Compendium of Examples from Recent EJ Analyses Conducted for EPA Rulemakings

December 2024

This document provides eight summaries of environmental justice (EJ) analyses, two from each of the main Program Offices that promulgate rules, that were conducted for proposed or final rulemakings. Each summary has been reviewed for technical accuracy by staff in the relevant Program Office. The goal in providing this library of examples is to lower barriers for the conduct of EJ analysis for rulemakings and facilitate information sharing among agency analysts.

Summaries of EJ analyses were previously located in Appendix C of the *Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (2016). For the revision, we house these summaries in a separate companion document to allow for more regularly updating and adding of examples over time.

These are brief summaries designed to give a high-level appreciation of the data and methodological approaches and main results. As such, they do not capture all aspects of the EJ analysis. For additional details, please see the complete EJ analysis for a specific regulation. Citations and web links are provided at the end of the document.

Proposed Reconsideration of the Dust-Lead Hazard Standards and Dust-Lead Post-Abatement Clearance Levels (U.S. EPA 2023a)

The EPA proposed to lower the dust-lead hazard standard (DLHS) to any reportable level above zero µg/ft^2 and the dust-lead clearance levels (DLCLs) to 3 µg/ft^2, 20 µg/ft^2, and 25 µg/ft^2 for floors, windowsills, and window troughs, respectively. The DLHS is used to identify conditions that can cause exposure to dust-lead hazards in target housing where children reside. Abatement activities must then eliminate any dust-lead hazards to below the DLCLs. Targeted housing units are those where an environmental investigation is triggered by a child's blood lead level (BLL) being above a federal or state action threshold (BLLT events) and those receiving rental assistance from the Department of Housing and Urban Development and therefore subject to its Lead Safe Housing Rule (HUD LSHR events).

Summary of Environmental Justice Concerns Related to the Regulatory Action

BLLs are higher for non-Hispanic Black and Mexican American children as well as children in households living below the poverty level compared to other children. Increased BLLs in children are associated with cognitive function decrements (e.g., reduced IQ), increased diagnoses of attention-related behavioral problems, and greater incidence of problem behaviors.

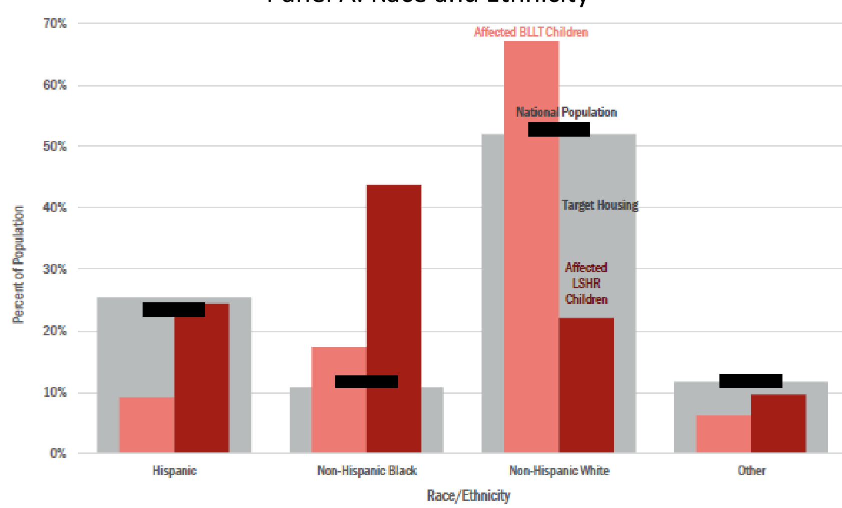
Affected Housing Units by Vulnerable Population

Approach: The EPA analyzed differences in race and ethnicity and the share of low-income individuals in affected housing units using data from the 2019 American Housing Survey for HUD LSHR events and the National Center for Health Statistics' National Health and Nutrition Examination Survey (NHANES) for BLLT events. Because no single data source contained all the information needed to estimate the demographic and housing characteristics of the affected housing units, the EPA used these data to create a combined dataset that simulates the characteristics of the housing affected by the proposed rule.

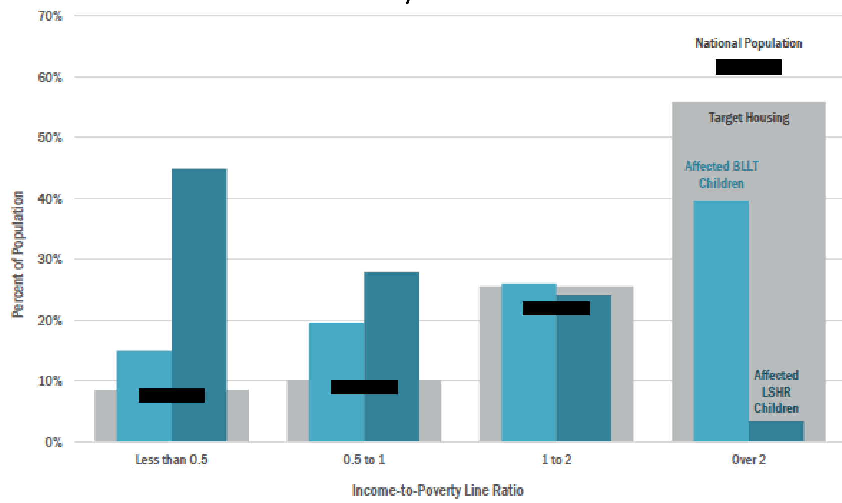
Results: The analysis indicated that Non-Hispanic Black and low-income children were more heavily represented in affected housing compared to both all pre-1978 target housing and the national population (Figure 1).

Figure 1. Proportion of Affected Children (Ages 1-6), Proposed Rule (Option 1)

Panel A: Race and Ethnicity



Panel B: Poverty-to-Income Ratio



Source: Figure 6-1 in U.S. EPA (2023a).

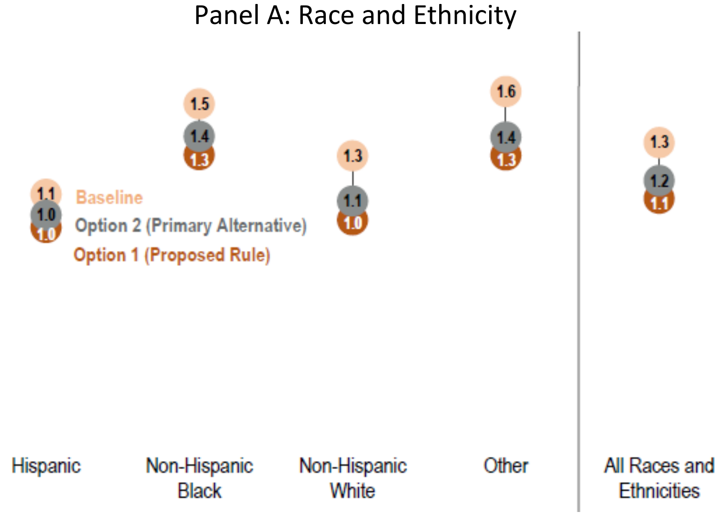
Estimating BLL Changes by Vulnerable Population

Approach: The EPA estimated average dust-lead levels in households affected by the proposed options by race/ethnicity and poverty-to-income ratio and used 1999-2004 NHANES data to develop an empirical model that predicts a child's BLL as a function of dust-lead loadings, housing characteristics, and demographic characteristics.

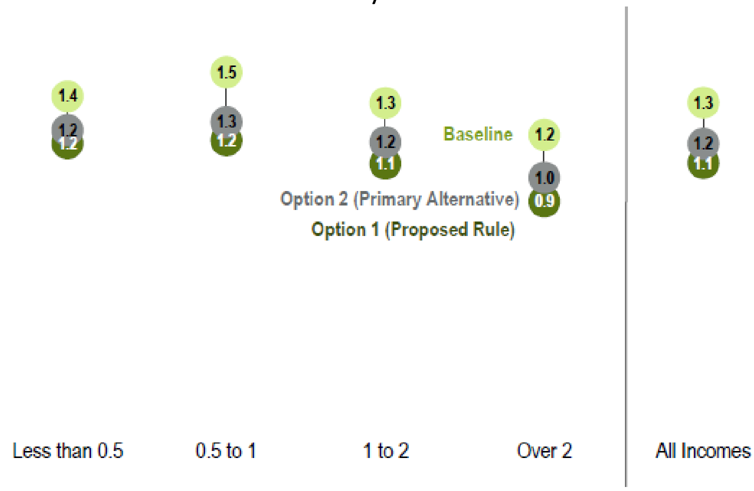
Results: The EPA estimated that dust-lead loadings decrease to a greater extent in BLLT units than LSHR units, on average. As a result, Non-Hispanic White children were expected to realize greater declines in dust-lead loadings than Non-Hispanic Black children because a greater proportion of Non-Hispanic White children are in BLLT units. Older housing, lower incomes, and Non-Hispanic Black children were associated with higher BLLs after controlling for dust-lead loadings. These demographic predictors explained differences between the ranking of average dust-lead levels and the ranking of average BLLs for different groups. For example, even though Non-Hispanic Black children were estimated to have similar baseline dust-lead loadings as Non-Hispanic White children, they tended to have comparatively higher estimated average BLLs (Figure 2).

Figure 2. Average BLL (μg/dL) by Race/Ethnicity and Poverty-to-Income Ratio

Panel A: Race and Ethnicity



Panel B: Poverty-to-Income Ratio



Source: Top panels of Figures 8-4 and 8-5 in U.S. EPA (2023a).

Estimating IQ Changes and Benefits by Vulnerable Population

Approach: The EPA used three models to estimate the relationship between BLL and IQ changes. Total incremental benefits were presented as a range to reflect differences across the models that relate BLLs to IQ.

Results: The magnitude of IQ changes is determined by the magnitude of the change in BLLs and the magnitude of the BLLs themselves. The first factor reflects that greater BLL changes result in greater IQ changes. The second factor relates to the assumption that changes in IQ are not linear. That is, the concentration-response functions predict smaller IQ changes at higher BLLs. For this reason, non-Hispanic Black children were estimated to have smaller average IQ gains. Non-Hispanic White children realized the majority of total monetized benefits. About 44 percent of total monetized benefits were realized by children living below the poverty line, who made up 19 percent of the total childhood population.

Potential Behavioral Responses from Landlords Subject to LSHR

The EPA identified the possibility that landlord participation in tenant-based rental assistance programs might decline under a revised DLHS and DLCL as an area of policy uncertainty. Because landlord participation is voluntary, the additional costs of complying with the HUD LSHR may drive some landlords back to the private housing market. If low-income families that live in these subsidized housing units are forced to move due to landlord exit from housing programs, these families may return to the private housing market where they may face higher housing costs. This may cause an involuntary loss of housing and the potential for dust-lead levels that exceed those in baseline LSHR-regulated housing.

Empirical evidence suggests that the only landlords willing to bear administrative and inspection costs for housing vouchers are those with properties that are satisfactory for inspection but are in amenity-poor neighborhoods. In addition, there is evidence of discrimination against families in the housing voucher program. Because Subpart M of HUD's LSHR applies only when children under the age of 6 are occupants, landlords with housing suitable for families may opt out of program participation.

Chrysotile Asbestos; Regulation of Certain Conditions of Use Under Section 6(a) of the Toxic Substances Control Act (U.S. EPA 2024a).

Following a finding of unreasonable risk to public health and the environment,[1] the EPA finalized a rule to prohibit chrysotile asbestos for six conditions of use: processing and industrial use in diaphragms in the chlor-alkali industry; processing and industrial use in sheet gaskets in chemical production; industrial use and disposal in oil field brake blocks; commercial use, consumer use, and disposal in aftermarket automotive brakes and linings; commercial use and disposal of other vehicle friction products; and commercial use, consumer use, and disposal of other asbestos-containing gaskets.

Summary of Environmental Justice Concerns Related to the Regulatory Action

Populations with greater susceptibility to adverse health effects from chrysotile asbestos exposure include pregnant workers and children exposed prenatally, people genetically predisposed to mesothelioma, smokers, and those exposed early in life. Workers, occupational non-users (workers who do not handle the chemical but are in a workplace where the chemical is present), and consumers of chrysotile asbestos containing products are at greater risk of exposure. Health effects associated with exposure to chrysotile asbestos include cancer (including mesothelioma), respiratory effects, and asbestosis, a diffuse interstitial fibrosis of the lung.

The EPA was only able to characterize baseline conditions in affected communities. If firms and individuals respond to the regulation by adopting substitute technologies or practices that cause environmental harm, it is possible that EJ concerns may result from these effects. For example, the transition away from asbestos-containing diaphragms may result in greater usage and release of perfluorinated chemicals. Some perfluorinated chemicals have been shown to cause adverse health effects in adults and children.

Baseline Cancer Risks by Race and Ethnicity

Approach: The EPA examined 2013 – 2017 national incidence of cancers causally associated with chrysotile asbestos exposure by race and ethnicity, unadjusted for risk factors such as smoking or alcohol consumption. It was not possible to infer the extent to which variation across race and ethnicity was attributable to differences in chrysotile asbestos exposure, but the data provided context about disparities in baseline risks for these diseases.

Results: Data indicated that Non-Hispanic White and Black persons had the highest incidence of lung cancer of any racial or ethnic group. While 90 percent of lung cancers were attributable to smoking, racial and ethnic differences in smoking did not closely align with lung cancer risk disparities. Data on mesothelioma, which is caused by asbestos exposure and is unrelated to smoking, indicated that White persons had the highest rate of any racial group, and Hispanic persons of any race had the next highest rate. Incidence of laryngeal cancer was highest among non-Hispanic Black persons, followed by White and Hispanic persons. Ovarian cancer incidence was highest among White women, followed by American Indian and Alaska Native, Hispanic and Asian women.

Previous Toxic Releases and Transfers at Chlor-Alkali and Chemical Manufacturing Facilities

Approach: The EPA examined 2016 – 2020 Toxics Release Inventory (TRI) data for chlor-alkali and chemical manufacturing facilities affected by the regulation, including for friable asbestos.[2] While asbestos-containing products are typically considered nonfriable for conditions of use with unreasonable risk, it is possible for asbestos to become friable as products deteriorate over time. The EPA also assessed whether a facility

[1] U.S.EPA. 2020. Risk Evaluation for Asbestos Part 1: Chrysotile Asbestos. https://www.epa.gov/sites/default/files/2020-12/documents/1_risk_evaluation_for_asbestos_part_1_chrysotile_asbestos.pdf

[2] Only the friable form of asbestos in concentrations at or above 0.1 percent is a TRI-reportable chemical.

released asbestos due to remedial actions, catastrophic events, or other one-time events unassociated with production processes, which may be related to legacy uses rather than chrysotile asbestos in diaphragms.

Results: Chemical manufacturing facilities using asbestos-containing sheet gaskets reported no TRI releases or transfers of friable asbestos during 2017-2021, while five chlor-alkali facilities reported small air stack releases or transfers of friable asbestos. None of the facilities reported any non-production releases of asbestos, though. Most of the facilities reported releases or offsite transfers of a variety of other toxic chemicals for 2017-2021.

Compliance and Enforcement at Chlor-Alkali and Chemical Manufacturing Facilities

Approach: The EPA also examined the extent to which the facilities subject to the rule were in non-compliance with any of the other major environmental statutes over the last 12 quarters and the number of informal and formal enforcement actions at each facility during the last five years (as of September 2021).

Results: Six of the eight chlor-alkali facilities were in non-compliance with at least one major environmental statute for at least one quarter. Non-compliance with the Clean Water Act was most common. One chemical manufacturing facility was out of compliance with all four major environmental statutes for multiple quarters, while two had multiple quarters of non-compliance with at least one statute. All of the chlor-alkali facilities had at least one formal or informal EPA enforcement action in the last five years. Six of the facilities had multiple formal enforcement actions, with Clean Air Act enforcement actions being the most common.

Proximity Analysis: Characteristics of Communities with Affected Chlor-Alkali, Chemical Manufacturing, and Gasket Manufacturing Facilities

Approach: For three of the use categories, the EPA examined the demographic composition of populations living within 1 and 3 miles of a chlor-alkali, chemical, or gasket manufacturing facility where chrysotile asbestos is likely used. In addition to comparing average demographic characteristics to the overall national average, the EPA compared them to the rural national average using the 2019 American Community Survey (ACS) 5-year data. To better understand if these communities are exposed to other environmental risks in the baseline, the EPA also examined 2014 National Air Toxic Assessment (NATA) respiratory and cancer risks and the number of other TRI facilities located within 1 and 3 miles.

Table 1. Community Profile and NATA Risks: Chlor-Alkali Facilities

Variable	Overall (National Average)	Rural Areas (National Average)	Within 1 Mile of Chlor-Alkali Production Facility	Within 3 Miles of Chlor-Alkali Production Facility
% White	72	84	60	60
% Black or African American	13	7.6	36	34
% Other	15	8.2	4.2	6.8
% Hispanic	18	10	22	20
% Under Age 5	6.1	5.8	6.1	6
Median Household Income (2019$)	71,000	67,000	58,000	62,000
% Below Poverty Line	13	12	16	17
% Below Half the Poverty Line	5.8	5.1	8.7	7.8
Total Cancer Risk (per million)	26	23	46	47
Total Respiratory Risk (Hazard Quotient)	0.31	0.27	0.5	0.46
Source: U.S. Census Bureau 2020b; EPA 2022a				

Source: Table 6-34 in U.S. EPA (2024a).

Results: Table 1 indicates that communities within 1 and 3 miles of a chlor-alkali facility had a much higher share of Black individuals, lower median incomes, and higher poverty rates than the overall or rural national average. Cancer and respiratory risks from air toxics were also much higher than the national average. These results were driven by communities near six chlor-alkali facilities in Louisiana and Texas that had a high concentration of people of color and disproportionately high cancer risks from toxic releases from a variety of industrial facilities. Outside of Louisiana and Texas, most communities where asbestos-containing sheet gaskets are produced or used did not show elevated cancer or respiratory risks from air toxics, though some had high proportions of people of color, low incomes, and/or high poverty rates. One notable exception was near a gasket manufacturing facility in Kentucky, which had lower incomes than the national average and very high respiratory risks from air toxics.

Baseline Worker Demographic Analysis

Approach: While the EPA lacked data on characteristics of workers at specific facilities, it examined ACS data for Public Use Microdata Areas (PUMA) that broadly represent the labor market from which workers may be drawn. To identify potential differences in racial, ethnic, and income composition, the analysis compared workers in the geographic areas where affected facilities are located to these same industries nationally, the general population of workers in the locations where facilities are located, and the general population nationally.

Results: Table 2 is an example of the results included in the worker demographic analysis. While there was a greater proportion of chemical workers in communities with chlor-alkali facilities that were Hispanic, their average income was higher than for chemical workers nationally or for the general working population in these communities or nationally. While a greater proportion of chemical workers in communities with chemical manufacturers were Black and fewer were Hispanic than nationally, they were representative of the general working population in these communities. Chemical workers in communities with a chemical manufacturing facility also had noticeably higher incomes and lower poverty rates than the general working population in these communities or nationally. The workers in the communities with the two gasket manufacturing facilities were largely White and non-Hispanic and had an average income similar to the general working population nationally. Worker characteristics for the oil and gas extraction and support services, automotive repair and related industries, and other motor vehicle dealers were only available nationally.

Table 1. Characteristics of Chemical Workers and General Population in Areas with Chlor-Alkali Facilities and Nationally

Variable	Chemical Workers in Communities with Chlor-Alkali Facilities	Chemical Workers Nationally	General Working Population in Communities with Chlor-Alkali Facilities	General Working Population Nationally
% White (race)	87%	84%	79%	78%
% Black or African American (race)	9%	8%	15%	10%
% Other (race)	4%	8%	6%	12%
% Hispanic (ethnic origin)	11%	8%	17%	13%
Average Personal Income (2019$)	97,560	83,140	38,247	43,561
% Below Poverty Line*	2%	3%	12%	11%
% Below Half the Poverty Line*	1%	1%	5%	5%
Number of Surveyed Individuals	864	24,798	31,176	13,088,454

Source: Table 6-62 in U.S. EPA (2024a).

Impacts from Changes in Electricity Consumption in Chlor-Alkali Industry

The EPA acknowledged how changes in electricity generation resulting from the regulation may raise EJ concerns if they exacerbate pre-existing disparities in exposure to pollutants from electricity generation. However, electricity generation is expected to decline as a result of the rule due to the decreased energy consumption associated with chlor-alkali technologies that do not use asbestos diaphragms. The model to characterize the emissions implications of changes in the power sector for the benefits analysis had a relatively coarse geographic resolution that did not allow the EPA to predict spatially explicit changes in emissions and exposures needed to inform a quantitative environmental justice analysis. This approach was insufficiently detailed to identify where populations may experience changes in pollutant air concentrations with a high geographic resolution.

Per- and Poly-Fluoroalkyl Substances (PFAS) National Primary Drinking Water Regulation (U.S. EPA 2024b)

The EPA's final Per- and Poly-Fluoroalkyl Substances (PFAS) National Primary Drinking Water Regulation aims to reduce exposure to six PFAS compounds in drinking water. NPDWRs are enforceable standards for public water systems (PWS) that limit contaminants in drinking water. The EPA set Maximum Contaminant Levels (MCLs) for each regulated contaminant and identified the expected adverse health impacts from exposure to contaminants above the MCLs. The final regulation utilized compound-specific MCLs for five specific PFAS and a group MCL based on a hazard index for four PFAS compounds. The regulation also required that public water systems monitor, notify the public of regulated PFAS levels, and reduce PFAS levels if standards are exceeded.

Summary of Environmental Justice Concerns Related to Regulatory Action

Studies suggest that communities with EJ concerns experience higher PFAS concentrations in their drinking water, higher incidences of exposure, and longer delays in clean-up. PFAS exposure is associated with a wide range of adverse health effects including (but not limited to): carcinogenic, developmental, cardiovascular, hepatic, immune, endocrine, metabolic, reproductive, and musculoskeletal effects.

Literature Review

There are a limited number of studies on the association between PFAS exposure via drinking water and health outcomes for vulnerable communities on a national level. Available studies found that communities with EJ concerns reside near a range of PFAS-contaminated sites. Such contamination was also shown to occur at higher levels and more often in low-income communities and communities of color. Studies analyzing biomarker data indicated some demographic disparities in blood serum levels across certain PFAS compounds. While studies demonstrated that communities of color experience relatively higher rates of cardiovascular disease, kidney cancer, and low infant birth weight, there was a dearth of evidence on whether differences in these health outcomes are associated with PFAS exposure. People of color are also underrepresented in biomarker data.

EJ PFAS Exposure Analysis

Approach: The EPA estimated the likelihood of PFAS exposure above specific thresholds by demographic group served by PWSs. It combines American Community Survey (ACS) data from the EJSCREENbatch R package with simulated PFAS occurrence data using a hierarchical Bayesian model optimized with national drinking water occurrence data from UCMR 3 and state PFAS occurrence data, where available - referred to as category 1 and 2 PWSs - by service area or zip code served as a proxy.[3] The EPA evaluated PFAS exposure above a baseline and two theoretical regulatory thresholds, above UCMR 5 minimum reporting levels (MRL) and above 10 parts per trillion (ppt).[4] This threshold-based approach was intended as an estimate of anticipated exposure to PFAS levels, as it was not possible to confirm who consumed the water at the time of elevated PFAS occurrence. Population-weighted mean concentrations of PFAS were also presented by demographic group. These results were also differentiated between small and large systems based on population served.

Results: Table 1 illustrates the type of information presented for populations with PFAS concentrations above the baseline and each theoretical regulatory threshold. The EPA found a higher percentage of Hispanic and non-Hispanic Black populations served with exposure to PFAS above baseline thresholds across all four PFAS analytes compared to both the total population served and other demographic groups.

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[3] The same analysis is also conducted for public water systems without UCMR3 data but with state level PFAS occurrence data.
[4] UCMR 3 and UCMR 5 refer to different iterations of the Unregulated Contaminant Monitoring Rule for public water systems.

Table 1. Baseline Scenario: Population Served by Category 1 and 2 PWS Service Areas Above Baseline Thresholds and as a Percent of Total Population Served[5]

PFAS	Race/Ethnicity					Income			Total Population Served
	Non-Hispanic American Indian or Alaska Native	Non-Hispanic Asian	Non-Hispanic Black	Non-Hispanic Pacific Islander	Hispanic	Non-Hispanic White	Below Twice the Poverty Level	Above Twice the Poverty Level	
Population Served Above Baseline Threshold									
PFOS	96,464	1,761,960	4,130,816	25,193	6,263,677	14,156,536	8,035,262	19,075,300	27,110,562
PFHxS	79,130	802,126	2,303,033	20,823	4,458,586	7,184,715	5,095,233	10,132,796	15,228,029
PFHpA	52,579	602,837	1,732,707	12,312	3,459,309	5,729,697	3,670,395	8,188,555	11,858,950
PFOA	88,674	1,069,233	3,423,882	19,851	5,202,088	10,561,078	6,651,205	14,211,140	20,862,345
Population Served Above Baseline Threshold as a Percent of Total Population Served									
PFOS	8.5%	***10.9%***	***11.9%***	6.9%	***12.1%***	10.0%	10.2%	***11.0%***	10.8%
PFHxS	***6.9%***	5.0%	***6.7%***	5.7%	***8.6%***	5.1%	***6.5%***	5.8%	6.0%
PFHpA	4.6%	3.7%	***5.0%***	3.4%	***6.7%***	4.1%	4.7%	4.7%	4.7%
PFOA	7.8%	6.6%	***9.9%***	5.4%	***10.1%***	7.5%	***8.5%***	8.2%	8.3%

Abbreviations: PFHpA – perfluoroheptanoic acid; PFHxS – perfluorohexanesulfonic acid; PFOA – perfluorooctanoic acid; PFOS – perfluorooctanesulfonic acid.

Source: Table 8-5 in U.S. EPA (2024b).

Table 2 demonstrates that Hispanic and non-Hispanic Black populations were also exposed to higher mean concentrations in the baseline than is typical for the total population served for three or more PFAS analytes. The results also suggested that American Indian and Alaska Native, Pacific Islander, and low-income individuals were exposed to higher average concentrations than the total population served for at least two PFAS.

Table 2: Modeled Average PFAS Concentrations (ppt) by Demographic Group in the Baseline, Category 1 and 2 PWS Service Areas[6]

PFAS	Race and Ethnicity					Income			Total Population Served
	Non-Hispanic American Indian or Alaska Native	Non-Hispanic Asian	Non-Hispanic Black	Non-Hispanic Pacific Islander	Hispanic	Non-Hispanic White	Below Twice the Poverty Level	Above Twice the Poverty Level	
PFOS	0.97	1.01	1.05	0.90	1.15	0.96	1.01	1.02	1.01
PFHxS	0.81	0.58	0.64	0.86	0.75	0.59	0.64	0.62	0.63
PFHpA	0.53	0.50	0.55	0.51	0.64	0.50	0.54	0.53	0.53
PFOA	1.05	0.85	1.03	1.14	1.11	0.89	0.99	0.94	0.96

Abbreviations: PFHpA – perfluoroheptanoic acid; PFHxS – perfluorohexanesulfonic acid; PFOA – perfluorooctanoic acid; PFOS – perfluorooctanesulfonic acid.

Source: Table 8-6 in U.S. EPA (2024b).

For systems above the theoretical regulatory threshold of UCMR 5 MRL values, the analysis showed that all three non-White race/ethnicity groups and low-income populations were estimated to face higher rates of

[5] Percentages are bolded and italicized when the percentage of the population in a specific demographic group with modeled PFAS above the baseline threshold is greater than in the total population served (right-hand column). Highlighted numbers represent where percentages of the population served in a particular demographic group are more than 1 percentage point greater than the percentage for the total population served.

[6] Highlighted cells indicate where average concentrations for a specific demographic group are higher than for the total population served (right-hand column).

system-level mean PFAS exposure over these thresholds compared to rates of exposure for the total population served). The differences were even greater when compared to the rates of exposure over these thresholds for non-Hispanic White populations. While the proportion of the population experiencing PFAS exposures above 10 ppt was small, these populations also had slightly higher PFAS exposure above 10.0 ppt for some PFAS analytes.

SafeWater EJ Analysis of Proposed Regulatory Option and Alternatives

Approach: The EPA also used the SafeWater Multi-Contaminant Benefit-Cost Model to analyze the distribution of anticipated health benefits by race/ethnicity group (i.e., annual avoided cases of mortality and morbidity per 100,000 people) for the proposed regulatory option and three regulatory alternatives. Health benefits are associated with changes in cardiovascular disease, renal cell carcinoma, and birth weight. The EPA also estimated average annual incremental household costs by system size for category 1 and 2 PWS service areas.

Results: Across all health endpoints except non-fatal myocardial infarction, communities of color were anticipated to experience the greatest quantified benefits associated with the proposed option. This finding may be driven by disparities in baseline exposure to PFAS and underlying disparities in death and/or disease incidence by race/ethnicity.

Table 3: Annualized Cases Avoided per 100,000 People by Race/Ethnicity Group, Final Rule

Health Endpoint	Race and Ethnicity				Income	
	Non-Hispanic Black	Hispanic	Other	Non-Hispanic White	Below Twice the Poverty Level	Above Twice the Poverty Level
Non-Fatal MI Cases Avoided	2.34	3.78	3.52	2.91	3.09	2.99
Non-Fatal IS Cases Avoided	7.48	5.33	3.87	3.78	4.68	4.45
CVD Deaths Avoided	3.90	1.57	1.29	1.26	1.72	1.62
Non-Fatal RCC Cases Avoided	3.31	4.04	3.04	2.73	3.09	3.02
Fatal RCC Cases Avoided	0.96	1.44	0.86	0.74	0.91	0.88
Birth Weight Gain (total grams)	122,024	167,846	102,190	71,201	100,943	93,366
Birth Weight-Related Deaths Avoided	1.00	0.93	0.47	0.41	0.62	0.55

Abbreviations: CVD – cardiovascular disease; MI – myocardial infarction; IS – ischemic stroke; RCC – renal cell carcinoma.

Source: Table 8-23 in U.S. EPA (2024b).

When examining costs anticipated to result from the proposed rule, the EPA found that cost differences across demographic groups were typically small, with no clear unidirectional trend in cost differences based on demographic group. In some cases, the EPA found that communities of color (i.e., non-Hispanic Black, Hispanic, and Other) were anticipated to bear minimally increased costs, but in other cases costs to communities of color were anticipated to be lower than those across all race/ethnicity groups. Average incremental household costs generally decreased as system size increased, which was expected due to economies of scale.

National Primary Drinking Water Regulations for Lead and Copper Improvements (U.S. EPA 2023b).

Lead can enter drinking water when plumbing materials that contain lead (such as pipes, faucets, and fixtures) corrode, especially where the water has high acidity or low mineral content. To reduce the level of lead leaching into drinking water, water systems can treat water using chemicals that reduce corrosivity. When this corrosion control treatment is not sufficient to control lead exposure, existing lead and copper regulations require systems to replace lead service lines (LSLs) and educate the public about the risks of lead in drinking water. The final Lead and Copper Improvements (LCRI) rule aims to strengthen and simplify the existing regulatory framework by requiring LSL replacement independent of lead levels and reducing the lead action level from 0.015 mg/L to 0.010 mg/L and strengthening tap sampling procedures, among other changes.

Summary of Environmental Justice Concerns Related to the Regulatory Action

Lead is a highly toxic contaminant that may damage neurological, cardiovascular, immunological, developmental, and other major body systems. No safe level of lead exposure has been identified. Children are at higher risk from the effects of lead than adults because of differences in physiology and behavior. Health risks among children include a range of neurological effects, including decreases in intelligence and increases in attention problems. Health risks among adults include the increased risk of cardiovascular disease and mortality. In addition, literature suggests that LSLs are more likely in older housing and that children of color and/or from low-income families living in older homes are more likely to have elevated blood lead levels (BLL).

Literature Review

Approach: For the proposal, the EPA synthesized findings from peer-reviewed literature published since 2015 that provided information on drinking water quality and lead health risk indicators in communities with people of color or low-income populations. One set of studies used socioeconomic data and LSL location data to determine the extent to which specific populations were disproportionately served by LSLs. A second set of studies incorporated epidemiological data such as BLL to assess the effects of multi-media lead exposure on people of color and low-income populations.

Results: The literature indicated that people of color and/or low-income populations were at higher risk of lead exposure from drinking water and other lead sources such as from lead dust in older homes and contaminated soil. Studies found that drinking water health violations were more prevalent in areas with higher percent non-White populations and uninsured residents. Studies also found that Black, Hispanic, and children from low-income families had higher blood lead levels than non-Hispanic White and children in higher income families.

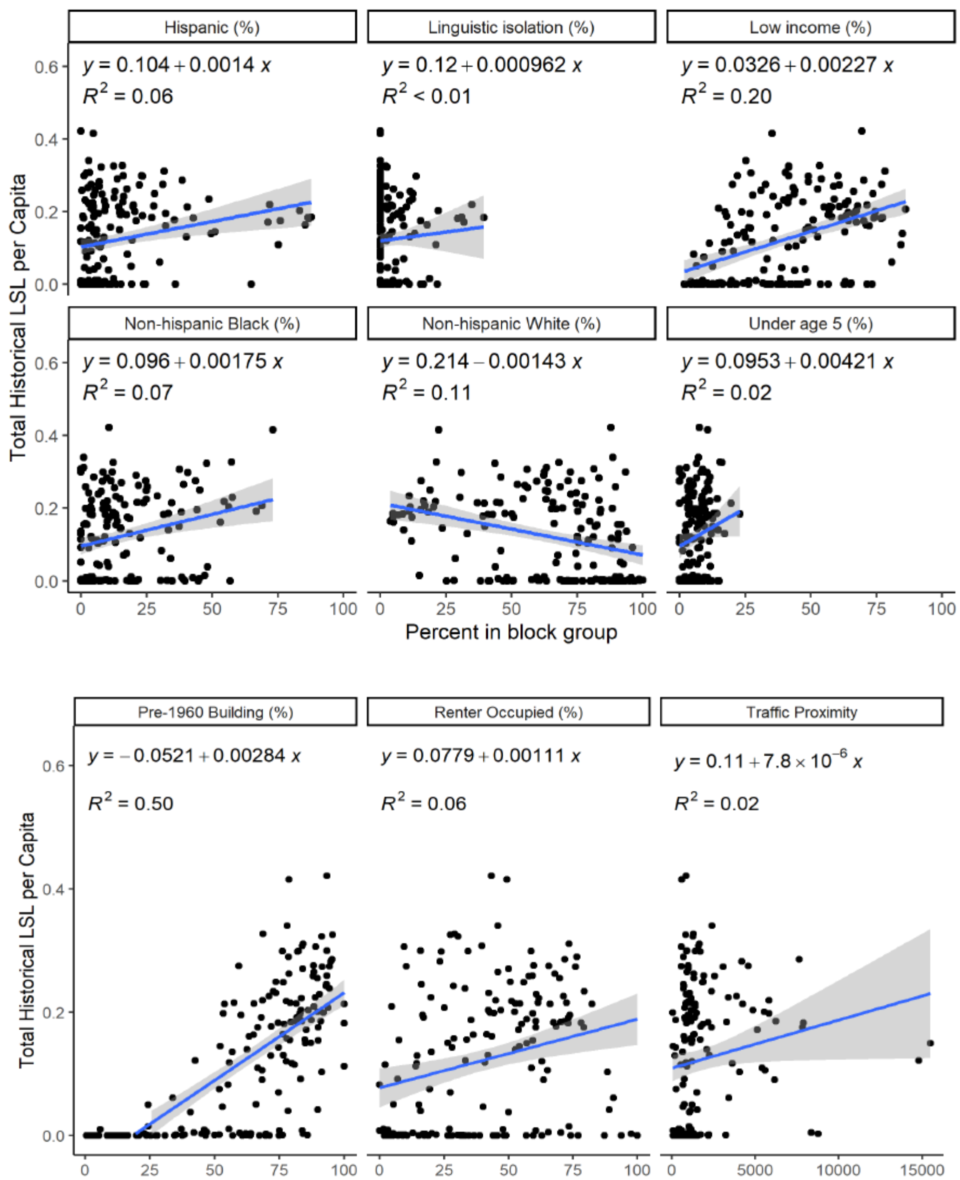
Case Studies

Approach: Data on LSLs at the spatial resolution needed for the EJ analysis were not available nationwide. The EPA identified seven water systems at proposal willing to provide LSL inventory data to facilitate a set of within-system case studies on the potential EJ implications of LSL distribution and replacement activities.

For each case study, the EPA combined the service line inventory data with U.S. Census socioeconomic and housing data at the block group level. In addition to race and ethnicity, the EPA included indicators for young children given their susceptibility to lead exposure and health risks, linguistically isolated and renter populations who may present lead mitigation outreach challenges, and low-income households that may not be able to afford household costs for LSL replacement. Variables associated with housing conditions that may indicate higher lead exposure risk include housing age, home ownership, and traffic proximity. The EPA produced maps to show the distribution of LSLs. Where available, the maps identify the neighborhoods assigned Grades C and D through the Home Owners' Loan Corporation practice of redlining. The EPA conducted univariate linear regression analyses of LSL per capita and each socioeconomic or housing variable and then examined whether block groups in the top quartile for LSLs per capita had a greater proportion of people of color and low-income populations compared to the overall service area population. The EPA also compared the socioeconomic and housing variables for the service area to those for the relevant state population.

Results: Six case studies had notably higher percentages of non-Hispanic Black populations in the block groups with historical LSL per capita values in the top quartile in each service area, indicating potential for greater exposure to LSL-related health risks among these populations. Regression analysis showed strong positive associations between LSL per capita and low income in two cities (Grand Rapids, MI and Cincinnati, OH). Using Grand Rapids, MI as an example, Figure 1 shows results of the statistical analysis for one case study.

Figure 1. Statistical Analysis of Socioeconomic Variables (top) and Housing Unit Variables (bottom) for Total Historical LSL, Grand Rapids Water System, Grand Rapids, MI



Source: Exhibit 2-14 in U.S. EPA (2023b).

Exhibit 2 shows the difference in population race, ethnicity, and socioeconomic distributions between the block groups in the top quartile of historic LSL per capita values and service area wide population distributions for this same case study.

Figure 2. Socioeconomic Comparison between Top Quartile of Block Groups and All Service Area Block Groups, Grand Rapids Water System, Grand Rapids, MI

Category	Race			Ethnicity			Other Socioeconomic		
	American Indian or Alaska Native	Asian or Pacific Islander	Other or Two+	Hispanic	Non-Hispanic Black	Non-Hispanic White	Low Income	Under 5	Linguistic Isolation
Population in top quartile (historic LSL per capita)	271	678	5,698	7,142	11,459	26,761	24,801	3,463	551
Percent of population in the top quartile	0.6%	1.4%	11.6%	14.6%	23.4%	54.7%	50.7%	7.1%	3.0%
Percent of population in all service area block groups	0.4%	2.7%	10.3%	15.0%	15.7%	62.6%	37.9%	6.9%	3.2%
Difference (percent in top quartile minus percent in all service area block groups)	0.2%	-1.3%	1.4%	-0.4%	7.7%	-7.9%	12.8%	0.2%	-0.2%

Note: Difference values may differ slightly from detail values because of independent rounding. All values are population counts except Linguistic Isolation, which is measured at the household level.

Source: Exhibit 2-15 in U.S. EPA (2023b).

All seven case studies had positive regression analysis associations between LSL per capita and percent of pre-1960 housing units. This result was expected as LSLs are generally present in older homes but may also indicate potential additional lead exposure risk because of lead paint. Two case study locations were also included in a separate EPA analysis that integrated LSL data with BLL to identify potential hotspots. That study found strong correlations between percent with elevated BLLS and LSL prevalence in Cincinnati, OH and Grand Rapids, MI.

Evanston, IL and Washington, D.C. had negative associations between LSL per capita and percent of renter-occupied units. Conversely, Cincinnati, OH and Barrington, IL had positive associations. These differences may reflect variations in the type of housing stock available to renters. A positive association between LSLs and percent of renter-occupied housing may indicate that single family homes and duplexes dominate the rental stock. (Larger multi-family buildings are less likely to have LSLs.) Regression analysis for the other socioeconomic and housing unit variables did not point to association patterns across case studies.

The statistical analysis of the percent of LSL replacements did not identify strong associations in any case studies. In general, either no or relatively few LSLs had been removed compared to the overall number of LSLs in our case study locations, which impeded the ability to quantify a relationship.

The small number of case studies included in the analysis also did not permit generalizing the findings beyond these individual systems. The heterogeneity in socioeconomic and housing characteristics within service areas and relative to the prevalence of LSLs across systems highlighted the importance of individual system characteristics on potential EJ concerns associated with baseline LSL presence.

Reconsideration of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (U.S. EPA 2024c)

The EPA strengthened the primary (health-based) annual fine particulate matter ($PM_{2.5}$) standard from 12.0 µg/m^3 to 9.0 µg/m^3 while retaining the primary 24-hour $PM_{2.5}$ standard of 35 µg/m^3. The Administrator also retained the primary 24-hour PM_{10} standard of 150 µg/m^3. As part of the regulatory impact analysis, the EPA conducted an EJ analysis that quantitatively evaluated the potential for disparities in $PM_{2.5}$ exposures and mortality rates across different demographic populations under illustrative control strategies associated with meeting lower alternative annual and 24-hour $PM_{2.5}$ standard levels (10/35 mg/m^3, 10/30 µg/m^3, 9/35 µg/m^3, and 8/35 µg/m^3) at the national and regional levels as compared to a baseline of the then-current primary annual and 24-hour $PM_{2.5}$ standards (12/35 µg/m^3). Scenarios throughout the analysis are labeled accordingly (e.g., "9/35" reflects a primary annual $PM_{2.5}$ standard of 9.0 µg/m^3 and a primary 24-hour $PM_{2.5}$ standard of 35 µg/m^3).

Summary of Environmental Justice Concerns Related to the Regulatory Action

Factors that may be associated with increased risk of $PM_{2.5}$-related health effects include lifestage (e.g., children), pre-existing disease (e.g., cardiovascular disease, respiratory disease), race/ethnicity, and socioeconomic status. The EPA's 2019 PM Integrated Science Assessment concluded that there is adequate evidence that race and ethnicity modify $PM_{2.5}$-related risk, and that non-White, and particularly Black individuals, are at increased risk for $PM_{2.5}$-related health effects, in part due to disparities in exposure.

Analysis of Exposures Under Current and Alternative Standard Levels

Approach: The EJ analysis presented information on total changes, and proportional changes in annual average $PM_{2.5}$ concentrations in 2032 in the baseline and for the revised and alternative standard levels. Air quality changes were based on Community Multiscale Air Quality (CMAQ) model projections, which simulate the key processes (i.e., emissions, transport, chemistry, and deposition) affecting primary and secondary (formed by atmospheric processes) PM at a 12 km x 12 km grid scale. This information was combined with county-level population projections for key demographic characteristics.

Results: In the baseline scenario, populations who are linguistically isolated, Hispanic, Asian, Black, without a HS diploma, unemployed, uninsured, or living below the poverty line were estimated to experience disproportionately higher annual $PM_{2.5}$ concentrations nationally than the overall population, both in terms of aggregated average exposure and across the distribution of air quality. In addition, those living in urban areas that received Home Owners' Loan Corporation (HOLC) neighborhood quality grades for mortgage lending purposes had higher national annual $PM_{2.5}$ concentrations, both for urban areas designated as "redlined" (i.e., 'Grade D' or "hazardous") and those not redlined (i.e., Grades A, B, and C) compared to ungraded areas. Those living in urban areas that received a grade of D were estimated to experience the highest concentrations, both on average and across $PM_{2.5}$ concentration distributions, of all demographic groups analyzed. These differences were also observed at the regional level, to varying extents.

At the national scale, residents of HOLC Grade D (i.e., redlined) census tracts, populations that are linguistically isolated, residents of HOLC Grade A-C (i.e., not redlined) census tracts, Hispanic populations, Asian populations, less educated populations, and unemployed populations were estimated to see greater proportional reductions in $PM_{2.5}$ concentrations than the overall population, with proportional reductions increasing as the standard levels decreased. In addition, exposure disparities in baseline Black and uninsured populations were estimated to be mitigated when moving to alternative standard levels of 8/35 µg/m^3. Table 1 provides an example of how these results were presented in the EJ analysis.

Table 1. Heat Map of National Average Annual $PM_{2.5}$ Concentrations and Concentration Reductions ($\mu g/m^3$) by Demographic for Current, Revised and Alternative PM NAAQS Levels (annual/24-hr) after Application of Controls in 2032

Population Group	Population (Ages)	Number of People	12/35	10/35	12/35-10/35	10/30	1235-10/30	9/35	12/35-9/35	8/35	12/35-8/35
Reference	All (0-99)	371M	7.2	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3
Race	White (0-99)	287M	7.1	7.0	0.1	7.0	0.1	6.9	0.1	6.8	0.3
	American Indian (0-99)	4M	6.8	6.7	0.1	6.7	0.1	6.6	0.1	6.5	0.3
	Asian (0-99)	27M	7.8	7.7	0.1	7.7	0.1	7.6	0.2	7.4	0.4
	Black (0-99)	52M	7.4	7.3	0.0	7.3	0.0	7.2	0.1	7.0	0.3
Ethnicity	Non-Hispanic (0-99)	287M	6.9	6.9	0.0	6.9	0.0	6.8	0.1	6.7	0.2
	Hispanic (0-99)	84M	7.9	7.8	0.1	7.8	0.1	7.7	0.2	7.5	0.4
Educational Attainment	More educated (25-99)	219M	7.1	7.0	0.0	7.0	0.1	7.0	0.1	6.8	0.3
	Less educated (25-99)	37M	7.5	7.4	0.1	7.4	0.1	7.3	0.2	7.1	0.3
Employment Status	Employed (0-99)	174M	7.2	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3
	Unemployed (0-99)	9M	7.3	7.2	0.1	7.2	0.1	7.1	0.2	7.0	0.3
	Not in the labor force (0-99)	188M	7.2	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3
Insurance Status	Insured (0-64)	264M	7.2	7.1	0.1	7.1	0.1	7.1	0.1	6.9	0.3
	Unisured (0-64)	32M	7.3	7.3	0.1	7.2	0.1	7.2	0.1	7.0	0.3
Linguistic Isolation	English "well or better" (0-99)	354M	7.1	7.1	0.0	7.1	0.1	7.0	0.1	6.8	0.3
	English < "well" (0-99)	17M	8.1	8.0	0.1	8.0	0.2	7.9	0.3	7.7	0.5
Poverty Status	Above the poverty line (0-99)	312M	7.1	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3
	Below poverty line (0-99)	58M	7.3	7.2	0.1	7.2	0.1	7.2	0.1	7.0	0.3
Redlined Areas	HOLC Grades A-C (0-99)	44M	8.0	7.8	0.1	7.8	0.2	7.7	0.3	7.5	0.5
	HOLC Grade D (0-99)	16M	8.2	8.1	0.1	8.1	0.1	7.9	0.3	7.7	0.5
	Ungraded by HOLC (0-99)	311M	7.0	7.0	0.0	7.0	0.0	6.9	0.1	6.8	0.2
Age	Adults (18-64)	212M	7.2	7.2	0.1	7.1	0.1	7.1	0.1	6.9	0.3
	Children (0-17)	84M	7.2	7.2	0.1	7.2	0.1	7.1	0.1	6.9	0.3
	Older Adults (65-99)	75M	7.0	6.9	0.0	6.9	0.1	6.9	0.1	6.7	0.3
Sex	Females (0-99)	188M	7.2	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3
	Males (0-99)	184M	7.2	7.1	0.1	7.1	0.1	7.0	0.1	6.9	0.3

Source: Figure 6-1 in U.S. EPA (2024c).

Analysis of Health Effects under Current and Alternative Standard Levels

Approach: This analysis presented information on total concentrations, changes, and proportional changes in premature mortality rates attributable to long-term $PM_{2.5}$ exposure in the baseline and for the revised and alternative standard levels. Mortality rate estimates were calculated using additional inputs as compared to exposure estimates, specifically hazard ratios, and baseline incidence. Exposure-mortality relationships were stratified by race and ethnicity based on two separate studies evaluating different age ranges of 18+ (Pope III, et al 2019) and 65+ (Di, et al 2017).[7]

Results: Some populations were predicted to experience disproportionately higher rates of premature mortality than the overall population in the baseline scenario. Black populations over the age of 64 were predicted to experience substantially greater mortality rate burdens compared to White populations of similar age (Table 2). This may be partly due to higher $PM_{2.5}$ concentrations for this population, which may contribute

[7] Pope III, C., Lefler, J., Ezzati, M, Higbee, J., Marshall, J., Kim, S-Y, Bechle, M., Gilliat, K., Vernon, S., and Robinson, A. 2019. Mortality risk and fine particulate air pollution in a large, representative cohort of US adults. *Environmental Health Perspectives* 127(7): 077007. Di, Q., Wang, Y., Zanobetti, A., Wang, Y., Koutrakis, P, Choirat, C, Dominici, F., and Schwartz, J. 2017. Air pollution and mortality in the Medicare population. *New England Journal of Medicine* 376(26): 2513-2522.

to a higher magnitude concentration-response relationship between exposure concentrations and premature mortality (Di et al., 2017), as well as other underlying health factors that may increase susceptibility to adverse outcomes among Black populations. When moving to more stringent standard levels, Black and non-Hispanic Black populations were predicted to experience proportionally similar mortality rate reductions for less stringent alternative standards (i.e., 10/35 and 10/30), but greater reductions in mortality rates for more stringent revised and alternative standards (i.e., 9/35 and 8/35) compared to the reference population.

Table 2. Heat Map of National Average Annual Mortality Rates and Rate Reductions (per 100k) for Demographic Groups for Current, Revised, and Alternative PM NAAQS Levels After Application of Controls in 2032

Study (Ages)	Population Group	Number of People	Baseline Mortality	Ratio of Baseline Mortality	HR (Beta)	12/35	10/35	12/35-10/35	10/30	12/35-10/30	9/35	12/35-9/35	8/35	12/35-8/35
Di 2017 (65-99)	Reference	75M	2,926K	3.9	0.0070	186	185	1	185	1	183	3	180	7
	White	62M	2,479K	4.0	0.0061	163	162	1	162	1	161	2	158	5
	American Indian	1M	14K	2.6	0.0095	151	150	1	150	2	149	2	147	5
	Asian	4M	76K	2.0	0.0092	145	142	4	142	4	139	7	136	10
	Black	8M	298K	3.6	0.0189	464	462	3	462	3	456	9	445	22
	Hispanic	9M	216K	2.4	0.0110	206	203	4	203	4	201	6	197	10
Pope 2019 (18-99)	Reference	287M	3,414K	1.2	0.0113	90	90	1	90	1	89	2	87	3
	NH White	167M	2,577K	1.5	0.0104	104	104	0	104	1	103	1	101	3
	NH American Indian	2M	17K	0.8	0.0095	45	45	0	45	0	45	0	44	1
	NH Asian	21M	96K	0.5	0.0095	34	34	1	34	1	33	1	32	2
	NH Black	37M	397K	1.1	0.0140	103	103	1	103	1	102	2	99	5
	Hispanic	59M	298K	0.5	0.0182	69	67	1	67	1	67	2	65	4

Source: Table 6-12 in U.S. EPA (2024c).

New Source Performance Standards for the Synthetic Organic Chemical Manufacturing Industry and National Emissions Standards for Hazardous Air Pollutants for the Synthetic Organic Chemical Manufacturing Industry and Group I & II Polymers and Resins Industry (U.S. EPA. 2024d)

The EPA amended the New Source Performance Standards (NSPS) to address equipment leaks of volatile organic compounds (VOC) from the Synthetic Organic Chemical Manufacturing Industry (SOCMI). It also proposed strengthening National Emission Standards for Hazardous Air Pollutants (NESHAP) for ethylene oxide and chloroprene emissions that apply to the SOCMI (referred to as the Hazardous Organic NESHAP or HON) and Group I and II Polymers and Resins Industry.[8]

Summary of Environmental Justice Concerns Related to the Regulatory Action

The equipment and processes used to make synthetic organic chemicals or produce neoprene release hazardous air pollutants such as ethylene oxide and chloroprene, which are known or suspected to cause cancer and other serious health effects for people residing near emitting facilities. Updated cancer unit risk estimates from the EPA's Integrated Risk Information System (IRIS) also indicated that chloroprene and ethylene oxide are significantly more hazardous to human health than previously understood.

Proximity and Risk-Based Demographic Assessment for HON Source Category

Approach: The EPA conducted both proximity and risk-based demographic analyses that examine the demographic composition of populations living within 10 and 50km of HON facilities. The demographic results were shown as population weighted percentages for each demographic at the source category and facility-level. These results were then compared to the percentages for the nationwide average for reference. Block group level demographic data were from the 2015 – 2019 American Community Survey. To estimate cancer risks, the EPA used the Human Exposures Model, which combines ambient air concentrations, as surrogates for lifetime exposure, with unit risk estimates and inhalation reference concentrations.[9] The risk-based demographic analysis characterized populations with cancer risks ≥ 1-in-1 million, ≥ 50-in-1 million, and > 100-in-1 million from HON source category emissions in the baseline and post-control.

Results: The proximity analysis indicated that for those living within 10 km of a HON facility, the percent of the population that is Black, Hispanic/Latino, living below the poverty level, or over 25 years without a high school diploma is higher than the national average. The baseline risk-based demographic analysis for those living within 10 km indicated that 90 percent of the 2.8 million people with cancer risks ≥ 1-in-1 million from HON source category emissions live around 29 of the 111 HON facilities. All but three of these 29 facilities are in Texas and Louisiana. For all three risk bins, the percent of the population within 10 km who are Black, Hispanic/Latino, living below the poverty level, or over 25 years without a high school diploma was significantly higher than the national average. While the number of people exposed to cancer risks ≥ 1-in-1 million declined slightly post-control, the demographic distribution remained largely unchanged. The number of people exposed to risks ≥ 50-in-1 million fell substantially (from 322K to 29K), and the proportion of the population exposed who are Black, living below the poverty level, over 25 years without a high school diploma, or linguistically isolated fell to levels similar to or below the national average. While the number of Hispanic/Latino people exposed to cancer risks ≥ 50-in-1 million also fell, their relative proportion of the total exposed population increased. Table 1 shows an example of results from the proximity and risk-based

[8] Group I includes HAPS from elastomer production, including styrene, n-hexane, 1,3-butadiene, acrylonitrile, methyl chloride, hydrogen chloride, carbon tetrachloride, chloroprene, and toluene. Group II includes HAP emissions from epoxy resins production and non-nylon polyamides production.

[9] https://www.epa.gov/fera/risk-assessment-and-modeling-human-exposure-model-hem

demographic analyses, indicating that the number of people with cancer risks > 100-in-1 million from source category emissions was reduced from over 82,000 people in the baseline to zero people post-control.

Table 1. Baseline and Post-Control Demographics for Cancer Risks > 100-in-1 Million resulting from SOCMI Source Category Emissions Living within 10 km

Demographic Group	Nationwide Average for Reference	Baseline Proximity Analysis for Pop. Living within 10 km of HON Facilities	Cancer Risk >100-in-1 million within 10 km of HON facilities	
			Baseline	Post-Control
Total Population	328M	9,271,798	82,792	0
Number of Facilities	-	195	8	0
Race and Ethnicity by Percent [number of people]				
White	60 percent [197M]	47 percent [4.4M]	543 percent [44K]	- -
Black	12 percent [40M]	25 percent [2.35M]	14 percent [12K]	- -
American Indian or Alaska Native	0.7 percent [2M]	0.2 percent [20K]	0.2 percent [150]	- -
Hispanic or Latino (includes white and nonwhite)	19 percent [62M]	22 percent [2M]	26 percent [22K]	- -
Other and Multiracial	8 percent [27M]	5 percent [493K]	7 percent [5.5K]	- -
Income by Percent [Number of People]				
Below Poverty Level	13 percent [44M]	19 percent [1.75M]	14 percent [12K]	- -
Above Poverty Level	87 percent [284M]	81 percent [7.5M]	86 percent [71K]	- -
Education by Percent [Number of People]				
Over 25 and without a High School Diploma	12 percent [40M]	16 percent [1.5M]	14 percent [12K]	- -
Over 25 and with a High School Diploma	88 percent [288M]	84 percent [7.8M]	86 percent [71K]	- -
Linguistically Isolated by Percent [Number of People]				
Linguistically Isolated	5 percent [18M]	5 percent [510K]	5 percent [4K]	- -

Source: Table 10 in U.S. EPA (2024d).

Risk-Based Demographic Assessment for Whole HON Facilities

Approach: To understand cancer risks from exposure to air toxics emitted from HON facilities as a whole, including emissions from non-HON sources not covered by the proposed rule, the EPA assessed the demographic composition and remaining cancer risks for populations living within 10 and 50 km of HON facilities for HAP emissions from the whole facility post-control.

Results: The whole-facility analysis for those living within 10 km found about 400,000 additional people with risks ≥ 1-in-1 million, 50,000 additional people with risks ≥ 50-in-1 million, and 2,900 additional people with risks > 100-in-1 million than for post-control HON source category emissions only. The demographic distribution of the population within 10 km with whole-facility post-control cancer risks ≥ 1-in-1 million was similar to that for post-control HON source category emissions, with the exception that a smaller percentage of Hispanic/Latino individuals were affected in the whole-facility analysis. A lower percent of the population that is Hispanic/Latino and a higher percent living below the poverty level or over 25 years without a high school diploma had whole-facility post-control cancer risks ≥ 50-in-1 million relative to post-control HON source category emissions. The percent of the population with whole-facility post-control risks > 100-in-1 million that is Black, below the poverty level, or over 25 years without a high school diploma was above the national average. Whole-facility post-control cancer risks > 100-in-million were driven by ethylene oxide emissions from non-HON processes and remaining SOCMI and neoprene production category risk at the neoprene production facility.

Risk-Based Demographic Assessment of Neoprene Production Source Category

Approach: The EPA examined the demographic composition and average pre- and post-control cancer risks for the single neoprene production source category facility. A five km buffer was used because this smaller distance captures 100 percent of the population with cancer risks at ≥ 50-in-1 million and > 100-in-1 million resulting from neoprene production source category emissions.

Results: Table 2 illustrates the results of the total population living in close proximity and for the population with cancer risks >100-in-1 million. The percent of the population living within 5 km of the neoprene production facility that is Black was more than four times the national average and the percent living below the poverty level was almost double the national average. While these groups are overrepresented at all cancer risk levels pre-control, there were no people with risks > 100-in-1 million post-control. The number of people with ≥ 50-in-1 million cancer risk declined by more than 88 percent, while it remained unchanged for ≥ 1-in-1 million cancer risk.

Table 2. Baseline and Post-Control Demographics for Cancer Risks > 100-in-1 Million resulting from Neoprene Production Source Category Emissions Living within 5 km

Demographic Group	Nationwide	Total Population living within 5 km of the Neoprene Facility	Cancer Risk >100-in-1 million within 5 km of the Neoprene Facility	
			Baseline	Post-Control
Total Population	328M	28,590	2,332	326
Number of Facilities	-	1	1	1
Race and Ethnicity by Percent [number of people]				
White	60 percent [197M]	35 percent [10K]	13 percent [300]	1 percent [3]
Black	12 percent [40M]	56 percent [16K]	83 percent [1.9K]	99 percent [300]
American Indian or Alaska Native	0.7 percent [2M]	0.0 percent 0	0.0 percent [0]	0.0 percent [0]
Hispanic or Latino (includes white and nonwhite)	19 percent [62M]	5 percent [1.5K]	4 percent [100]	0 percent [0]
Other and Multiracial	8 percent [27M]	3 percent [900]	0.2 percent [6]	0 percent [0]
Income by Percent [Number of People]				
Below Poverty Level	13 percent [44M]	23 percent [6.5K]	30 percent [700]	33 percent [100]
Above Poverty Level	87 percent [284M]	77 percent [22K]	70 percent [1.6K]	67 percent [200]
Education by Percent [Number of People]				
Over 25 and without a High School Diploma	12 percent [40M]	16 percent [4.6K]	15 percent [350]	12 percent [40]
Over 25 and with a High School Diploma	88 percent [288M]	84 percent [24K]	86 percent [2.0K]	88 percent [300]
Linguistically Isolated by Percent [Number of People]				
Linguistically Isolated	5 percent [18M]	1 percent [300]	0.1 percent [3]	0 percent [0]

Source: Table 14 in U.S. EPA (2024d).

Proximity and Risk-Based Demographic Assessment for Other Source Categories

Approach: The EPA also conducted proximity analyses for the other source categories subject to the proposed rule to evaluate the demographic composition of populations living within 5 and 50 km of facilities in Group I and II polymers and resins source categories, and those that may be subject to NSPS requirements for VOC equipment leaks (Subpart VVb) or process vents (Subpart IIIa, NNNa, and RRRa). Because the locations of sources that will be constructed, modified, or reconstructed in the future - and therefore subject to the proposed NSPS requirements - are not known, the EPA examined the demographics of populations near existing facilities that may modify or reconstruct in the future.

Results: The proximity analysis results for Group I and II polymers and resins showed that for populations living within 5 km of a Group I polymer and resin facility, the percentage of the population that is African American, Hispanic/Latino, living below the poverty level, over 25 years without a high school diploma, and linguistically isolated households were above their corresponding national averages. For populations living within 5 km of a Group II polymer and resin facility, the percentage of the population that is American Indian or Alaska Native, Hispanic/Latino, and over 25 years without a high school diploma were above their corresponding national averages. For the facilities potentially subject to NSPS requirements on VOC equipment leaks, the proximity analysis showed that the percent of the population living within 5 km of an existing facility that is Black was double the national average. The percent of people living below the poverty level and over 25 years without a high school diploma were also higher than their corresponding national averages. The results for the facilities potentially subject to NSPS requirements for VOC process vents were similar to those for equipment leakage, although the percent of the population that is Hispanic/Latino was also higher than the national average.

Accidental Release Prevention Requirements: Risk Management Program Under the Clean Air Act; Safer Communities by Chemical Accident Prevention (U.S. EPA 2024e)

To improve safety, assist in planning, preparedness, and response to reportable accidents, and improve public awareness of chemical hazards at regulated facilities, the EPA finalized several changes to its Risk Management Program (RMP). These include expanding and enhancing accident prevention program and emergency preparedness requirements and increasing public availability of chemical hazard information. Affected facilities include petroleum refineries and large chemical manufacturers; water and wastewater treatment systems; chemical and petroleum wholesalers and terminals; food manufacturers, packing plants, and other cold storage facilities with ammonia refrigeration systems; agricultural chemical distributors; and midstream gas plants. Some provisions have additional requirements for facilities within one mile of another RMP facility and/or those with a recent RMP-reportable accident.

Summary of Environmental Justice Concerns Related to the Regulatory Action

Facilities subject to the RMP pose significant risks to the public and the environment because of the types and quantities of hazardous substances they store and use in chemical processes. An accidental release of one of these substances can result in death and injury due to fires, explosions, and noxious gas clouds. Exposure can lead to corrosive damage to property, acute health respiratory effects, or even burns.

Proximity Analysis

Approach: While populations living closer to RMP facilities are more likely to be exposed if an accidental chemical release occurs, the EPA was unable to characterize the change in risk or model fate and transport of potential releases from the proposed option. Instead, the EPA conducted a proximity analysis to compare populations with incomes less than or equal to twice the poverty threshold and of a race or ethnicity other than non-Hispanic White living within one and three miles of an RMP facility to the overall U.S. population. The EPA examined the demographics of nearby populations for facilities with at least one accident between 2004 and 2020 and in NAICS codes 324 and 325, which face additional requirements under the rule. The EPA also evaluated the demographics of populations living near RMP facilities based on potential risk: (1) total number of RMP-related accidents reported from 2004 to 2020, (2) the program level to which they belong,[10] and (3) the ratio of the quantity of chemical used in a process relative to the chemical's regulatory threshold quantity.

Results: Table 1 shows the results of the main proximity-based analysis: a higher proportion of Black alone (non-Hispanic), Hispanic, or low-income individuals resided within one and three miles of an RMP facility (and thus were at potentially greater risk) relative to the U.S. population. Similar patterns emerged for communities near the subset of facilities with at least one historical accident. While not shown here, the EJ analysis found that this pattern persisted for communities in proximity to RMP facilities with NAICS codes 324 and 325 processes, including within the subset that had at least one RMP-reportable accident.

The EJ analysis also found that communities near the few RMP facilities with many historical accidents had even greater percentages of low income, Black (non-Hispanic), and Hispanic individuals compared to the full universe of active facilities as well as facilities with fewer accidents. The EPA found that communities in proximity to facilities with Program Level 3 processes had higher percentages of low income and Hispanic individuals compared to the full universe of active facilities as well as facilities with lower program levels. In contrast, the EPA found that percentages of Black (non-Hispanic), Hispanic, Asian, and low-income individuals tended to decrease as the chemical process quantity multiplier increased.

[10] Program levels are assigned to regulated processes within RMP facilities based on the relative potential for public impacts and the level of effort needed to prevent accidents. Those classified as Program 3 are considered of higher potential risk than Program 1 or 2.

Table 2. Sociodemographic Composition of RMP Fenceline Communities

	Number of Facilities	Buffer Distance (Miles)	Total Population	Percentage of Individuals that Identify as Black or African American Alone (non-Hispanic)	Percentage of Individuals that Identify as American Indian and Alaska Native Alone (non-Hispanic)	Percentage of Individuals that Identify as Asian Alone (non-Hispanic)	Percentage of Individuals that Identify as Native Hawaiian and Other Pacific Islander Alone (non-Hispanic)	Percentage of Individuals that Identify as Some Other Race Alone (non-Hispanic)	Percentage of Individuals that Identify as Two or More Races	Percentage of Individuals that Identify as Hispanic or Latino	Percentage of Individuals Earning Less Than or Equal to Twice the Federal Poverty Level
Facilities with accidents 2004-2020	1,487	1	7,453,862	**18.3%**	0.4%	4.6%	0.2%	0.3%	2.8%	**31.9%**	**40.8%**
		3	87,442,724	**17.4%**	0.3%	**6.5%**	0.2%	0.4%	3.1%	**26.9%**	**34.2%**
All active facilities	11,714	1	24,755,209	**15.6%**	0.4%	4.8%	0.2%	0.3%	3.0%	**27.6%**	**38.0%**
		3	130,875,693	**15.1%**	0.4%	**5.9%**	0.2%	0.4%	3.1%	**24.1%**	**33.3%**
National Comparison Group			*309,242,323*	*11.8%*	*0.6%*	*5.6%*	*0.2%*	*0.4%*	*3.2%*	*17.7%*	*28.5%*

Source: Exhibit 9-2 in U.S. EPA (2024e).

Proposed Disposal of Coal Combustion Residuals (CCR) From Electric Utilities; Legacy CCR Surface Impoundments (U.S. EPA 2023c)

The EPA proposed to expand the management of coal combustion residual (CCR) disposal to include inactive surface impoundments at inactive facilities, so called legacy CCR disposal and management units. These units will now have to comply with specific requirements related to design and operating criteria; structural stability assessments; air criteria; inspections; groundwater monitoring and correcting actions; closure and post-closure care; and recordkeeping, notification, and public access to information.

Summary of Environmental Justice Concerns Related to the Regulatory Action

Communities located near legacy CCR surface impoundments face risks of impoundment failure, groundwater contamination, and fugitive air emissions. If a failure or contamination occur, nearby residents face risks to their health. Other risks include damage to surrounding and downstream environmental amenities. Future impacts of a changing climate seem likely to increase the risks associated with failure of these legacy CCR surface impoundments, built without liners or other precautionary measures required of modern coal ash disposal. Increased likelihood of flooding and other severe weather events may further increase the likelihood that legacy CCR surface impoundments flood, overtop, and release contaminants or collapse.

National- and State-Level Comparison of Demographic and Environmental Indicators

Approach: The EPA characterized the demographic composition of populations living within 1 and 3 miles of legacy CCR disposal and management units using data from the U.S. Census Bureau's American Community (ACS) survey, focusing on race and ethnicity, income, education, employment, and linguistic isolation. To better understand the extent to which these communities are also exposed to other environmental stressors, the EPA also examined environmental indicators from EJScreen related to particulate matter (PM2.5 and diesel PM), ozone, lifetime air toxics cancer risk, traffic, and proximity to National Priorities List (NPL or Superfund), Risk Management Plan (RMP), and hazardous waste facilities (TSDFs) near the universe of legacy CCR units.

The EPA also compared demographic and environmental indicators within one and three miles of legacy CCR disposal and management unit sites at the state level. The analysis first aggregated facilities and results within each state, then compared the total to state average values for each indicator. State averages were only available for the race, ethnicity, linguistic isolation, and less than high school education. To identify the potential for hotspots, the EPA also examined disaggregated facility-level environmental and demographic indicators from EJScreen for the "top three" facilities compared to state average values.

Results: As illustrated in Table 1, the proximity analysis indicated that facilities containing legacy CCR disposal or management units tended to be located near communities with higher percentages of people of color, poverty, and linguistic isolation and lower levels of education at the state and national levels. The analysis found that these communities also likely face existing burdens from other environmental hazards that put them at greater cumulative risk.

Potential Negative Impacts on Communities from the Proposed Rule

While the EPA was not able to quantify local impacts from removal of CCR, it discussed these impacts qualitatively. Specifically, if heavy-duty vehicles are used to remove CCR from the legacy units and hauling routes are not specifically planned to avoid community disruptions, the proposed rule may worsen traffic in communities near legacy CCR surface impoundment while closure and remediation activities are underway. While these are temporary activities, they may be significant. Similarly, the use of heavy machinery to remove CCR from legacy CCR surface impoundments will also likely increase localized diesel emissions and may increase local $PM_{2.5}$ concentrations, at least on a temporary basis.

Table 1: Key Demographics Near Legacy and Management Unit Sites and the Total U.S. Population

Demographic Category	Population within 1 Mile of Sites with Legacy CCR Surface Impoundments	Population within 3 Miles of Sites with Legacy CCR Surface Impoundments	Population within 1 Mile of Sites with CCR Management Units	Population within 3 Miles of Sites with CCR Management Units	U.S. Population
Race					
Asian	2.67%	2.95%	2.77%	2.55%	5.59%
Black or African American	15.41%	19.15%	15.83%	14.88%	12.61%
Hawaiian/Pacific Islander	0.08%	0.07%	0.01%	0.07%	0.19%
Native American	0.87%	1.29%	0.48%	0.58%	0.82%
Other	15.86%	16.77%	10.07%	9.19%	10.49%
Ethnicity					
Hispanic (any race)	31.15%	25.9%	14.87%	15.27%	18.97%
Minority					
Minority	52.42%	51.56%	37.74%	36.15%	40.49%
Poverty Level					
Households below the poverty level	17.39%	17.79%	15.21%	14.45%	12.83%
Other Demographics					
Linguistically isolated households	7.44%	6.16%	1.77%	2.86%	4.87%
Less than a High School Education	19.85%	17.01%	11.99%	12.61%	11.59%
Note: 1) Values above the national average for each indicator are highlighted in orange. 2) This table reflects an analysis conducted in December 2022; since that time EPA has refined the affected universe. Results are expected to remain in line with those presented here and have therefore not been updated.					

Source: Exhibit 5-9 in U.S. EPA (2023c).

Examination of Climate-Related Vulnerability

Approach: To assess climate-related vulnerability, the EPA classified facilities with legacy CCR surface impoundment as low, medium, or high risk of inland or coastal flooding from storm surge or sea level rise in 2050 based on the average of representative concentration pathways 8.5 and 4.5.[11,12]

Results: The analysis found that many facilities with legacy CCR disposal or management units and their nearby populations are vulnerable to inland flooding due to climate change, reflecting either high or medium risk. Two facilities have coastal flood risk potential. While a subset of facilities with legacy CCR surface impoundment were identified as a top three facility in terms of demographic or environmental indicators (labeled, high probability of EJ concern) relative to the national average, the analysis found that they are distributed across all three climate risk categories (Table 2).

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[11] Representative concentration pathways refer to different scenarios of greenhouse gas emissions. RCP8.5 represents a scenario with a high baseline greenhouse gas emission. RCP4.5 represents a scenario with medium baseline greenhouse gas emissions.

[12] For inland flooding, the criteria correspond with Federal Emergency Management Agency (FEMA) designated areas, and if the flood risk is worsened by climate change. For coastal flooding, the criteria relate to the range of the 50-year storm surge event and vulnerability to sea level rise.

Table 2: Climate-Related Flood Risk for Legacy CCR Units

Inland Flood Risk		
Risk Category	**Number of Facilities**	**Number of Facilities with Higher Probability of EJ Concerns**
Low	19 (35%)	8 (15%)
Medium	25 (45%)	9 (16%)
High	11 (20%)	4 (7%)
Coastal Flood Risk		
Low	2 (4%)	0
Medium	0	0

Source: Exhibit 5-16 in U.S. EPA (2023c).

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