leaking doors, depending on the size of the battery (4 percent for "tall" batteries (equal to or greater than 6 meters (20 feet) or more), 3.3 percent for other batteries). For byproduct recovery facilities with production capacity greater than 3 million tons per year (tpy) of coke, EPA is a proposing a revised limit of 1.5 percent leaking doors for tall doors and 1 percent leaking doors for other doors. This limit only affects U.S. Steel's Clairton facility. For all other byproduct recovery facilities, EPA is proposing a 3 percent leaking door limit. Finally, EPA is also proposing to lower the leak limits for lids from 0.4 percent leaking lids to 0.2 percent; and for offtake systems, from 2.5 percent leaking offtakes to 1.2 percent leaking offtakes. EPA expects all facilities can meet the revised leak limits without incurring additional cost as a result of this proposed change. The proposed compliance date for revisions to the allowable limits for leaking doors, lids, and offtakes under the COB NESHAP is one year after publication of the final rule.

1.3.2 *40 CFR Part 63, Subpart L (COB) Fenceline Monitoring*

The EPA is also proposing a fenceline monitoring requirement pursuant to CAA section 112(d)(6) for the COB source category. This requirement includes a work practice action level for benzene of 3 micrograms per cubic meter ($\mu g/m^3$). If a facility exceeds the action level, it must perform a root cause analysis and take corrective action to lower emissions. The fenceline monitoring requirements allow facilities to reduce sampling frequency by 50 percent at individual monitors if the reading from a monitor falls below 0.3 $\mu g/m^3$ for two years, with further frequency reductions possible if the monitor maintains a benzene level below 0.3 $\mu g/m^3$. If at any point a monitor measures a concentration above 0.3 $\mu g/m^3$, then it must immediately return to the original monitoring frequency. The proposed compliance date to begin fenceline monitoring is one year after the publication date of the final rule. Facilities must perform root cause analysis and apply corrective action requirements upon exceedance of an annual average concentration action level starting three years after the publication date of the final rule. The estimated cost for fenceline monitoring is approximately $120,000 per facility per year for testing, operation and maintenance of fenceline monitors, and recordkeeping and reporting (R&R) (approximately $1.3 million industry-wide for the 11 affected facilities). Any costs associated with changes in equipment or practices that would result from exceedance of the fenceline standard have not been estimated. It is unknown which facilities and sources would cause an exceedance and how well the current practices are being performed at each facility for each source.

1.3.3 *40 CFR Part 63, Subpart 5C (PQBS) Risk and Technology Review (RTR)*

Technologies for controlling HAP from PQBS sources include baghouses or scrubbers for coke pushing and baffles for coke quenching. The EPA has not identified cost-effective options to further reduce HAP emissions as part of the PQBS source category NESHAP technology review. The EPA is proposing that risks due to emissions of HAP from the PQBS source category are acceptable and that the current PQBS source category NESHAP provides an ample margin of safety to protect public health.

1.3.4 *40 CFR Part 63, Subpart 5C (PQBS) Regulatory Gaps*

The EPA also identified 17 total regulatory gaps for the PQBS source category (see Table 1-3). For 15 of the 17 identified regulatory gaps, the EPA is proposing a MACT floor limit. It is expected that all facilities can meet the MACT floor limit for these 15 regulatory gaps without additional emissions control; therefore, the only costs of these proposed standards are from compliance testing and R&R. The proposed compliance date for these 15 MACT limits is one year after publication of the final rule.

The EPA evaluated potential beyond-the-floor (BTF) options for control of emissions beyond the MACT limits. The only cost-effective BTF options identified apply to two HAP (Hg and non-Hg HAP metals) emitted from HNR B/W stacks. EPA is proposing a BTF limit for these pollutants that applies to HNR facilities that do not use an HRSG. This requirement only affects one facility: SunCoke Energy, Inc.'s Vansant (VA) facility. SunCoke is expected to install a baghouse at the Vansant facility to meet the proposed limit for non-Hg metals and an additional activated carbon injection (ACI) system along with the baghouse to meet the Hg limit. The proposed compliance date for these BTF limits is three years after publication of the final rule.

Table 1-3: Identified Regulatory Gaps in 40 CFR Part 63, Subpart 5C Sources

Emissions Source	HAP	No. of MACT Standards
HNR HRSG B/W Heat Stacks	Acid gases, formaldehyde, Hg, PM metals, PAHs	5
HNR HRSG Main Stack	Acid gases, Hg, PM metals, PAHs	4
Coke Pushing	Acid gases, hydrogen cyanide, Hg, PAHs	4
By-product Recovery Battery Stack	Acid gases, hydrogen cyanide, Hg, PM metals	4
Total Number of Regulatory Gaps		**17**

1.3.5 *Summary of Proposed NESHAP Amendments*

The proposed NESHAP amendments are summarized in Table 1-4. The fenceline monitoring requirement under 40 CFR part 63, subpart L and the BTF limit for Hg and non-Hg metals from HNR HRSG B/W heat stacks under 40 CFR part 63, subpart 5C are expected to require facilities to incur incremental costs relative to current standards. The proposed lowering of leak limits for coke oven doors, lids, and offtake systems under 40 CFR part 63, subpart L is not expected to achieve actual emission reductions but reduce allowable emissions. The MACT standards under 40 CFR part 63, subpart 5C for currently unregulated sources are expected to cause incremental costs at affected facilities for compliance testing and R&R. The projected cost and emissions impacts of the proposed amendments are presented in the next chapter.

Table 1-4: Summary of the Proposed Amendments to the 40 CFR part 63, Subparts 5C and L NESHAP

Emissions Source	Current Standard	Proposed Standard
40 CFR Part 63, Subpart L (COB)		
Fenceline Monitoring	no requirement	work practice action level for benzene
Leaking from Coke Oven Doors[a]		
Clairton Facility	3.3-4% limit	1-1.5% limit
Other By-product Facilities		3% limit
Leaking Lids	0.4% limit	0.2% limit
Leaking Offtake Systems	2.5% limit	1.2% limit
40 CFR Part 63, Subpart 5C (PQBS) Regulatory Gaps		
HNR HRSG B/W Heat Stacks		
Acid Gases, Formaldehyde, PAHs	no requirement	MACT floor limit (All HNR facilities)
Hg and non-Hg Metals	no requirement	BTF limit (One facility-Vansant, VA); MACT limit (remaining facilities)
HNR HRSG Main Stack		
Acid Gases, Hg, PM Metals, PAHs	no requirement	MACT floor limit
Coke Pushing		
Acid Gases, hydrogen cyanide, Hg, PAHs	no requirement	MACT floor limit
By-product Recovery Battery Stack		
Acid Gases, hydrogen cyanide, Hg, PM metals	no requirement	MACT floor limit

[a] Higher opacity limit applies to "tall" (equal to or greater than 6 meters) doors; lower leak limit applies to other doors.

2 EMISSIONS AND ENGINEERING COSTS ANALYSIS

2.1 Introduction

In this chapter, we present estimates of the projected emissions reductions and engineering costs associated with the proposed NESHAP amendments for the 2025 to 2036 period. The projected costs and emissions impacts are based on facility-level estimates of the costs of meeting the proposed emission limits and the expected emission reductions resulting from installing the necessary controls. The baseline emissions and emission reduction estimates are based on facility stack testing data and information and assumptions about existing and newly-installed controls.

The impacts of regulatory actions are evaluated relative to a baseline that represents the world without the regulatory action. In this EIA, we present results for the proposed amendments to the 40 CFR part 63, subpart L (COB) NESHAP and the 40 CFR part 63, subpart 5C (PQBS) NESHAP. Throughout this document, we focus the analysis on the proposed requirements that result in quantifiable compliance cost or emissions changes compared to the baseline.

For the analysis, we calculate the cost and emissions impacts of the proposed NESHAP amendments from 2025 to 2036. The initial analysis year is 2025 as we assume the proposed action will be finalized in early 2024. Compliance with the 15 new MACT limits under the PQBS NESHAP and fenceline monitoring under the COB NESHAP is thus expected to begin in early 2025. We assume full compliance with the proposed BTF Hg and non-Hg metal limits under the PQBS NESHAP will take effect in early 2027, which is required by the proposed rule and is consistent with CAA Section 112 requirements. The final analysis year is 2036, which allows us to provide 10 years of regulatory impact estimates after the proposed amendments are assumed to fully take effect.

We assume the number of facilities active in the source category remains constant during the analysis period. This assumption introduces uncertainty as there are two currently idle facilities: Bluestone Coke and the Cleveland-Cliffs facility in Middletown, Ohio. It is unknown if these facilities will resume operation (the Bluestone facility is discussed in detail in Section 1.2.3 and Section 3.2). The estimates in this section, unless otherwise noted, assume the Bluestone Coke and Cleveland-Cliffs Middletown, OH facilities remain idle/closed during the analysis period. In specific cases, we also provide estimates of cost assuming both of these facilities resume operation. The specific provisions of the proposed NESHAP amendments are described in Section 1.3.

2.2 Emissions Reduction Analysis

EPA projects that the only provision of the proposed NESHAP amendments that will lead to emissions changes relative to the baseline is the BTF limit for Hg and non-Hg HAP metals under 40 CFR part 63, subpart 5C that applies to heat and non-recovery (HNR) facilities that do not use a heat recovery steam generator (HRSG). There is only one such facility: SunCoke Energy, Inc's Vansant (VA) facility (Jewel Coke). Vansant emits coke oven gas during all periods of operation from a bypass/waste (B/W) heat stack.

Table 2-1 shows estimated baseline emissions and emission reductions associated with Vansant installing additional pollution controls to meet the BTF limit for Hg and non-Hg metals. The estimates are based on testing data from Vansant's waste heat stack. Lead (approximately 58 percent of emissions) and arsenic (approximately 18 percent of emissions) are the primary non-Hg HAP metals emitted by the facility. The emissions reductions estimates are based on assumptions of 99.9 percent control of PM and non-Hg metal HAP and 90 percent control of Hg by a newly-installed baghouse and activated carbon injection (ACI) system. $PM_{2.5}$ is assumed to make up 6 percent of PM emissions, based on the AP-42 emission factor for uncontrolled pulverized anthracite coal combustion in dry-bottom boilers.[18]

[18] U.S. EPA. (1995). *AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources*. Table 1.2.4. Available at: https://www.epa.gov/sites/default/files/2020-09/documents/1.2_anthracite_coal_combustion.pdf.

Table 2-1: Vansant Facility Estimated Emission Baseline and Reductions under the Proposed Amendments

		Baseline	Reductions
Tons per Year	Non-Hg Metal HAP	4.04	4.03
	Hg	0.08	0.07
	PM	237.3	237.06
	$PM_{2.5}$	14.23	14.21
Total Tons, 2027-2036	Non-Hg Metal HAP	40.40	40.30
	Hg	0.80	0.72
	PM	2,373	2,370.6
	$PM_{2.5}$	142.3	142.1

2.3 Engineering Cost Analysis

This section presents estimated impacts for each provision of the proposed amendments. Total annualized costs include capital cost annualized using the bank prime rate in accord with the guidance of the EPA Air Pollution Control Cost Manual[19], operating and maintenance costs, annualized costs of increased compliance testing, and associated costs of R&R. Compliance testing for HAP covered by the proposed amendments occurs initially (in early 2025) to demonstrate compliance and every 5 years thereafter, and is annualized over a 5-year period in calculating annualized costs. To estimate these annualized costs, the EPA uses a conventional and widely accepted approach, called equivalent uniform annual cost (EUAC) that applies a capital recovery factor (CRF) multiplier to capital investments and adds that to the annual incremental operating expenses to estimate annual costs. This cost estimation approach is described in the EPA Air Pollution Control Cost Manual.[20] These costs are the costs to directly affected firms and facilities (or "private investment"), and thus are not true social costs. Detailed discussion of these costs, including all calculations and assumptions made in estimating total capital investment, annual O&M, and compliance testing/R&R costs, can be found in the

[19] U.S. EPA. (2017). *EPA Air Pollution Control Cost Manual*. Office of Air Quality Planning and Standards. Available at: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.

[20] Ibid.

technical memo produced for the proposed rule in the docket.[21] The bank prime rate was 7.50 percent at the time of the analysis but has since risen to 7.75 percent. All cost figures are in 2022$.[22]

2.3.1 *Fenceline Monitoring*

The EPA is proposing a fenceline monitoring requirement pursuant to CAA section 112(d)(6) for the COB source category (40 CFR part 63, subpart L). This requirement includes a work practice action level for benzene. If a facility exceeds the action level, it must perform a root cause analysis and take corrective action to lower emissions. The estimated cost for fenceline monitoring is approximately $120,000 per facility per year. This includes testing costs, operation and maintenance of fenceline monitors, and R&R costs. Assuming eleven active facilities, the industry-wide cost of this requirement is expected to be $1.3 million per year, but could reach up to $1.5 million per year if Bluestone Coke and/or Cleveland Cliff's Middletown, OH facility resume operation. Firms are not expected to require capital purchases to meet the requirement.

Facilities will be required to commence fenceline monitoring within one year of the publication date (anticipated May 2024) of the final rule. The fenceline monitoring requirements allow facilities to reduce fenceline sampling if they remain below the action level for an extended period of time. These proposed provisions are described in Section 1.3.2. If facilities meet the action level in the early years of the analysis period, fenceline monitoring costs may be overstated in the later years of the analysis period. If facilities fail to meet the action level, they may incur additional costs not estimated here.

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[21] *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*. 2023. D. L. Jones, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, and G. Raymond, RTI International, Research Triangle Park, North Carolina. Docket ID No.'s EPA-HQ-OAR-2002-0085 and EPA-HQ-OAR-2003-0051

[22] When necessary, dollar figures in this RIA have been converted to 2022$ using the annual GDP Implicit Price Deflator values in the U.S. Bureau of Economic Analysis' (BEA) NIPA Table 1.1.9 found at found at <https://fred.stlouisfed.org/release/tables?rid=53&eid=41158>. 2022$ reflect all inflation though Q3, the most recent quarter posted at the time of the analysis.

2.3.2 *BTF Limit for Hg and Non-Hg HAP Metals*

EPA is proposing a BTF limit for Hg and non-Hg metals under 40 CFR part 63, subpart 5C (PQBS) that applies to HNR facilities that do not use an HRSG. As discussed in Section 1.3.4, this requirement only affects one facility: SunCoke Energy, Inc.'s Vansant (VA) facility. SunCoke is expected to install a baghouse (which requires additional ductwork) at the Vansant facility to meet the proposed limit for non-Hg metals and an additional activated carbon injection (ACI) to meet the Hg limit. The total annualized cost (*i.e.*, annualized capital plus annual O&M cost) of the BTF limit for Hg and non-Hg HAP metals at SunCoke's Vansant facility is estimated to be $4.7 million. Estimated total capital investment, annual O&M, and total annualized cost of achieving the BTF limit for Hg and non-Hg HAP metals at the facility is listed in Table 2-2.

Table 2-2: Estimated Cost per Year of Hg and Non-Hg HAP Metal BTF Limit at Vansant Facility

Facility	Control	Total Capital Investment	Annual O&M	Annualized Cost
SunCoke-Vansant, VA	Activated Carbon Injection	$310,000	$1,600,000	$1,600,000
	Baghouse	$6,600,000	$2,000,000	$2,600,000
	Ductwork	$540,000	$370,000	$430,000
	Total	$7,500,000	$4,000,000	$4,700,000

Note: Totals may not sum due to independent rounding. Numbers rounded to two significant digits unless otherwise noted.

2.3.3 *Other Proposed Amendments*

The EPA is proposing MACT floor standards for 15 currently unregulated HAP (see Table 1-3) from HNR HRSG B/W heat stacks, HNR HRSG main stacks, coke pushing, and coke by-product facility battery stacks under 40 CFR part 63 subpart 5C (PQBS). It is expected that each affected facility can meet these limits without installing additional emission controls or changing existing work practices. The only expected costs are for compliance testing and associated R&R. Compliance testing for the MACT/BTF standards is estimated to cost $10.6 million initially and every 5 years thereafter ($2.6 million per year annualized over five years), assuming eleven active coke facilities. If the two currently-idle facilities resume production, these costs would reach $11.6 million initially and every five years ($2.9 million annualized over five years). The associated R&R for the MACT standards compliance testing is expected to be $560,000 per year assuming eleven active facilities, and could reach $600,000 if the two currently-idle facilities resume production.

EPA is also proposing amendments to leak limits for leaking coke oven doors, lids, and offtake systems under 40 CFR part 63, subpart L (COB). The affected facilities currently meet the proposed leak limits, so these amendments are not expected to require changes to work practices or other additional costs.

2.3.4 *Summary Cost Tables for the Proposed NESHAP Amendments*

This section presents summary cost tables for the proposed amendments. Table 2-3 and Table 2-4 present estimated annualized costs and estimated costs by year based on when costs are likely to be incurred. Although SunCoke may spread capital investment in the Vansant facility across the three years prior to full implementation of the proposed standards, we conservatively assume that all capital investment occurs in the first year of full implementation in 2027. Additional compliance testing for the proposed MACT standards occurs initially in 2025 and once every five years thereafter. The total annualized cost of the proposed amendments is estimated to be $9.1 million.

Table 2-5 presents total costs for each year discounted to 2023 in 2022 dollars, along with the present-value (PV) and equivalent annualized value (EAV) over the analysis period, using both a 3 percent and 7 percent discount rate. The EAV represents a flow of constant annual values that would yield a sum equivalent to the PV. The estimated PV of the compliance costs over the 12-year period from 2025 to 2036 is about $82 million ($9.6 million EAV) using a 3 percent discount rate and about $63 million ($8.9 million EAV) using a 7 percent discount rate.

Table 2-3: Annualized Costs per Year for the Proposed NESHAP Amendments (2022$)

	Per Year
Annualized Capital	$690,000
Annual O&M	$4,000,000
Annualized MACT Testing	$2,600,000
Annual MACT R&R	$560,000
Annual Fenceline Monitoring and R&R	$1,300,000
Total Annualized Cost	$9,100,000

Note: Totals may not sum due to independent rounding. Numbers rounded to two significant digits unless otherwise noted.

Table 2-4: Total Costs for the Proposed NESHAP Amendments, 2025-2036 (2022$)

Year	Capital	Annual O&M	MACT Testing/R&R	Fenceline Monitoring/R&R	Total
2025	$0	$0	$11,000,000	$1,300,000	$13,000,000
2026	$0	$0	$560,000	$1,300,000	$1,800,000
2027	$7,500,000	$4,000,000	$560,000	$1,300,000	$13,000,000
2028	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2029	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2030	$0	$4,000,000	$11,000,000	$1,300,000	$16,000,000
2031	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2032	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2033	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2034	$0	$4,000,000	$560,000	$1,300,000	$5,800,000
2035	$0	$4,000,000	$11,000,000	$1,300,000	$16,000,000
2036	$0	$4,000,000	$560,000	$1,300,000	$5,800,000

Note: Totals may not sum due to independent rounding. Numbers rounded to two significant digits unless otherwise noted.

Table 2-5: Present-Value, Equivalent Annualized Value, and Discounted Costs for Proposed NESHAP Amendments, 2025-2036 (million 2022$, discounted to 2023)

Year	Discount Rate	
	3%	7%
2025	$12	$11
2026	$2	$2
2027	$12	$10
2028	$5	$4
2029	$5	$4
2030	$13	$10
2031	$5	$3
2032	$5	$3
2033	$4	$3
2034	$4	$3
2035	$12	$7
2036	$4	$2
PV	**$82**	**$63**
EAV	**$9.6**	**$8.9**

Note: Totals may not sum due to independent rounding. Numbers rounded to two significant digits unless otherwise noted.

2.4 Uncertainties and Limitations

Throughout this EIA, we considered a number of sources of uncertainty, both quantitatively and qualitatively, regarding the costs of the proposed NESHAP amendments. We summarize the key elements of our discussions of uncertainty here:

- **Projection methods and assumptions**: The number of facilities in operation is assumed to be constant over the course of the analysis period. This is a particular source of uncertainty with respect to the two idled facilities: Bluestone Coke and Cleveland-Cliffs Inc.'s Middletown, OH facility. If either facility were to resume operation, that could increase the projected costs of the proposed amendments. Further, one or more of the currently active facilities could close due to unforeseen economic circumstances and no longer need to incur the costs associated with the proposed rule. We also assume 100 percent compliance with these proposed rules and existing rules, starting from when a source becomes affected. If sources do not comply with these rules, at all or as written, the cost impacts and emission reductions may be overestimated. Additionally, new control technology may become available in the future at lower cost, and we are unable to predict exactly how industry will comply with the proposed rules in the future.

- **Years of analysis**: The years of the cost analysis are 2025, to represent the first-year facilities are compliant with the proposed MACT limits and fenceline monitoring requirements, through 2036, to present 12 years of potential regulatory impacts, as discussed earlier in this chapter. Extending the analysis beyond 2036 would introduce substantial and increasing uncertainties in the projected impacts of the proposed regulations.

- **Compliance Costs**: There is uncertainty associated with the costs required to install and operate the equipment necessary to meet the proposed emissions limits. There is also uncertainty associated with the exact controls a facility may install to comply with the requirements, and the interest rate they are able to obtain if financing capital purchases. There may be an opportunity cost associated with the installation of environmental controls (for purposes of mitigating the emission of pollutants) that is not reflected in the compliance costs included in this chapter. If environmental investment displaces investment in productive capital, the difference between the rate of return on the marginal investment (which is discretionary in nature) displaced by the mandatory environmental investment is a measure of the opportunity cost of the environmental requirement to the regulated entity. To the extent that any opportunity costs are not included in the control costs, the compliance costs presented above for this proposed action may be underestimated. Also, the fenceline monitoring requirements allow facilities to reduce fenceline sampling if they remain below the action level for an extended period of time. These proposed provisions are described in Section 1.3.2. If facilities meet the action level in the early years of the analysis period, fenceline monitoring costs may be overstated in the later years of the analysis period. On the other hand, if these provisions result in corrective action being undertaken by facilities, both costs and benefits would be understated.

- **Emissions Reductions**: Baseline emissions and projected emissions reductions are based on AP-42 emissions factors, assumptions about current emissions controls, and facility stack testing. To the extent that any of these data or assumptions are unrepresentative or outdated, the emissions reductions associated with the proposed amendments could be over or underestimated.

3 ECONOMIC IMPACT ANALYSIS AND DISTRIBUTIONAL ASSESSMENTS

3.1 Introduction

The proposed NESHAP amendments are projected to result in environmental control expenditures and work practice adjustments to comply with the rule. The national-level compliance cost analysis in Section 2.3 does not speak directly to potential distributional impacts of the proposed rule, which may be important consequences of the action. This section is directed towards complementing the compliance cost analysis and includes an analysis of potential firm-level impacts of the estimated regulatory costs and a discussion of potential employment and small entity impacts.

3.2 Economic Impact Analysis

Although facility-specific economic impacts (production changes or closures, for example) cannot be estimated by this analysis, the EPA conducted a screening analysis of compliance costs compared to the revenue of firms owning coke facilities. The EPA often performs a partial equilibrium analysis to estimate impacts on producers and consumers of the products or services provided by the regulated firms. This type of economic analysis estimates impacts on a single affected industry or several affected industries, and all impacts of this rule on industries outside of those affected are assumed to be zero or inconsequential.[23]

If the compliance costs, which are key inputs to an economic impact analysis, are small relative to the receipts of the affected industries, then the impact analysis may consist of a calculation of annual (or annualized) costs as a percent of sales for affected parent companies. This type of analysis is often applied when a partial equilibrium or more complex economic impact analysis approach is deemed unnecessary given the expected size of the impacts. The annualized cost relative to sales for a company represents the maximum price increase in the affected product or service needed for the company to completely recover the annualized costs imposed by the regulation (assuming demand stays constant). We conducted a cost-to-sales analysis to estimate the economic impacts of this proposal, given that the EAV of the compliance

[23] U.S. EPA. (2016). *Guidelines for Preparing Economic Analyses*. Available at: https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses.

costs is about $9.6 million in 2022 dollars (using a 3 percent discount rate), which is small relative to the revenues of the steel industry.

As discussed in Section 1.2, six firms own the 14 coke facilities in the U.S. (see Table 3-1). Of these six firms, four are publicly-traded companies that reported revenue in 2021 greater than $1 billion. Drummond Company, a privately-held company based in Birmingham, Alabama, owns the ABC Coke facility in Tarrant, Alabama.[24] Online sources list Drummond's 2021 revenue and employment as $3.3 billion and 5,600, respectively.[25] The sixth (James C. Justice Companies, Inc.) is a holding company that owns Bluestone Coke, which has been idle since October 2021, when the health department in Jefferson County, Alabama denied Bluestone's request to renew its permit.[26] Bluestone recently entered into a consent decree that could allow it to resume operations conditional on paying fines and upgrading the facility to control air emissions (industry experts estimate Bluestone may need capital improvements in excess of $150 million in order to reopen).[27] It is unclear when or if the Bluestone facility will reopen. Given the private status of James C. Justice Company, Inc., there is additional uncertainty around the revenue and employment information presented compared to the other firms.

Table 3-1: Coke Facility Owner Sales and Employment, 2021

Parent Company	HQ Location	Legal Form	Sales (million USD)	Employment
U.S. Steel	Pittsburgh, PA	Public	$20,275	24,500
Cleveland-Cliffs Inc.	Cleveland, OH	Public	$20,444	26,000
SunCoke Energy, Inc.	Lisle, IL	Public	$1,460	1,133
DTE Energy Company	Detroit, MI	Public	$14,960	10,300
Drummond Company	Birmingham, AL	Private	$3,300	5,600
James C. Justice Companies, Inc.	Roanoke, VA	Private	$316	520
Total			$59,055	69,253

Sources: Dun & Bradstreet/Hoover's online database and ZoomInfo online database.

Table 3-2 presents total annualized cost relative to sales for the proposed NESHAP amendments. Firm revenues have been converted to 2022 dollars to accord with the dollar-year of the cost estimates. Total annualized costs of the proposed amendments are small compared to

[24] https://www.forbes.com/companies/drummond/?sh=5cd6366926fc. Accessed 2/6/2023.
[25] https://www.zoominfo.com/c/drummond-company-inc/33201072. Accessed 2/6/2023.
[26] https://www.propublica.org/article/bluestone-jim-justice-north-birmingham. Accessed 1/31/2023.
[27] https://www.propublica.org/article/bluestone-jim-justice-north-birmingham-consent-decree. Accessed 1/31/2023.

total revenue for each firm (less than 0.5 percent for SunCoke Energy, Inc and less than 0.05 percent for the remaining parent companies). These costs include the costs of fenceline monitoring, additional compliance testing, and costs of installing a baghouse and ACI system at the Vansant facility to meet the BTF limit for Hg and non-Hg HAP metals. These costs also include the expected annualized costs of compliance testing at Bluestone Coke if the facility were to re-open.

As shown in Table 2-2, the estimated total capital investment to install the baghouse and ACI system at Vansant is $7.5 million, which could be incurred by SunCoke Energy, Inc. in a single year. This total capital investment represents about 0.48 percent of SunCoke Energy, Inc's reported 2021 revenue. Based on these estimates, the maximum necessary price increase caused by the proposed regulation is small relative to the size of the firms that own facilities in the source category, and the potential economic impacts of the proposed rule are likely to be small.

Table 3-2: Total Annualized Cost-to-Sales Ratios for Coke Facility Owners

Ultimate Parent Company	2021 Revenue (million 2022$)	Total Annualized Cost (million 2022$)	TAC-Sales Ratio
Cleveland-Cliffs Inc.	$21,737	$1.06	0.0049%
DTE Energy Company	$15,909	$0.16	0.0010%
Drummond Company	$1,702	$0.23	0.0137%
James C. Justice Companies	$336	$0.20	0.0602%
SunCoke Energy, Inc	$1,553	$7.63	0.4913%
U.S. Steel	$21,567	$0.46	0.0022%

3.3 Employment Impact Analysis

This section presents a qualitative overview of the various ways that environmental regulation can affect employment. Employment impacts of environmental regulations are generally composed of a mix of potential declines and gains in different areas of the economy over time. Regulatory employment impacts can vary across occupations, regions, and industries; by labor and product demand and supply elasticities; and in response to other labor market conditions. Isolating such impacts is a challenge, as they are difficult to disentangle from employment impacts caused by a wide variety of ongoing, concurrent economic changes. The EPA continues to explore the relevant theoretical and empirical literature and to seek public comments in order to ensure that the way the EPA characterizes the employment effects of its regulations is reasonable and informative.

Environmental regulation “typically affects the distribution of employment among industries rather than the general employment level”.[28] Even if impacts are small after long-run market adjustments to full employment, many regulatory actions have transitional effects in the short run.[29] These movements of workers in and out of jobs in response to environmental regulation are potentially important and of interest to policymakers. Transitional job losses have consequences for workers that operate in declining industries or occupations, have limited capacity to migrate, or reside in communities or regions with high unemployment rates.

As indicated by the potential impacts on the owners of coke facilities discussed in Section 3.2, the proposed requirements are unlikely to cause large shifts in coke or steel production and prices. As a result, demand for labor employed in coke production activities and associated industries (such as the steel industry) is unlikely to see large changes but might experience adjustments as there may be increases in compliance-related labor requirements such as labor associated with the manufacture, installation, and operation of pollution control devices as well as changes in employment due to quantity effects in directly-regulated sectors and sectors that consume coke (though any potential quantity effects are expected to be minimal). For this proposal, however, we do not have the data and analysis available to quantify these potential labor impacts.

3.4 Small Business Impacts Analysis

To determine the possible impacts of the proposed NESHAP amendments on small businesses, the firms that own affected coke facilities are categorized as small or large using the Small Business Administration’s (SBA’s) general size standards definitions. Coke facilities fall under two six-digit North American Industry Classification System (NAICS) codes. Facilities located within an integrated iron and steel manufacturing facility fall under NAICS 331110 (Iron and Steel Mills and Ferroalloy Manufacturing); all other facilities fall under NAICS 324199 (All

[28] Arrow, K. J., Cropper, M. L., Eads, G. C., Hahn, R. J., Lave, L. B., Noll, R. J., . . . Stavins, R. N. (1996). Benefit-Cost Analysis in Environmental, Health, and Safety Regulation: A Statement of Principles. American Enterprise Institute Press. Available at: https://www.aei.org/wp-content/uploads/2014/04/-benefitcost-analysis-in-environmental-health-and-safety-regulation_161535983778.pdf.

[29] Office of Management and Budget. (2015). 2015 Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act. U.S. Office of Management and Budget, Office of Information and Regulatory Affairs. Available at: whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/inforeg/inforeg/2015_cb/2015-cost-benefit-report.pdf.

Other Petroleum and Coal Products Manufacturing). The SBA size standards for these NAICS codes indicate that a business is small if it employs 1,500 or fewer workers if classified under NAICS 331110 and 500 or fewer workers if classified under NAICS 324199.[30]

The primary operations of a facility determine which NAICS a facility is classified under. Cleveland-Cliffs, Inc. and U.S. Steel own coke facilities that are located within integrated iron and steel manufacturing facilities, so we classified these firms using the larger (1,500 employee) small business size threshold. All other firms are classified using the 500-employee size threshold. Table 3-3 shows the size standard applying to each firm. Based on the SBA standards and the company employment figures shown in Table 3-1, none of the firms that own affected coke facilities are small businesses. Therefore, this proposed action will not have a "Significant Impact on a Substantial Number of Small Entities" (SISNOSE).

Table 3-3: SBA Size Standard by Ultimate Parent Company

Ultimate Parent Company	Facility	Located within Integrated Steel Manufacturing Facility	Applicable Size Standard (employees)
Cleveland-Cliffs Inc.	Burns Harbor, IN	Yes	1,500
	Follansbee, WV	No (closing)	
	Monessen, PA	No	
	Middletown, OH	Yes	
	Warren, OH	No	
DTE Energy Company	EES-River Rouge, MI	No	500
Drummond Company	ABC-Tarrant, AL	No	500
James C. Justice Companies Inc.	Bluestone-Birmingham, AL	No	500
SunCoke Energy, Inc.	East Chicago, IN	No	500
	Franklin Furnace, OH	No	
	Granite City, IL	No	
	Middletown, OH	No	
	Vansant, VA	No	
U.S. Steel	Clairton, PA	Yes	1,500

Source: U.S. Small Business Administration, Table of Standards, Effective December 19, 2022. Available at: https://www.sba.gov/document/support--table-size-standards. Accessed January 17, 2023.

James C. Justice Companies is near the SBA size threshold according to modeled employment information from Dun & Bradstreet/Hoover's online database, and given the

[30] U.S. Small Business Administration, Table of Standards, Effective December 19, 2022. Available at: https://www.sba.gov/document/support--table-size-standards. Accessed January 17, 2023.

additional uncertainty in its revenue and employment as a privately-held company, it is possible a precise accounting of employment would classify James C. Justice Companies as a small business under the SBA size standards. Bluestone Coke is currently idled, and is therefore not projected to incur any cost under the proposed amendments. If the facility were to resume operations, it would incur approximately $200,000 in annualized testing costs for fenceline monitoring, MACT compliance testing, and R&R ($400,000 in its first year of operation). As shown in Table 3-2, this is a small percentage of the company's 2021 revenue as estimated by Dun & Bradstreet/Hoover's online database. Further, as discussed in Section 3.2, Bluestone Coke is expected to require capital investment far in excess of this testing cost in order to re-open the facility. Therefore it is not expected that the costs associated with the proposed amendments would have a substantial impact on Bluestone Coke in the event that the facility were to re-open.

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