MEMORANDUM

TO: Docket for rulemaking, "National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel" (EPA-HQ-OAR-2002-0083)

DATE: June 2025

SUBJECT: Regulatory Impact Analysis for the National Emission Standard for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review: Interim Final Rule

1. Introduction

This document describes the estimated cost and benefit impacts of the U.S. Environmental Protection Agency's (EPA) interim final National Emission Standards for Hazardous Air Pollutants (NESHAP) rule for major sources in the Integrated Iron and Steel Manufacturing Facilities source category (40 CFR part 63, subpart FFFFF). The integrated iron and steel (II&S) manufacturing facility source category includes all facilities engaged in the production of steel from iron ore and includes the processes of sinter production, iron production, and iron preparation (e.g., hot metal desulfurization). The facilities in this source category produce steel from iron ore pellets, coke, scrap metal, and flux materials (e.g. limestone and dolomite).

The II&S source category includes eight active facilities owned and operated by Cleveland-Cliffs Inc. (five facilities) and U.S. Steel (three facilities). The EPA finalized amendments to the NESHAP for the II&S source category on April 3, 2024. The amendments set standards for previously unregulated HAP from sinter plants, blast furnaces (BFs), and basic oxygen process furnaces (BOPFs); standards for previously unregulated fugitive emissions from BFs and BOPF shops; and required fenceline monitoring for chromium.

The EPA expects the 2024 fugitive standards to reduce HAP and particulate matter (PM) emissions, some of which is expected to be $PM_{2.5}$ (PM less than or equal to 2.5 micrometers in diameter). The EPA estimated monetized $PM_{2.5}$ health benefits associated with emissions reductions from compliance with these 2024 amendments exceeding $200 million per year, which made the 2024 action significant under E.O. 12866 as amended by E.O. 14094. (E.O. 14094 has since been rescinded but was in force when the 2024 amendments were finalized.)

This interim final rule revises certain compliance deadlines for the 2024 amendments while the EPA reconsiders various aspects of the 2024 rule. This Regulatory Impact Analysis (RIA) estimates the cost and benefit impacts from revising these compliance deadlines. Due to emissions reductions no longer expected to occur from April 3, 2025, to April 3, 2027, this interim final rule is estimated to lead to monetized $PM_{2.5}$ benefit changes greater than $100 million per year over that timeframe. Therefore, this interim final rule constitutes an economically significant action under E.O. 12866.

1.1 Regulatory Background

Section 112 of the Clean Air Act (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 under CAA section 112(d) for source categories identified as emitting one or more HAP listed in CAA section 112(b). Sources of HAP emissions are either major sources or area sources depending on the amount of HAP the source has the potential to emit.[1] 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. 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 or management practices (GACT) 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.

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). CAA section 112(f)(2) requires the EPA to evaluate

[1] "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."

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.[2] No requirement exists to address residual risk for area sources subject to GACT standards, but technology reviews are still required. Technology reviews assess developments in practices, processes, or control technologies and revise the standards as necessary without regard to risk, considering factors like cost and cost effectiveness. The EPA must 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), while the subsequent reviews are only technology reviews.

The EPA also addresses regulatory gaps (i.e., "gap-filling") when conducting NESHAP reviews, meaning it must establish standards for listed HAP that are known to be emitted from the source category pursuant to our interpretation of Louisiana Environmental Action Network v. EPA, 955 F.3d 1088 (D.C. Cir. 2020) (LEAN). The EPA has generally set new MACT standards related to gap-filling under CAA sections 112(d)(2) and (d)(3) or, in specific circumstances, under CAA sections 112(d)(4) or (h).

II&S manufacturing facilities produce finished steel from iron ore using a process consisting mainly of a BF, a BOPF, in some cases sinter production, and secondary finishing processes. The BF combines sinter, taconite iron ore pellets, coke, and limestone (or another flux material) and creates a chemical reaction that produces molten iron and slag (a by-product consisting of lime, silicates, and aluminates). The BOPF combines molten iron with scrap steel to produce molten steel and slag. Once separated from the slag, steel is poured into a ladle for casting. Sinter plants recover the iron-bearing materials from BF and BOPF waste products and combine them with flux and coke breeze for use as BF feedstock. II&S facilities also include several ancillary processes, such as hot metal transfer, desulfurization, slag-skimming, and ladle

[2] If risks are unacceptable, the EPA must determine the emissions standards necessary to reduce risk to an acceptable level without considering costs. If risks are acceptable but potentially of concern, 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 decision.

metallurgy, but BFs, BOPFs, and sinter plants produce most HAP and PM emissions from the source category. The eight active II&S facilities in the United States include three sinter plants.

The EPA finalized the NESHAP for II&S facilities in 2003 under CAA section 112(d). The standards address emissions of HAP from new and existing sinter plants, BFs, and BOPF shops using PM and opacity limits as surrogates for particulate HAP. Sinter plants also need to meet volatile organic compound (VOC) emissions limits or limit oil content in sinter feed. The EPA amended the NESHAP in 2006 to add a new compliance option, revise emission limitations, reduce the frequency of repeat performance tests for certain emission units, add corrective action requirements, and clarify monitoring, recordkeeping, and reporting requirements.

In 2020, the EPA finalized the RTR for the source category. The 2020 RTR determined that risks from the source category were acceptable and provide an ample margin of safety to protect public health. The RTR did not identify cost-effective technology-based developments that would further reduce HAP emissions beyond the original NESHAP. The EPA did, however, finalize a new requirement to limit mercury (Hg) emissions from scrap metal used in steel operations. The EPA also finalized amendments to clarify that the standards are applicable during periods of startup, shutdown, and malfunction and require electronic reporting of performance test results, notifications of compliance status, and semi-annual reports. The final 2020 amendments also revised several other monitoring requirements to increase flexibility.[3]

On April 3, 2024, the EPA finalized amendments to the NESHAP for the II&S source category to complete the technology review for the source category and address regulatory gaps pursuant to the LEAN decision. These amendments established the following requirements:

- MACT standards for five previously unregulated HAP (COS, CS_2, Hg, HCl, and HF)[4] emitted from sinter plants

[3] Details of the 2020 Integrated Iron and Steel Manufacturing Facilities NESHAP RTR can be found in the Federal Register publication at the following link: https://www.federalregister.gov/documents/2020/07/13/2020-09753/national-emission-standards-for-hazardous-air-pollutants-integrated-iron-and-steel-manufacturing.

[4] COS: carbonyl sulfide; CS2: carbon disulfide, Hg: mercury; HCl: hydrogen chloride; HF: hydrogen fluoride

- MACT standards, in the form of work practice standards and opacity limits, for five previously unregulated sources of unmeasured fugitive and intermittent particulate (UFIP) emissions: unplanned BF bleeder valve openings, planned BF bleeder valve openings, iron beaching, BF bell leaks, and BF slag processing, handling and storage
- new emissions limits for three unregulated pollutants from BFs and BOPFs (THC as a surrogate for non-dioxin and non-furan organic HAP, HCl, and D/F)[5]
- work practice standards for BOPF shops and a requirement that facilities conduct Method 9 readings two times per month at the BOPF shop and BF casthouse
- fenceline monitoring for chromium.

On June 3, 2024, the EPA received administrative petitions for reconsideration from Cleveland-Cliffs Inc. and U.S. Steel. Both parties also submitted requests for an administrative stay of requirements pursuant to CAA section 307(d)(7)(B). The EPA issued a response letter to the petitions for reconsideration on August 14, 2024, granting reconsideration on three issues and stating our intention to issue corrections and clarifications to the final regulatory text. After receiving the response letter from the EPA, industry contacted EPA staff and provided additional information. As a result of these discussions, on March 5, 2025, the EPA issued a second letter modifying the scope of the discretionary reconsideration by identifying some items from the petition as appropriate for mandatory reconsideration based on the criteria in CAA section 307(d)(7)(B). The preamble of this interim final rule contains further details on these corrections and items for reconsideration. The EPA has decided to revise all compliance deadlines associated with the April 3, 2024, rule to April 3, 2027 (providing the maximum-allowable three years under CAA section 112) while reconsidering certain aspects of the rule. The revision to compliance deadlines is the subject of this interim final action. On March 31, 2025, the EPA issued a 90-day partial administrative stay of the provisions of the April 3, 2024 II&S NESHAP amendments with compliance dates of April 3, 2025, pending reconsideration of the amendments.

[5] THC: total hydrocarbons; D/F: dioxins and furans

1.2 Interim Final Rule Requirements

CAA section 112 allows the EPA to establish compliance deadlines for new NESHAP requirements of up to three years following promulgation of a rule. Depending on the provision, the NESHAP amendments finalized on April 3, 2024, allow either one year, two years, or three years for facilities to demonstrate compliance. The UFIP opacity limits for planned BF bleeder valve openings, work practice standards for BF bell leaks, and work practice standards for BOPF shops allow one year (April 3, 2025) for compliance; the UFIP work practice standards and limits for unplanned BF bleeder valve openings, work practice standards for beaching, and the opacity limit for slag processing, handling, and storage allow two years (April 3, 2026); the fenceline monitoring requirements for chromium allow one year following promulgation of the fenceline method for metals or two years following promulgation of the final rule, whichever is later; and all other requirements allow three years (April 3, 2027) for compliance. This interim final action revises the compliance deadlines for all UFIP requirements to April 3, 2027. The changes to compliance deadlines related to this interim final rule are contained in Table 1 below.

Table 1: Finalized and Revised Compliance Deadlines

Requirement	Finalized Compliance Deadline	Revised Compliance Deadline
Opacity limits for planned openings of BF bleeder valves, work practice standards for BF bell leaks, and work practice standards for BOPF shops.	April 3, 2025	April 3, 2027
Work practice standards and limits for unplanned BF bleeder valve openings, work practice standards for BF iron beaching, and opacity limit for slag processing, handling, and storage	April 3, 2026	April 3, 2027
New HAP limits for sinter plants and BF/BOPF	April 3, 2027	April 3, 2027
Fenceline monitoring for chromium	1 year after promulgation of fenceline method for metals or April 3, 2026, whichever date is later.	1 year after promulgation of fenceline method for metals or April 3, 2027, whichever date is later.

1.3 Summary of Cost and Benefit Impacts

This interim final rule only affects the compliance deadlines associated with UFIP emissions sources. All other deadlines remain in place. In preparing the 2024 NESHAP

amendments, the EPA estimated the cost and emissions impacts of implementing the work practice standards and/or achieving the required limits for UFIP emissions sources. The EPA estimated reductions of both HAP and PM emissions, some of which was $PM_{2.5}$. These cost and emissions impact estimates are the subject of the memorandum *Unmeasured Fugitive and Intermittent Particulate Emissions and Cost Impacts for Integrated Iron and Steel Facilities under 40 CFR Part 63, Subpart FFFFF* (hereafter referred to as the UFIP Memo), submitted to the docket for the final 2024 rule.[6] Based on the emissions impacts estimated in the UFIP Memo and the $PM_{2.5}$ benefit-per-ton estimated for the II&S sector, the projected monetized benefits associated with $PM_{2.5}$ reductions were valued at greater than $200 million per year, making the rule significant under E.O. 12866 as amended by E.O. 14094 (which has since been rescinded but was in force at the time).[7] In accordance with E.O. 12866 and 13563, the guidelines of OMB Circular A-4, and the EPA's Guidelines for Preparing Economic Analyses, the EPA prepared and submitted to the docket an RIA for the final rule.[8,9] The RIA included an analysis of the cost, emissions reductions, and benefits of all aspects of the final rule.

For this interim final rule, the EPA is analyzing only the changes to estimated costs, emissions reductions, and benefits for UFIP emissions sources caused by revising the compliance deadlines for the April 3, 2024, NESHAP amendments. The baseline for this analysis is the counterfactual world in which the final 2024 NESHAP amendments for the II&S source category went into effect on April 3, 2025. Cost, emissions, and benefit impacts are measured incremental to this baseline. The UFIP Memo and corresponding workbook estimate the total capital investment, annual operating and maintenance (O&M) cost, and emissions reductions

[6] Key et al. (Feb 22, 2024). *Unmeasured Fugitive and Intermittent Particulate Emissions and Cost Impacts for Integrated Iron and Steel Facilities under 40 CFR Part 63, Subpart FFFFF*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1974.

[7] U.S. EPA. (Sep 2023). *Technical Support Document: Estimating the Benefit per Ton of Reducing Directly-Emitted PM2.5, PM2.5 Precursors and Ozone Precursors from 21 Sectors*. Available at: https://www.epa.gov/system/files/documents/2021-10/source-apportionment-tsd-oct-2021_0.pdf.

[8] U.S. EPA. (2024). *Guidelines for Preparing Economic Analyses (3rd edition)*. Report number EPA-240-R-24-001. Washington, DC. Available at: https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses-3rd-edition.

[9] U.S. EPA. (2024). *Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

from implementing the work practice standards and meeting the limits imposed by the final 2024 rule.[10] This RIA combines these estimates with the compliance deadlines from the final 2024 rule and the revised deadlines implemented in this interim final rule to project cost, emissions, and benefit impacts from the deadline revisions. The deadline revisions shift costs and emissions reductions out of the period from April 3, 2025, through April 3, 2027. The EPA assumes that capital investment necessary for compliance with all UFIP work practice standards and limits takes place once compliance with this interim final rule is required on April 3, 2027. The analytical timeframe extends to 2035, the final year included in the analysis for the 2024 final rule. A summary of the estimated changes to emissions reductions and the present value (PV) and equivalent annualized value (EAV) of estimated changes to compliance costs, monetized benefits, and monetized net benefits is contained in Table 2.[11] PV and EAV are presented using a 3 percent and 7 percent social discount rate. The choice of social discount rates reflects the guidance of OMB Circular A-4, which suggests a 3 percent rate to represent the social rate of time preference (i.e., the rate at which society discounts future consumption) and a 7 percent rate to represent the opportunity cost of capital.[12] All EAVs in this document have been annualized over eleven years to reflect the length of the analytical timeframe examined in this RIA.

[10] Available for download under "Additional Resources" here: https://www.epa.gov/stationary-sources-air-pollution/integrated-iron-and-steel-manufacturing-national-emission.

[11] The EAV of the PV of a stream of costs or benefits represents a single value which, if received at the end of each period over which costs or benefits occur, is equal in PV to the original stream. April 3, 2025, is treated as t=0 for the purposes of discounting and calculating PV and EAV in this RIA.

[12] OMB. Circular No. A-4. September 17, 2003. https://www.federalregister.gov/documents/2003/10/09/03-25606/circular-a-4-regulatory-analysis. Accessed 3/19/2025.

Table 2: Monetized Benefits, Compliance Costs, Net Benefits, and Emission Changes for the Interim Final Rule, 2025-2035, Discounted to 2025 (millions of 2024 dollars)

	3 Percent Discount Rate		7 Percent Discount Rate	
	PV	**EAV**	**PV**	**EAV**
Monetized Health Benefits	-$400 and -$860	-$43 and -$93	-$350 and -$760	-$47 and -$100
Compliance Costs	-$3.3	-$0.4	-$3.5	-$0.5
Net Benefits	-$400 and -$850	-$43 and -$92	-$350 and -$750	-$47 and -$100
Emissions Increases	**2025-2035**			
HAP	120 short tons			
PM	3,500 short tons			
$PM_{2.5}$	900 short tons			

Note: Negative costs indicate cost savings. Figures rounded to two significant digits and may not add due to rounding. Estimated emissions increases are relative to the baseline, and don't reflect increased emissions relative to current emissions.

Data, resource, and methodological limitations prevented the EPA from monetizing some of the human health impacts from changes to exposure to the HAP directly targeted by the final 2024 NESHAP amendments. These included potential cancer risks and potential non-cancer impacts including cardiovascular and central nervous system impacts. The EPA provides a qualitative discussion of the health effects of HAP likely to be impacted by the final 2024 NESHAP amendments in the RIA for the final 2024 rule.[13] In addition, the potential impacts from ecosystem effects and visibility changes (from changes to haze caused by PM) from the changes in $PM_{2.5}$ emissions are not monetized here. Ecosystem effects of nitrogen and sulfur deposition include terrestrial and aquatic acidification, terrestrial nitrogen enrichment and aquatic eutrophication. The monetized benefits summarized in the table above are therefore not necessarily inclusive of all benefits changes expected from this interim final rule. Given that

[13] U.S. EPA. (2024). *Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

these potential changes to non-monetized benefits would stem from increases in emissions relative to baseline, they are likely to be negative.

This RIA proceeds as follows. Section 2 contains a brief overview of the steel sector. Section 3 describes the estimated emission, cost, and economic impacts of the interim final rule. Sections 4 and 5 describe the estimated benefit and net benefit impacts, respectively.

2. Industry Overview

This section provides a brief overview of the iron and steel industry. The North American Industry Classification System code (NAICS) for Iron and Steel Mills and Ferroalloy Manufacturing is 331110, and all integrated II&S manufacturing facilities fall within this classification. For a more detailed industry profile, see the RIA for the final 2024 rule.[14]

There are two primary methods for manufacturing steel. The first uses a BF to convert iron ore and other raw materials into molten iron, and then produces steel in a BOPF by combining the molten iron with scrap steel, flux and other alloying materials. This is the BF/BOPF process, and is the method used by II&S manufacturing facilities. The other method is the electric arc furnace (EAF) process, which produces new steel products by melting scrap steel or direct-reduced iron (DRI) and flux and alloying materials. The United States produced 87 million metric tons of raw steel in 2021, about 29 percent of which was produced by the BF/BOPF process in II&S facilities. EAF produced the remainder.[15] Steel is a primary input to automobiles, home appliances, and residential construction, so demand for steel is a derived demand that depends on an array of products.

There is a four-step production process for manufacturing steel at II&S facilities. The first step is iron making. The raw materials to the iron making process are iron ore (or other sources of iron), coke or coal, and flux (mainly limestone or dolomite). Coke is made in ovens that heat metallurgical coal to drive off gases, oil, and tar, which can be collected and processed by a chemical by-product recovery plant to use at the coking facility or to sell. Coke may be produced at an II&S facility or purchased from a merchant coke producer. Flux is a general name for any material used in the iron or steel making process to collect impurities from molten metal. Limestone is commonly used as flux in BFs, in addition to silica, dolomite, and lime.[16]

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[14] U.S. EPA. (2024*). Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

[15] USGS. (2022). *Iron and Steel Mineral Commodity Summary 2022*. Available at: https://www.usgs.gov/centers/national-minerals-information-center/iron-and-steel-statistics-and-information.

[16] Britannica. *Flux metallurgy*. Available at: https://www.britannica.com/technology/flux-metallurgy. Accessed 3/19/2025.

These raw materials are charged into the top of the BF as hot air is piped into the bottom of the furnace. The hot air ignites the coke, producing a chemical reaction that reduces iron ore to molten iron. The flux materials combine with impurities in the molten iron to form slag, which is separated from the iron at the bottom of the BF.

Pig iron emerges from the BF and is the primary input to the next step in the process: steel making. Other steel inputs include scrap metal, flux, and alloying metals (such as nickel, manganese, and copper). Steel making is carried out in BOPFs or in EAFs. BOPFs are the standard steel making furnace used at integrated mills. EAFs are the standard furnace at mini mills since they use scrap metal efficiently on a small scale.

Molten iron typically accounts for 70-75 percent of the iron charged into a steel making furnace.[17] Scrap metal is also used, which either comes as waste from other mill activities or is purchased on the scrap metal market. Scrap metal must be carefully sorted to control the alloy content of the steel. DRI may also be used to increase iron content, particularly in EAFs that use mainly scrap metal for the iron source. DRI has been reduced from iron ore in a solid state through reaction with a process gas (typically produced from natural gas or coal) at high temperatures below the melting point of iron.[18]

At BOPFs, molten iron and other iron sources are charged into the furnace. An oxygen lance is lowered into the furnace to inject high purity oxygen—99.5 to 99.8 percent pure—to minimize the introduction of contaminants. Some BOPFs insert the oxygen from below. Energy for the melting of scrap and cooled pig iron comes from the oxidation of silicon, carbon, manganese, and phosphorous. Flux is added to collect the oxides produced in the form of slag and to reduce the levels of sulfur and phosphorous in the metal. When the process is complete, the furnace is tipped and the molten steel flows out of a tap into a ladle.

EAFs primarily use scrap metal for the iron source; alloys may also be added before the melt. In EAFs, electric arcs are formed between two or three carbon electrodes. The EAFs require a power source to supply the charge necessary to generate the electric arc and typically

[17] *Steelmaking*. https://www.wermac.org/steel/steelmaking.html. Accessed 3/20/2025.

[18] Iron Metallics Association. *Direct reduced iron (DRI)*. (2019). Available at: https://www.metallics.org/about-metallics/dri/. Accessed 3/25/2025.

use electricity purchased from an outside source. Flux is blown or deposited on top of the metal after it has melted. Impurities are oxidized by the air in the furnace and by oxygen injections. When complete, the furnace is tilted and the molten steel is drained through a tap.

The steel making process produces molten steel that is shaped into solid forms at forming mills. Steel often undergoes additional (referred to as secondary) metallurgical processes after removal from the steel making furnace. Secondary steel making takes place in vessels, smaller furnaces, or the ladle. Secondary steel making can have many purposes, such as removal of oxygen, sulfur, hydrogen, and other gases by exposing the steel to a low-pressure environment; removal of carbon monoxide using deoxidizers such as aluminum, titanium, and silicon; and changing of the composition of unremovable substances such as oxides to further improve mechanical properties.

Finishing mills then shape, harden, and treat the semi-finished steel to yield its final marketable condition. Two main methods are used to shape the molten steel into a solid form for use at finishing mills: ingot casting and continuous casting machines. Ingot casting is the traditional method of forming molten steel in which the metal is poured into ingot molds to cool and solidify. However, continuous casting currently accounts for greater than 99 percent of steel production.[19] Continuous casting, in which the steel is cast directly into a moving mold on a machine, reduces steel lost in processing.

Table 3 shows world steel consumption across a variety of categories. Building and infrastructure construction accounts for more than half of global steel consumption. The automotive industry is the largest end-user of domestic steel produced by II&S facilities, accounting for about 43 percent of U.S. Steel's steel shipments and 40 percent of Cleveland-Cliffs Inc.'s total revenue, excluding sales to steel wholesalers and converters, with construction accounting for the next largest share of each firm's sales.[20] Since steel demand is derivative of demand for automobiles and construction, sales of U.S. II&S facilities are particularly responsive to changes in macroeconomic conditions.

[19] USGS. (2022). *Iron and Steel Mineral Commodity Summary 2022*. Available at: https://www.usgs.gov/centers/national-minerals-information-center/iron-and-steel-statistics-and-information.

[20] Source: U.S. Steel Corporation Form 10-K 2022 and Cleveland-Cliffs Inc. Form 10-K 2022.

Table 3: Global Steel Consumption by Category, 2019

Category	Share
Buildings and Infrastructure	52%
Automotive	12%
Metal Products	10%
Mechanical Equipment	16%
Other Transport (inc. airplanes and trains)	5%
Domestic Appliances	2%
Electrical Equipment	3%

Source: https://worldsteel.org/about-steel/steel-facts/. Accessed 3/19/2025.

There are currently eight II&S manufacturing facilities in the United States. These facilities, listed in Table 4, are all in the midwestern U.S., spread across five states: three in Indiana, two in Ohio, and one each in Illinois, Michigan, and Pennsylvania. A ninth facility, the Great Lakes Works in Ecorse, Michigan (owned by U.S. Steel) closed its primary iron and steel manufacturing operations in 2019 (the facility still maintains some secondary operations).[21] The facilities range in steel production capacity from 2.5 to 7.5 million metric tons (MMT) per year. Three II&S facilities use on-site sinter plants: Burns Harbor Works, Indiana Harbor Works, and Gary Works. The Dearborn Works permanently idled their hot strip mill, anneal, and temper operations in 2020.[22] The number of II&S facilities is down from 20 (owned by 14 firms) in 2001.[23] Cleveland-Cliffs Inc. facilities account for 59 percent of II&S capacity and U.S. Steel facilities account for the remaining 41 percent.

[21] Isidore, Chris. (Dec 20, 2019). *US Steel is closing a Detroit-area steel mill and laying off 1,500 workers*. Available at: https://www.cnn.com/2019/12/20/business/us-steel-mill-closing/index.html#:~:text=The%20mill%2C%20called%20the%20Great,be%20lost%2C%20the%20company%20said. Accessed 3/19/2025.

[22] https://www.clevelandcliffs.com/operations/steelmaking/dearborn-works#:~:text=During%202020%2C%20the%20Dearborn%20Works,temper%20operations%20were%20permanently%20idled. Accessed 3/21/2025.

[23] U.S. EPA. (2001). *National Emission Standards for Hazardous Air Pollutants (NESHAP) for Integrated Iron and Steel Plants - Background Information for Proposed Standards*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-0838.

Table 4: II&S Facilities

Ultimate Parent Company	Facility	Location	Capacity (MMT/year)	Sinter Plant
Cleveland-Cliffs Inc.	Burns Harbor Works	Burns Harbor, IN	5	Yes
	Cleveland Works	Cleveland, OH	3	No
	Dearborn Works	Dearborn, MI	2.5	No
	Indiana Harbor Works	East Chicago, IN	5.5	Yes
	Middletown Works	Middletown, OH	3	No
U.S. Steel	Gary Works	Gary, IN	7.5	Yes
	Granite City Works	Granite City, IL	2.8	No
	Mon Valley Works	Braddock, PA	2.9	No

Sources: US Steel and Cleveland-Cliffs websites https://www.clevelandcliffs.com/operations/steelmaking https://www.ussteel.com/about-us/locations.

3. Emission, Cost, and Economic Impacts

This RIA analyzes only the changes to estimated costs, emissions reductions, and benefits for UFIP emissions sources caused by revising the compliance deadlines for the April 3, 2024, NESHAP amendments. The baseline for this analysis is the counterfactual world in which the 2024 final NESHAP amendments for the II&S source category went into effect on April 3, 2025. As discussed in Section 1.1, on March 31, 2025 EPA issued a 90-day partial administrative stay of requirements associated with the 2024 final rule. At the time of the issuance of the stay, EPA does not believe that industry had yet incurred any costs associated with compliance. Aspects of the rule that require advance installation of capital (specifically, the installation of stockline monitors and raw material screens required to comply with the work practice standards and limits for unplanned bleeder valve openings) had a previous compliance deadline of April 3, 2026. EPA does not believe that any capital associated with these requirements has already been installed. With this in mind, the analysis contained in this RIA could be considered an estimate of the impacts of the interim final rule and the 90-day administrative stay. Given that the EPA did not provide an estimate of the impacts of the stay at the time of issuance, this provides a means of accounting for those impacts and the impacts of the interim final rule in a consistent manner. Cost, emission, and benefit impacts are measured incremental to this baseline.

The EPA assumes full compliance with the 2024 final NESHAP amendments is required and achieved by II&S manufacturing facilities on April 3, 2027. The EPA expects that the impacts of revising the deadlines will be contained to the years directly impacted by the revisions and the first year of full compliance with the interim final NESHAP amendments. The impacts in the first year of full compliance stem from capital investment deferred from 2025 and 2026, when compliance is no longer required. The analysis timeframe extends to 2035 to cover the period analyzed in the RIA for the 2024 final rule, but there are no estimated impacts from 2028 to 2035.

The UFIP Memo and corresponding workbook estimate the total capital investment, annual operating and maintenance (O&M) cost, and emissions reductions from implementing the work practice standards and meeting the limits imposed by the 2024 final rule.[24] The estimates in

[24] Available for download under "Additional Resources" here: https://www.epa.gov/stationary-sources-air-pollution/integrated-iron-and-steel-manufacturing-national-emission.

this memo form the basis of the analysis. The details and methods for estimating these impacts are described in greater detail in the UFIP Memo and the RIA for the 2024 final rule.

The baseline for the analysis in this RIA is the world in which the compliance deadlines go into effect on the original timeline required by the 2024 final rule. All estimates presented here can be viewed as relative to the more stringent regulatory alternative of not promulgating this interim final rule. The impacts of this more stringent regulatory alternative, with respect to costs, emissions, and benefits, is zero in all years of the analytical timeframe using the methodology to estimate cost, emissions, and benefits used in the 2024 final rule RIA and this RIA. However, as discussed in the preamble of this interim final rule, since promulgation of the 2024 final rule new information has raised questions as to whether compliance with the rule as written is feasible. This includes both how costly it would be to meet the requirements and whether the prescribed work practices for UFIP sources would achieve the estimated emissions reductions. The EPA is conducting additional analyses related to these issues that will be used to reconsider the 2024 final rule. Not issuing this interim final rule could result in non-compliance at certain facilities. This context should be kept in mind when assessing the cost and benefits impacts contained in this RIA. The following subsections discuss emission, cost, and economic impacts respectively.

3.1 Emission Impacts

This interim final rule revises the compliance deadlines associated with UFIP emissions sources from April 3, 2025, or April 3, 2026 (depending on the provision) to April 3, 2027, allowing the maximum-allowable time for sources to achieve compliance under CAA section 112. UFIP emissions occur from planned openings of BF bleeder valves, unplanned openings of BF bleeder valves, BF bell leaks, BF iron beaching, BF slag processing/handling/storage, and BOPF shops.

The 2024 final NESHAP amendments required facilities to implement work practice standards to limit emissions from BF bell leaks, BF unplanned bleeder valve openings, BF iron beaching, and BOPF shops. The 2024 final NESHAP amendments also set opacity limits for emissions from planned openings of BF bleeder valves and slag processing/handling/storage as well as a limit on the number of unplanned bleeder valve openings that may occur in a year.

These emission sources and the required work practice standards are described in detail in the UFIP Memo and the RIA for the 2024 final rule.

The 2024 finalized NESHAP amendments for II&S facilities set a compliance deadline of April 3, 2025 for opacity limits for planned openings of BF bleeder valves, work practice standards for BF bell leaks, and work practice standards for BOPF shops, and a compliance deadline of April 3, 2026, for work practice standards and limits for unplanned BF bleeder valve openings, work practice standards for BF iron beaching, and opacity limit for slag processing/handling/storage (see Table 1). This interim final rule revises all compliance deadlines to April 3, 2027. Table 5 presents the estimated annual emissions reductions for the final amendments per year from each UFIP source. The bulk of the anticipated reductions (approximately 91 percent) are from reduced emissions from BOPF shops and BF bell leaks. The provisions affecting these sources were originally scheduled to go into effect on April 3, 2025.

Table 5: Estimated Emissions Reductions (short tons per year) for UFIP Sources from 2024 Final NESHAP Amendments

	PM	**$PM_{2.5}$**	**HAP**
Original Deadline: April 3, 2025			
BOPF Shop	790	230	25
BF Planned Openings	11	2.5	0.4
BF Bell Leaks	830	190	31
Subtotal	1,600	430	56
Original Deadline: April 3, 2026			
BF Unplanned Openings	14	3.1	0.5
Iron Beaching	0.09	0.03	0.0035
Slag Handling	220	43	7
Subtotal	230	46	8
Total	**1,900**	**470**	**64**

Note: Figures rounded to two significant digits and may not add due to rounding.

Revising the compliance deadlines for UFIP emissions sources is expected to decrease the emissions reductions from BOPF shops, BF planned openings, and BF bell leaks from April 3, 2025, to April 2, 2026, and from all UFIP sources from April 3, 2026, to April 2, 2027. No changes in emissions reductions from this interim final rule are expected outside of this time

frame. The changes to estimated emissions reductions for UFIP sources are summarized in Table 6.

Table 6: Changes to Estimated Emissions Reduction (short tons) for the Interim Final NESHAP Amendments, 2025-2035

Year	PM	$PM_{2.5}$	HAP
2025	-1,600	-430	-56
2026	-1,900	-470	-64
2027	0	0	0
2028	0	0	0
2029	0	0	0
2030	0	0	0
2031	0	0	0
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	0	0	0

Note: Figures are rounded to two significant digits.

3.2 Cost Impacts

Implementing the work practice standards and emissions limits for UFIP sources requires affected facilities to develop plans, make capital investments, perform emissions monitoring, and perform routine O&M tasks to ensure compliance. Revising the associated compliance deadlines allows affected facilities to defer capital investments from the original deadline to the new deadline and avoid routine O&M expenses during the period over which compliance is no longer required. As a result, firms operating affected facilities realize cost savings from reduced capital investment and O&M costs in the period prior to compliance and increased capital investment (relative to the original compliance deadlines) in the first year of compliance. Total capital investment is unchanged over the analysis period (2025-2035), as the equipment life associated with all relevant capital investments is 20 years. Since O&M costs are identical in the baseline and under the interim final rule from 2027 through 2035, the only difference in costs from 2027 onward are from this deferred capital investment.

Table 7: Changes to Undiscounted Compliance Costs for the Interim Final NESHAP Amendments (millions of 2024 dollars), 2025-2035

Year	Total Capital Investment	O&M	Total
2025	-$2.4	-$1.4	-$3.8
2026	-$2.2	-$1.8	-$4.0
2027	$4.6	$0.0	$4.6
2028	$0.0	$0.0	$0.0
2029	$0.0	$0.0	$0.0
2030	$0.0	$0.0	$0.0
2031	$0.0	$0.0	$0.0
2032	$0.0	$0.0	$0.0
2033	$0.0	$0.0	$0.0
2034	$0.0	$0.0	$0.0
2035	$0.0	$0.0	$0.0
Total	**$0.0**	**-$3.2**	**-$3.2**

Note: Negative values indicate cost savings. Figures rounded to two significant digits and may not add due to rounding.

The discounted cost changes, PV, and EAV for this interim final rule, calculated using both a 3 percent and 7 percent social discount rate, are in Table 8. This interim final rule is estimated to result in a PV of $3.3 million of cost savings ($0.4 million EAV) using a 3 percent social discount rate and a PV of $3.5 million of cost savings ($0.5 million EAV) using a 7 percent social discount rate.

Table 8: Present Value, Equivalent Annualized Value, and Discounted Compliance Cost Changes for the Interim Final NESHAP Amendments (millions of 2024 dollars), 2025-2035

Year	Discount Rate (Discounted to 2025)	
	3%	7%
2025	-$3.8	-$3.8
2026	-$3.8	-$3.7
2027	$4.3	$4.0
2028	$0.0	$0.0
2029	$0.0	$0.0
2030	$0.0	$0.0
2031	$0.0	$0.0
2032	$0.0	$0.0
2033	$0.0	$0.0
2034	$0.0	$0.0
2035	$0.0	$0.0
PV	**-$3.3**	**-$3.5**
EAV	**-$0.4**	**-$0.5**

Note: Negative values indicate cost savings. Figures rounded to two significant digits and may not add due to rounding.

3.3 Economic Impacts

This section is directed towards revising the compliance cost analysis and includes an analysis of potential firm-level impacts of regulatory costs and potential small entity impacts. Although facility-specific economic impacts (production changes or closures, for example) cannot be estimated by the compliance cost analysis contained in the previous section, the EPA conducted a screening analysis of compliance costs compared to the revenue of firms owning II&S 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.[25]

If the compliance costs changes, 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 percentage 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-to-sales ratio 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 a regulation. For this interim final rule, the change in estimated compliance costs is negative, as the EPA estimates that firms owning II&S facilities will realize cost savings due to this interim final rule. The EPA conducted a cost-to-sales analysis to estimate economic impacts for this interim final rule because the EAV of the compliance cost savings range from $0.4 million using a 3 percent social discount rate to $0.5 million using a 7 percent discount rate in 2024 dollars, which is small relative to the size of the affected firms and the revenues of the steel industry.

As discussed in Section 2, only two firms own the eight operating II&S manufacturing facilities in the United States: Cleveland-Cliffs Inc. (Burns Harbor, Cleveland, Dearborn, Indiana Harbor, and Middletown Works) and U.S. Steel (Gary, Granite City, and Mon Valley Works). Both firms report sales greater than $15 billion in 2024. Table 9 contains sales and employment information for each firm.

[25] U.S. EPA. (2024). *Guidelines for Preparing Economic Analyses (3rd edition)*. Report number EPA-240-R-24-001. Washington, DC. Available at: https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses-3rd-edition.

Table 9: II&S Facility Owner Sales and Employment, 2024

Ultimate Parent Company	HQ Location	Legal Form	Sales	Employment
U.S. Steel	Pittsburgh, PA	Public	$16,000	22,000
Cleveland-Cliffs Inc.	Cleveland, OH	Public	$19,000	30,000
Total			**$35,000**	**52,000**

Sources: U.S. Steel Corporation Form 10-K 2025 and Cleveland-Cliffs Inc. Form 10-K 2025. Figures rounded to two significant digits and may not add due to rounding.

Table 10 presents the total annualized cost savings relative to sales estimated for this interim final rule for U.S. Steel and Cleveland-Cliffs Inc. The annualized cost savings are calculated by first calculating total capital investment and O&M cost relative to the analytical baseline in each year for each firm. These costs are added together, converted to present values, and annualized using the bank prime rate (7.5 percent at the time of the analysis) as a proxy for each firm's weighted average cost of capital.[26] This approach to annualization follows guidance in the EPA Air Pollution Control Cost Manual, which recommends using the bank prime rate to annualize costs to firms when firm or sector-specific interest rates are not available.[27] The cost savings are annualized over the length of the analytical timeframe of this RIA (2025-2035). The total annualized cost savings are approximately $210,000 per year for U.S. Steel and $270,000 per year for Cleveland-Cliffs Inc. The annualized cost savings estimated as a result of this interim final rule is small relative to the revenue of both U.S. Steel and Cleveland Cliffs Inc., so any potential economic impacts are likely to be small.

Table 10: Total Annualized Cost Savings-to-Sales Ratios of II&S Facility Owners for the Interim Final NESHAP Amendments

Ultimate Parent Company	2024 Revenue	Total Annualized Cost Savings	TACS-Sales Ratio
U.S. Steel	$16,000	$0.21	0.0013%
Cleveland-Cliffs Inc.	$19,000	$0.27	0.0014%

Note: Figures are rounded to two significant digits. Dollar figures measured in millions of 2024 dollars.

[26] Commerce Bank. *Current Prime Rate*. https://www.commercebank.com/about-us/prime-rate-update. Accessed 3/20/2025.

[27] U.S. EPA. (2018). *EPA Air Pollution Control Cost Manual*. Available at: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.

3.4 Small Entity Impacts

The Regulatory Flexibility Act (RFA; 5 U.S.C. §601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act (Public Law No. 104121), provides that whenever an agency publishes a proposed rule, it must prepare and make available an initial regulatory flexibility analysis (IRFA), unless it certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities (5 U.S.C. §605[b]). Small entities include small businesses, small organizations, and small governmental jurisdictions. An IRFA describes the economic impact of the rule on small entities and any significant alternatives to the rule that would accomplish the objectives of the rule while minimizing significant economic impacts on small entities. An agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, has no net burden or otherwise has a positive economic effect on the small entities subject to the rule.

To determine the possible impacts of this interim final rule on small entities, the EPA categorized ultimate parent companies producing iron and steel in integrated facilities as small or large using the Small Business Administration's (SBA's) general size standards definitions. For NAICS 331110 (Iron and Steel Mills and Ferroalloy Manufacturing), these guidelines indicate a small business employs 1,500 or fewer workers.[28] As discussed previously, only Cleveland-Cliffs Inc. and U.S. Steel own II&S manufacturing facilities in the United States. Based on the SBA definition and the company employment shown in Table 9, this industry has no small businesses. Further, this interim final rule reduces the stringency of the requirements facing regulated entities by revising relevant compliance deadlines. The EPA has therefore concluded that this interim final rule will not have a significant economic impact on a substantial number of small entities.

[28] U.S. Small Business Administration, Table of Standards, Effective March 17, 2023. Available at: https://www.sba.gov/document/support--table-size-standards. Accessed March 20, 2025.

4. Benefit Impacts

Implementing the work practice standards and meeting the limits required by the 2024 final NESHAP amendments applying to UFIP sources is expected to reduce HAP emissions, including emissions of manganese (Mn), lead (Pb), arsenic (As), chromium/chromium VI (Cr/Cr+6), dioxins/furans (D/F), polycyclic aromatic hydrocarbons (PAH), and other HAP. The work practice standards and limits for UFIP sources are also expected to reduce emissions of non-HAP pollutants, such as PM (including $PM_{2.5}$). Given this, revising the compliance deadlines for UFIP sources is likely to decrease the emissions reductions associated with the 2024 final NESHAP amendments for the II&S source category during the period that these requirements would have otherwise been in force. These changes to emissions reductions are estimated in Section 3.1.

In this section, the EPA provides the benefits analysis for this interim final rule. Data, resource, and methodological limitations prevented the EPA from monetizing the human health benefits from changes to exposure to HAP impacted by the 2024 final NESHAP amendments. These included potential cancer risks and potential non-cancer impacts including cardiovascular and central nervous system impacts. The EPA provides a qualitative discussion of the health effects of HAP likely to be impacted by the 2024 final NESHAP amendments in the RIA for the 2024 final rule.[29] In addition, the potential benefits from ecosystem effects and visibility changes (from changes to haze caused by PM) from changes in $PM_{2.5}$ emissions are not monetized here. Ecosystem effects of nitrogen and sulfur deposition include terrestrial and aquatic acidification, terrestrial nitrogen enrichment and aquatic eutrophication.

In this section, the EPA quantifies the economic value of health benefits estimated for this interim final rule, such as those associated with potential changes in $PM_{2.5}$-related premature deaths and illnesses expected to occur because of implementing this rule. $PM_{2.5}$ emissions changes are likely to occur from revising the compliance deadlines for UFIP sources, as

[29] U.S. EPA. (2024). *Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

discussed in Section 3.1. The EPA did not conduct air quality modeling for this rule. Rather, the value of reducing PM concentrations is quantified using a "benefit-per-ton" (BPT) approach. These BPT estimates provide the average total monetized human health benefits (the sum of premature mortality and premature morbidity) of reducing one ton of $PM_{2.5}$ (or $PM_{2.5}$ precursor such as NO_x or SO_2) from a specified source category. The BPT estimates for the II&S source category in 2025, 2030, and 2035 are shown in Table 11 below. These estimated BPT values are applied to estimated $PM_{2.5}$ emissions changes to monetize the impacts of this interim final rule. For a full discussion of the methodology for estimating these benefits, see Section 4.3 of the RIA for the 2024 final rule and the associated sources.[30]

Table 11: II&S Benefit-per-Ton Estimates of $PM_{2.5}$-Attributable Premature Mortality and Illness Used for the Interim Final NESHAP Amendments (millions of 2024 dollars)

	Discount Rate (BPT)					
Year	**3%**			**7%**		
2025	$450,000	and	$970,000	$410,000	and	$870,000
2030	$490,000	and	$1,000,000	$440,000	and	$910,000
2035	$550,000	and	$1,100,000	$490,000	and	$990,000

Note: Figures are rounded to two significant digits. The monetized health benefits are quantified using two alternative concentration-response relationships from the Di et al. (2016) and Turner et al. (2017) studies and presented at real discount rates of 3 and 7 percent.

The undiscounted monetized benefit estimates for this interim final rule are shown in Table 12. No changes to benefits are expected after April 3, 2027, as the compliance deadlines in this interim final rule are the same as those in the NESHAP amendments finalized on April 3, 2024. The undiscounted monetized changes to benefits are largest in the second year of the analysis timeframe, ranging from -$210 million to -$460 million using the BPT calculated using a 3 percent discount rate and from -$190 million to -$410 million using the BPT calculated using a 7 percent discount rate.

[30] Ibid.

Table 12: Undiscounted Monetized Benefits Estimates of $PM_{2.5}$-Attributable Premature Mortality and Illness for the Interim Final NESHAP Amendments (millions of 2024 dollars)

	Discount Rate (BPT)	
Year	**3%**	**7%**
2025	-$190 and -$410	-$170 and -$370
2026	-$210 and -$460	-$190 and -$410
2027	$0 and $0	$0 and $0
2028	$0 and $0	$0 and $0
2029	$0 and $0	$0 and $0
2030	$0 and $0	$0 and $0
2031	$0 and $0	$0 and $0
2032	$0 and $0	$0 and $0
2033	$0 and $0	$0 and $0
2034	$0 and $0	$0 and $0
2035	$0 and $0	$0 and $0

Note: Negative numbers indicate reductions in estimated benefits relative to baseline. Figures are rounded to two significant digits. The monetized health benefits are quantified using two alternative concentration-response relationships from the Di et al. (2016) and Turner et al. (2017) studies and presented at real discount rates of 3 and 7 percent. Estimates represent sums of all changes to future health benefit streams discounted back to the scenario year (2025-2026, 2026-2027, 2027-2028) to account for lags in the onset of health effects. The estimates do not represent lower- and upper-bound estimates and should not be summed. These estimates have not all been discounted to 2025 for present value calculations.

The discounted benefit estimates for each year, using a 3 percent and a 7 percent social discount rate, along with the associated present value and equivalent annualized value are shown in Table 13. The PV of the lower estimated benefits changes for this interim final rule are -$400 million using a 3 percent discount rate and -$350 million using a 7 percent discount rate with an EAV of -$43 and -$47 million respectively. The PV of the upper estimated benefits changes for this interim final rule are -$860 million using a 3 percent discount rate to -$760 million using a 7 percent discount rate with an EAV of -$93 and -$100 million respectively. All estimates are reported in 2024 dollars.

Table 13: Present Value, Equivalent Annualized Value, and Discounted Benefits of the Interim Final NESHAP Amendments (millions of 2024 dollars), 2025-2035

	Discount Rate (Discounted to 2025)					
Year	**3%**			**7%**		
2025	-$190	and	-$410	-$170	and	-$270
2026	-$210	and	-$440	-$180	and	-$380
2027	$0.0	and	$0.0	$0.0	and	$0.0
2028	$0.0	and	$0.0	$0.0	and	$0.0
2029	$0.0	and	$0.0	$0.0	and	$0.0
2030	$0.0	and	$0.0	$0.0	and	$0.0
2031	$0.0	and	$0.0	$0.0	and	$0.0
2032	$0.0	and	$0.0	$0.0	and	$0.0
2033	$0.0	and	$0.0	$0.0	and	$0.0
2034	$0.0	and	$0.0	$0.0	and	$0.0
2035	$0.0	and	$0.0	$0.0	and	$0.0
PV	**-$400**	**and**	**-$860**	**-$350**	**and**	**-$760**
EAV	**-$43**	**and**	**-$93**	**-$47**	**and**	**-$100**

Note: Negative numbers indicate reductions in estimated benefits relative to baseline. Figures are rounded to two significant digits. The monetized health benefits are quantified using two alternative concentration-response relationships from the Di et al. (2016) and Turner et al. (2017) studies and presented at real discount rates of 3 and 7 percent. The estimates do not represent lower- and upper-bound estimates and should not be summed.

5. Comparison of Benefits and Costs

In this section, the EPA presents a comparison of the benefits and costs of this interim final rule. All costs and benefits outlined in this RIA are estimated as the change from the baseline, which reflects the requirements already promulgated. Specifically, the baseline represents the state of the world in which the NESHAP amendments for the II&S source category finalized on April 3, 2024, go into effect based on the original compliance schedule. As stated earlier in this RIA, there is no monetized estimate of the benefits for the HAP emission changes expected to occur because of this interim final rule. Further, the monetized benefits associated with $PM_{2.5}$ only include health benefits associated with reduced premature mortality and morbidity associated with exposure to $PM_{2.5}$, and do not include other health and environmental impacts associated with reduced PM emissions, such as ecosystem effects and reduced visibility.

As part of fulfilling analytical guidance with respect to E.O. 12866, the EPA presents estimates of the PV of the benefits, costs, and net benefits over the period 2025-2035. This is the period over which this interim final rule is expected to have incremental impacts relative to the baseline and extends to the end of the timeframe covered by the 2024 final rule RIA. To calculate the present value of the social net benefits of this interim final rule, annual benefits and costs are in 2024 dollars and are discounted to 2025 at 3 percent and 7 percent discount rates as directed by OMB's Circular A-4. As discussed in that document, the 3 percent rate is chosen as an estimate of the rate at which society discounts future consumption while the 7 percent rate is chosen as a proxy for the opportunity cost of capital. The EPA also presents the EAV, which represents a flow of constant annual values that would yield a sum equivalent in PV to the original stream of costs or benefits. The EAV represents the value of a typical cost or benefit for each year of the analysis, consistent with the estimate of the PV, in contrast to year-specific estimates.

Table 14 presents a summary of the monetized benefits, compliance costs, and net benefits of interim final rule in terms of present value (PV) and equivalent annualized value (EAV). Table 15 presents the undiscounted net benefits by year of this interim final rule. Table

16 shows the discounted net benefits for each year, along with the associated present value and equivalent annualized value, using a 3 percent and a 7 percent social discount rate. As discussed in Section 1.3, in the analysis for the 2024 final rule, the EPA did not monetize human health impacts from changes to exposure to the HAP directly targeted by the rule. These included potential cancer risks and potential non-cancer impacts including cardiovascular and central nervous system impacts. The EPA provides a qualitative discussion of the health effects of HAP likely to be impacted by the 2024 final rule in the associated RIA.[31] In addition, any potential impacts from ecosystem effects or visibility changes (from changes to haze caused by PM) from the changes in $PM_{2.5}$ emissions are not monetized here. Ecosystem effects of nitrogen and sulfur deposition include terrestrial and aquatic acidification, terrestrial nitrogen enrichment and aquatic eutrophication. All potential changes to benefits listed here caused by the interim final rule would be due to emissions increases, and would thus be negative.

[31] U.S. EPA. (2024). *Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

Table 14: Monetized Benefits, Compliance Costs, Net Benefits, and Emission Changes for the Interim Final NESHAP Amendments, 2025-2035, Discounted to 2025 (millions of 2024 dollars)

	3 Percent Discount Rate		7 Percent Discount Rate	
	PV	**EAV**	**PV**	**EAV**
Monetized Health Benefits	-$400 and -$860	-$43 and -$93	-$350 and -$760	-$47 and -$100
Compliance Costs	-$3.3	-$0.4	-$3.5	-$0.5
Net Benefits	-$400 and -$850	-$43 and -$92	-$350 and -$750	-$47 and -$100
Emissions Increases	**2025-2035**			
HAP	120 short tons			
PM	3,500 short tons			
$PM_{2.5}$	900 short tons			

Note: Negative costs indicate cost savings. Figures rounded to two significant digits and may not add due to rounding. Estimated emissions increases are relative to the baseline, and don't reflect increased emissions relative to current emissions.

Table 15: Undiscounted Changes in Net Benefits for the Interim Final NESHAP Amendments (millions of 2024 dollars), 2025-2035

	Discount Rate (BPT)					
Year	**3%**			**7%**		
2025	-$190	and	-$410	-$170	and	-$370
2026	-$210	and	-$450	-$190	and	-$410
2027	-$4.6	and	-$4.6	-$4.6	and	-$4.6
2028	$0	and	$0	$0	and	$0
2029	$0	and	$0	$0	and	$0
2030	$0	and	$0	$0	and	$0
2031	$0	and	$0	$0	and	$0
2032	$0	and	$0	$0	and	$0
2033	$0	and	$0	$0	and	$0
2034	$0	and	$0	$0	and	$0
2035	$0	and	$0	$0	and	$0

Note: Figures rounded to two significant digits.

Table 16: Present Value, Equivalent Annualized Value, and Discounted Net Benefits for the Interim Final NESHAP Amendments, Discounted to 2025 (millions of 2024 dollars), 2025-2035

	Discount Rate					
Year	**3%**			**7%**		
2025	-$190	and	-$410	-$170	and	-$370
2026	-$200	and	-$440	-$180	and	-$380
2027	-$4.3	and	-$4.3	-$4.0	and	-$4.0
2028	$0	and	$0	$0	and	$0
2029	$0	and	$0	$0	and	$0
2030	$0	and	$0	$0	and	$0
2031	$0	and	$0	$0	and	$0
2032	$0	and	$0	$0	and	$0
2033	$0	and	$0	$0	and	$0
2034	$0	and	$0	$0	and	$0
2035	$0	and	$0	$0	and	$0
PV	**-$350**	**and**	**-$750**	**-$310**	**and**	**-$660**
EAV	**-$43**	**and**	**-$92**	**-$42**	**and**	**-$100**

Note: Figures rounded to two significant digits.

There is uncertainty associated with the cost and benefit estimates included in this RIA. The EPA summarizes the key elements here.

- **Baseline Compliance Rates**: The EPA assumes that the affected facilities would be able to comply with the UFIP work practice standards and limits as written if implemented under the original compliance deadlines. Based on information received since promulgation of the 2024 final NESHAP amendments, discussed in the preamble of this interim final rule, the EPA is uncertain whether this is possible. The EPA is therefore reconsidering aspects of the NESHAP for the II&S source category prior to April 3, 2027, when compliance with the April 3, 2024, final NESHAP amendments is required under the baseline requirements. However, given that no new cost or emissions analysis of UFIP sources has been conducted for this interim final rule, the EPA uses the analysis conducted for the 2023 proposal and 2024 final rule to estimate impacts in this RIA.

- **Compliance Costs**: There is uncertainty associated with the costs necessary to perform the required work practices and meet the limits for UFIP sources. These costs provide the baseline level of costs against which the cost savings associated with this interim final rule are measured. To the extent that these costs were over or underestimated analysis of UFIP sources conducted for the 2024 rulemaking, the cost savings estimated for this interim final rule are over or underestimated. Additionally, facilities may develop less-costly methods of meeting the limits for UFIP sources, and the EPA is unable to predict exactly how industry will comply with the 2024 final amendments. Finally, while EPA does not believe facilities have yet incurred compliance costs related to the 2024 final rule, any such costs have not been captured in this analysis.

- **Emission Changes**: Baseline emissions and projected emissions reductions from implementing the required work practice standards and meeting the limits for UFIP sources are based on PM emissions factors developed by the EPA from the literature, knowledge of the sources, discussions with the II&S industry, assumptions about current emissions controls, and data collection from II&S facilities. To the extent that any of these data or assumptions are unrepresentative, the emissions changes (and therefore benefits changes) associated with revising the deadline by which affected facilities must meet the standards imposed by the final NESHAP amendments could be over or underestimated.

- **BPT Estimates and PM Health Impacts**: The benefit impacts estimated for this interim final rule are based on reduced form estimates of the health benefits from reduced premature mortality and morbidity associated with $PM_{2.5}$ directly emitted from II&S manufacturing facilities. Reduced form tools are less complex than the full air quality modeling. All national-average BPT estimates reflect the geographic distribution of the modeled emissions, which may not exactly match the emission reductions that would have occured due to the action, and they may not reflect local variability in population density, meteorology, exposure, baseline health incidence rates, or other local factors for any specific location. For a full discussion of the uncertainty associated with the BPT estimates and the

underlying analysis of PM health impacts, see Chapter 4 and Section 6.2 of the RIA for the 2024 final rule.[32]

- **Non-monetized Benefits**: Numerous categories of health and welfare benefits are not quantified and monetized in this RIA. These unquantified benefits, including benefits from changes in emissions of pollutants such as HAP, which are directly targeted by the 2024 final NESHAP amendments, are described in detail in Chapter 4 of the RIA for the 2024 final rule.[33]

- **Projection Methods and Assumptions**: The number of facilities in operation is assumed to be constant over the analysis period. Multiple facilities have idled or closed over the last several years, and if this trend were to continue then the costs and emissions impacts of this interim final rule may be overestimated. Any changes to the economic environment facing existing facilities in the period covered by this analysis (including those since the promulgation of the 2024 final rule) have not been captured.

[32] U.S. EPA. (2024*). Regulatory Impact Analysis for the Final National Emission Standards for Hazardous Air Pollutants: Integrated Iron and Steel Manufacturing Facilities Technology Review*. Available at: https://www.regulations.gov/document/EPA-HQ-OAR-2002-0083-1977.

[33] Ibid.