

# **FY 2023 EPA Annual Performance Report (APR) Evidence and Evaluation Summaries**

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March 2024



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# Section 1: FY 2023 EPA Program Evaluations

## Office of Chemical Safety and Pollution Prevention

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	EPA-Supported WPS Training of Farmworkers
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Estimated Completion Date</b>	May 2026

**Purpose and brief description:** EPA provides funding through a five-year cooperative grant (which runs into FY26) to train farmworkers in accordance with the Agricultural Worker Protection Standard (WPS) rule. WPS pesticide safety training is an annual requirement. This activity will assess the number of individuals trained and the effectiveness of the training.

**Question(s) that were addressed:** How many farmworkers are receiving EPA-supported annual training required under the WPS rule, and what is their knowledge retention of the material? Is EPA funding under the grant resulting in quality training? Is the grantee fulfilling the conditions of the grant in a satisfactory manner?

**Conclusions and/or (interim) findings:** In FY 2023, 15,155 farmworkers received EPA-supported annual WPS training, exceeding the FY 2023 target of 12,000.

**Use of the conclusions and/or (interim) findings:** EPA and the grantee will review FY 2023 results to evaluate the success of the training as well as whether changes can be made to increase the number of farmworkers being trained. These discussions could lead to amending future annual targets under this measure.

**Link to findings:** Association of Farmworker Opportunity Programs (AFOP)'s WPS Pesticide Safety Trainings page is <https://afop.org/health-safety/wps/> (Please note that weblink does not include pesticide training data.)

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	IT Modernization of EPA Pesticide Tracking Systems
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Estimated Completion Date</b>	September 2026

**Purpose and brief description:** In 2019, EPA kicked off Phase 1 of a multi-year digital transformation to create a fully electronic workflow for EPA registration and reevaluation activities. This effort builds on the 2016 launch of the Pesticide Submission Portal, a secure, web-based portal in EPA’s Central Data Exchange (CDX) environment through which the public can electronically submit applications for EPA assessment. In mid-2020, a pilot of the new system went live for one of the three regulatory divisions within the Office of Pesticide Programs (OPP), as well as the Information Technology and Resource Management Division (ITRMD) which handles the front-end receipt and processing of all applications. In early 2021, a second regulatory division in OPP entered the pilot. The pilot is specific to registration application workflows under the Pesticide Registration Improvement Act (PRIA) and its reauthorizations.

The next phase of the effort will be development of additional workflows and expansion to all of the divisions in the OPP that support registration and reevaluation regulatory activities. By improving the employee and user experience, and, later, improving the customer experience, EPA will enhance the ability of the regulated community, other stakeholders, partners, and the American public to directly engage with the regulatory and science efforts.

**Question(s) that were addressed:** How does a fully electronic workflow for EPA registration and reevaluation activities affect EPA employee work processes, such as the timeliness and efficiency of reviews?

**Conclusions and/or (interim) findings:** Because of a delay in FY 2023 in getting the IT Mission Support contract in place, the majority of evidence gathering activities envisioned for this fiscal year did not occur. EPA was able to move its registration review workflow fully into Salesforce over the summer and the remaining registering divisions in OPP were migrated into Salesforce at the end of September. Unfortunately, the delay of these migrations did not allow for substantive assessment of improvements in timeliness and efficiency. These assessments will continue in FY24 and beyond.

**Use of the conclusions and/or (interim) findings:** See above- very little evidence gathering was able to occur this fiscal year.

**Link to findings:** We do not have a weblink at this time.

## Office of Land and Emergency Management

<b>Lead Office</b>	Office of Land and Emergency Management
<b>Title</b>	Superfund Lead Collaboration Pilot Evaluation
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	February 2023

**Purpose and brief description:** Environmental Protection Agency (EPA) OCPA and OSRTI conducted a one-year formative program evaluation of the Superfund lead Collaboration pilot to inform collaboration efforts within and outside of EPA with the goal of reducing lead exposure in residential areas surrounding Superfund sites. The Superfund program aims to improve standardization of engagement across EPA program offices, agencies and stakeholders to promote more streamlined and coordinated multi-media approaches for addressing lead contamination from sources outside of the regulatory authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Superfund sites. The year-long Superfund Lead Collaboration Pilot required each of EPA's 10 Regions to identify a "convener" and a pilot site (or to otherwise participate in the pilot) and use a working draft of a *Superfund Collaboration Guide* to support the collaborations toward the identification and remediation/ removal of non-CERCLA lead sources at pilot sites and more broadly.

**Question(s) that were addressed:** A formative evaluation approach using interviews, surveys and documents provided by conveners in each Region was used to provide insights into the effectiveness of the Collaborative approaches and adjusting them to support Regional staff. Further this approach allowed for the documentation (in real time) of progress in establishing and leveraging collaborative relationships as well as the opportunity to gain some understanding of the level of staff effort needed. The goals of the Superfund Collaboration Pilot were to: understand the level of effort to standardize the approach; test different methods of staffing and accomplishing the convener role; assess and document the quality of results from the techniques used in the pilots identify best practices and lessons learned and determine what actions are feasible and scalable on a broader level.

**Conclusions and/or (interim) findings:** Overall, the Lead Collaboration Pilot provided important opportunities for learning and engaging with other agencies or organizations with whom Superfund staff might not typically engage. The focus on residential lead and collaboration also pushed conveners to pursue activities beyond their normal scope or outside of their usual timeline. Findings from the evaluation included: collaboration is a time investment and it is important to align the convener role with the scope of the work to sustain longer-term collaboration efforts; collaboration does not always lead to tangible or immediately measurable outcomes, but it can improve relationships with other agencies, non-profits, and community groups; collaboration can support communication across EPA program offices and establish information flows between EPA and other agencies; and support from senior leadership for building collaboration toward addressing non-CERCLA lead is critical.

**Use of the conclusions and/or (interim) findings:** The Superfund Program will continue to incorporate best practices and lessons learned from the Superfund Lead Collaboration pilot into the program as appropriate, including into policies and guidance documents. In FY 2023, EPA shared best practices in EPA training, including a session at the August 2023 National Brownfields Training Conference.

**Link to findings:** These findings are not being shared publicly due to enforcement-related considerations. As acknowledged above, the findings will be incorporated into the Superfund Program as appropriate.

## Office of Water

<b>Lead Office</b>	Office of Water
<b>Title</b>	National Estuary Program (NEP)
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2, Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The primary purpose of the Program Evaluation (PE) process is to help EPA assess how the National Estuary Programs (NEPs) are making progress in achieving programmatic and environmental results through implementation of their Comprehensive Conservation and Management Plans (CCMPs). The PE process was revised, and new guidance distributed to the 28 NEP locations at the end of 2021. The PE process is also useful for:

- transferring lessons learned among NEPs, EPA, and stakeholders through the sharing of case studies and transferable examples;
- documenting the value added to environmental management of estuarine systems using the partnership model of the national program and its individual NEPs, including their role in convening stakeholders for decision-making and interpreting science for management actions;
- demonstrating continued stakeholder commitment; and
- highlighting achievements and successes of each NEP, as well as suggestions for continued program improvements.

**Question(s) that were addressed:** PEs were conducted for nine of the 28 NEPs in FY 2023.

The PE goals are to:

- ensure submissions enable objective and consistent evaluations among the different NEPs;
- ensure a consistent and transparent process to determine NEP CCMP implementation progress;
- further align the PEs with individual NEP CCMP priorities and related NEP annual work plan goals and accomplishments;

- determine progress in achieving programmatic and environmental results by documenting NEP contributions to improving or reducing pressures on their coastal watersheds and enabling all NEPs to successfully serve as local implementation partners for EPA programs; and
- identify areas of improvement to assist NEPs in becoming stronger programs and achieving environmental results.

**Conclusions and/or (interim) findings:** The NEP Program Evaluation is an ongoing process that occurs each year on a five-year cycle. Each location within the NEP is evaluated every five years. The PE process uses a two-category determination of Proficient and Progressing, as defined in the [2021 NEP Program Evaluation Guidance](#). Proficient means a NEP is adequately meeting programmatic and environmental results. A Progressing determination means there are missing criteria that need to be addressed before the next PE cycle. A Progressing determination will catalyze a timeline to address those missing elements or opportunities for improvement before the next PE cycle. This determination is informed by the entire PE package (narrative submission, National Estuary Program Online Reporting Tool (NEPORT) data, annual work plans, and EPA required annual end of year reports), on-site visit, and through discussions with the NEP under review. In the group evaluated during FY 2023, the review teams found progress made since the previous PE for each NEP, including:

- Program Planning and Administration (e.g., changed host entities)
- Financial Management (e.g., developed and implemented finance plans)
- Assessment and Monitoring (e.g., developed monitoring strategy)
- Outreach and Public Involvement (e.g., documented performance of digital marketing efforts)

Some common strengths among this cohort were:

- Workplan Accomplishments (e.g., implemented living shoreline stabilization and created an online portal with quality assured environmental data that users can view and download)
- Ecosystem and Community Status (e.g., measured water quality parameters to assess the return of key habitat functions)
- Program Implementation (e.g., developed strategic plans addressing future challenges and ensuring long-term sustainability)

Some recommendations for improvement for this cohort include:

- Administration and Governance Structure (e.g., define governance procedures)
- Grant Obligation and Finance (e.g., enhance processes for managing grants and tracking spending)
- Community and Stakeholder Engagement (e.g., continue engaging new partners who represent locations that have not traditionally participated or been represented)
- Education and Outreach (e.g., continue evaluating behavior change campaigns and continue developing and tracking engagement metrics)

- Monitoring and Assessment (e.g., create numeric goals and establish systems to track and respond to progress)

**Use of the conclusions and/or (interim) findings:** The regular PE process examines each NEP location on a variety of topics as listed below. Each presents a potential challenge and can be addressed through the discussions between the PE team and NEP location. The results include recommendations for improvement based upon the following categories below and are submitted to each program as a final PE letter.

- NEP Administration and Governance Structure
- Grant Obligations and Finance including budget summary
- Healthy Ecosystems (e.g., fish, shellfish, plant, eelgrass, and wildlife populations; habitat protection/restoration, natural resources, land use, hydrological and ecological restoration, invasive species)
- Community and Stakeholder Engagement
- Education and Outreach
- Monitoring and Assessment
- Clean Water Act Programs Relationship
- EPA Priorities (nutrient pollution, water reuse and conservation, marine litter reduction, green infrastructure, environmental justice, climate change)

Summary information on the NEP is available on the EPA's [NEP website](#). We acknowledge the importance of NEP partnerships and proactive actions of most NEP location activities which are mostly non-regulatory and highly leveraged offering EPA an average value of \$16 for every \$1 of EPA investment. Individual PE results are typically not made available to the public.

**Link to findings:** The program is exploring how best to articulate the findings from the program evaluations annually to the public, in line with [EPA's Policy on Evaluations and Other Evidence-Building Activities](#). In the past, findings have been shared with each NEP individually via letter from EPA, but not publicly. Each NEP is unique and EPA does not compare one with another as a part of the evaluation process. However, we support transparency and understand the utility of sharing lessons and best practices across similar programs, so we are working to develop a way to share findings from each PE Group publicly on our website. (E.g., a brief, one-page annual summary of progress and findings.)



<b>Lead Office / Region</b>	Office of Water / Region 4
<b>Title</b>	Habitat Protection, Restoration, and Enhancement in the Gulf of Mexico Watershed Review
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2, Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The purpose of the evaluation is to assess progress made toward restoring, enhancing, or protecting habitats in the Gulf of Mexico watershed. The evaluation of progress is examined through outputs reported from recipients of assistance agreements and staff led efforts centered around projects or activities on agricultural lands and on watershed-based non-agricultural approaches supporting the use of nutrient management and reduction practices and tools. To quantifiably assess progress, habitat acres restored, enhanced, or protected were reported quarterly and tracked on the Gulf of Mexico SharePoint page. Staff led or supported efforts yielding acres contribute to the overall reporting of data.

**Question(s) that were addressed:** By tracking habitats restored, enhanced, or protected, the Gulf of Mexico will be able to respond to the following:

- Progress made toward meeting the assistance agreements goals, or staff led efforts: Are quantifiable goals attained?
- If not, why not? What adjustments to action plans are needed to achieve the goals?

**Conclusions and/or (interim) findings:** The Gulf of Mexico relied on data submitted in required assistance agreement progress reports and numbers attained through staff led efforts. The assistance agreements progress reports and staff led efforts are tracked and reported every three months. For FY 2023, a total 71,321 acres were restored, enhanced, or protected. This far exceeds our annual target of 1,000 acres.

**Use of the conclusions and/or (interim) findings:** The Gulf of Mexico Division will use results to develop Request for Applications and establish partnerships that seek to address emerging issues impacting habitat restoration, protection, or preservation. This will include novel tools, action, and research critical in shaping the direction of habitat work.

**Link to findings:** The Gulf of Mexico has a StoryMap which provides a depiction of financial investments, regional expanse of projects, and the varied project types underway to restore, enhance or protect habitats. The website is currently being updated and the data will be available here: [EPA Gulf of Mexico Division Story Map \(arcgis.com\)](https://www.epa.gov/gulf-of-mexico-division-story-map).

# Section 2: FY 2023 Significant Evidence Building Activities

## Region 5

<b>Lead Region</b>	Region 5
<b>Title</b>	Office of Inspector General (OIG) Report: The EPA Should Improve Management of Great Lakes Restoration Initiative Grants
<b>Link to Report</b>	<a href="#">The EPA Should Improve Management of Great Lakes Restoration Initiative Grants</a>
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General conducted this audit to determine whether the EPA awarded and monitored Great Lakes Restoration Initiative grants in accordance with federal laws, regulations, policies, and procedures.

**Focus of the report:** See above.

**Overview of main results/findings:** The EPA did not award and monitor Great Lakes Restoration Initiative, or GLRI, grants in accordance with federal and Agency grants-management requirements. Budget narratives lacked the required cost information, and grant agreements did not include all applicable terms and conditions. We identified questionable project costs totaling \$611,756. EPA staff did not conduct required monitoring in a timely, accurate, or complete manner. EPA staff also did not maintain GLRI grant documentation in the official grant file as required by EPA policy, and grant records were missing. Managers implemented processes to manage grants and to mitigate operational challenges, but staff lacked regular training on these processes. Furthermore, Agency guidance did not include key procedures to monitor staff compliance with grants-management and recordkeeping requirements.

### Recommendations and responses:

- Recommendation 1a: Develop and implement guidance for... the grant specialists in the Acquisition and Assistance Branch within Region 5's Mission Support Division that consists of a review process to verify that the work plan and budget narrative include the required information to support that the award decision was made in full compliance with grant award requirements.
  - Response: EPA agrees with the recommendation and is implementing corrective action.

- Recommendation 1b: Develop and implement guidance for... the grant specialists in the Acquisition and Assistance Branch within Region 5's Mission Support Division that consists of a baseline-monitoring process, with an emphasis on the milestones and accuracy of the baseline-monitoring report.
  - Response: EPA agrees with the recommendation and is implementing corrective action.
- Recommendation 1c: Develop and implement guidance for... the grant specialists in the Acquisition and Assistance Branch within Region 5's Mission Support Division that consists of an internal process for routinely selecting a representative group of Great Lakes Restoration Initiative grants to review for adherence to requirements, such that grant agreements are sufficiently and properly supported by work plans and budget narratives and include all applicable terms and conditions and baseline-monitoring reports are completed accurately.
  - Response: EPA agrees with the recommendation and has implemented corrective action.
- Recommendation 2: Review the OIG-identified questioned costs for the assessed Great Lakes Restoration Initiative grants to determine whether the costs are allowable and allocable as set forth in 2 C.F.R. part 200 and initiate recovery of any funds that the EPA paid for unallowable costs, as appropriate.
  - Response: EPA agrees with the recommendation and is implementing corrective action.
- Recommendation 3: In consultation with the Mission Support Division Assistance Agreements Branch, develop a records-management program for the Great Lakes National Program Office.
  - Response: EPA agrees with the recommendation and is implementing corrective action.
- Recommendation 4: Require periodic training and provide learning resources on grants management to all project officers and grant specialists, with an emphasis on recordkeeping; cost reviews; timely, accurate, and comprehensive baseline-monitoring reports; and other topics determined by the results of the routine internal review process established in Recommendation 1c.
  - Response: EPA agrees with the recommendation and is implementing corrective action.

## Office of Air and Radiation

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	Climate Change and Children's Health and Well-Being in the United States
<b>Link to EPA Strategic Plan</b>	Strategic Goal 1: Tackle the Climate Crisis
<b>Completion Date</b>	April 2023

**Purpose and brief description:** This report quantifies projected health effects to children from climate change. The report considers factors such as extreme heat, air quality, changing seasons, flooding, and infectious diseases. Where possible, the analyses consider the extent to which these risks disproportionately fall on children from overburdened populations.

**Question(s) that were addressed:** This report investigates five climate-related environmental hazards associated with children's health and well-being in the contiguous United States (U.S.): extreme heat, poor air quality, changes in seasonality, flooding, and different types of infectious diseases. It provides national-scale quantification of risks to children for a subset of key impacts, in addition to reviewing a broad set of pathways in which climate stressors affect children's health.

**Conclusions and/or (interim) findings:** At 2°C and 4°C of global warming:

- Climate change is expected to increase the incidence of asthma in children. Specifically, climate-driven changes in air quality are estimated to increase annual cases of asthma between 4% and 11%, respectively.
- Increases in oak, birch, and grass pollen are projected to increase children's asthma-related emergency department visits from 17%-30% each year.
- Additional cases of Lyme disease in children are projected to rise 79% to 241%, or an additional 2,600 to 23,400 new cases per year.
- Heat experienced during the school year affects concentration and learning in children. Climate-driven temperature increases are projected to result in 4% to 7% reductions in annual academic achievement per child. These learning losses can affect future income, with potential losses across cohorts of graduating students reaching billions of dollars annually (and in the thousands of dollars per individual).
- If no additional adaptation actions are taken, more than 2 million children are estimated to experience temporary home displacement or complete home loss, respectively, from coastal flooding at 50cm to 100cm of global mean sea level.

**Use of the conclusions and/or (interim) findings:** This report will help further efforts to address the climate crisis and advance environmental justice by serving as an important resource on the impacts to children's health due to climate change and other environmental factors.

**Link to findings:** <https://www.epa.gov/cira/climate-change-and-childrens-health-report>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	Climate Change Indicators in the United States
<b>Link to EPA Strategic Plan</b>	Strategic Goal 1: Tackle the Climate Crisis Strategic Objective 1.1: Reduce Emissions that Cause Climate Change
<b>Completion Date</b>	Ongoing Activity

**Purpose and brief description:** EPA’s Climate Change Indicators in the United States were created with the primary goal of informing readers’ understanding of climate change, specifically the public, scientists, analysts, decision-makers, and educators. The climate change indicators can also be used as a tool for communicating climate change science. EPA partners with more than 50 data contributors from various government agencies, academic institutions, and other organizations to compile a key set of indicators related to the causes and effects of climate change. These indicators also provide important input to the National Climate Assessment and other efforts to understand and track the science and impacts of climate change.

**Question(s) that were addressed:** The Climate Change Indicators serve to increase understanding of the impacts of climate change and track trends. They also provide a tool to improve communication on climate change science. By increasing understanding and improving communication, the Climate Change Indicators help inform science-based decision making.

**Conclusions and/or (interim) findings:** These indicators characterize observed changes from long-term records related to the causes and effects of climate change; the significance of these changes; and their possible consequences for people, the environment, and society. Examples of indicators include:

- Heat waves: trends in the number of heat waves per year (frequency); the average length of heat waves in days (duration); the number of days between the first and last heat wave of the year (season length); and how hot the heat waves were, compared with the local temperature threshold for defining a heat wave (intensity).
- Coastal flooding: tracks periodic inundation based on measurements from tide gauges at locations along U.S. coasts.
- Glaciers: examines the balance between snow accumulation and melting in glaciers and describes how glaciers in the United States and around the world have changed over time.
- Growing season: looks at the impact of temperature on the length of the growing season in the contiguous 48 states, as well as trends in the timing of spring and fall frosts.
- Wildfire: tracks four aspects of wildfires over time: the total number of fires (frequency), the total land area burned (extent), the degree of damage that fires cause to the landscape (severity), and the acreage burned by fires starting in each month of the year (seasonal patterns).

**Use of the conclusions and/or (interim) findings:** EPA uses the findings of the Climate Change Indicators in the United States to:

- Effectively communicate relevant climate science information in a sound, transparent, and easy-to-understand way.

- Assess trends in environmental quality, factors that influence the environment, and effects on ecosystems and society.
- Inform science-based decision-making.

**Link to findings:** <https://www.epa.gov/climate-indicators>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021
<b>Link to EPA Strategic Plan</b>	Strategic Goal 1: Tackle the Climate Crisis Strategic Objective 1.1: Reduce Emissions that Cause Climate Change
<b>Completion Date</b>	April 2023

**Purpose and brief description:** EPA has prepared the Inventory of U.S. Greenhouse Gas Emissions and Sinks since the early 1990s, which is submitted to the United Nations in accordance with the Framework Convention on Climate Change. This annual activity provides a comprehensive accounting of total greenhouse gas emissions from all man-made sources in the United States.

**Question(s) that were addressed:**

- What are the annual trends in US greenhouse gas emissions and sinks?
- How do emissions for 2021 compare to previous years and the long-term trend? What are the drivers behind any changes in trends?
- What is the relative contribution of different emission sources and greenhouse gases to climate change?

**Conclusions and/or (interim) findings:** In 2021, total gross U.S. greenhouse gas emissions were 6,340.2 million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub> Eq.). Total U.S. emissions have decreased by 2.3 percent from 1990 to 2021, down from a high of 15.8 percent above 1990 levels in 2007. Emissions increased from 2020 to 2021 by 5.2 percent (314.3 MMT CO<sub>2</sub> Eq.). Net emissions (including sinks) were 5,586.0 MMT CO<sub>2</sub> Eq. in 2021. Overall, net emissions increased 6.4 percent from 2020 to 2021 and decreased 16.6 percent from 2005 levels. From 2019 to 2020, there was a sharp decline in emissions largely due to the impacts of the coronavirus (COVID-19) pandemic on travel and other economic activity. Between 2020 and 2021, the increase in total greenhouse gas emissions was driven largely by an increase in CO<sub>2</sub> emissions from fossil fuel combustion due to economic activity rebounding after the height of the COVID-19 pandemic. In 2021, CO<sub>2</sub> emissions from fossil fuel combustion increased by 6.8 percent relative to the previous year. Carbon dioxide emissions from natural gas use increased by 8.6 MMT CO<sub>2</sub> Eq., a 0.5 percent increase from 2020. In a shift from recent trends, CO<sub>2</sub> emissions from coal consumption increased by 121.7 MMT CO<sub>2</sub> Eq., a 14.6 percent increase from 2020. The increase in natural gas consumption and emissions in 2021 is observed across all sectors except the Electric Power sector and U.S. Territories, while the coal increase is primarily in the Electric Power sector. Emissions from petroleum use also increased by 163.9 MMT CO<sub>2</sub> Eq. (8.6 percent) from 2020 to 2021. In 2021, CO<sub>2</sub> emissions from fossil fuel combustion were 4,639.1 MMT CO<sub>2</sub> Eq., or 1.9 percent below emissions in 1990.

**Use of the conclusions and/or (interim) findings:** An emissions inventory that identifies and quantifies a country's anthropogenic sources and sinks of greenhouse gases is essential for addressing climate change. This inventory adheres to both (1) a comprehensive and detailed set of methodologies for estimating sources and sinks of anthropogenic greenhouse gases, and (2) a common and consistent format that enables Parties to the United Nations Framework Convention on Climate Change (UNFCCC) to compare the relative contribution of different emission sources and greenhouse gases to climate change. EPA prepares the official U.S. Inventory of Greenhouse Gas Emissions and Sinks to fulfill annual existing commitments under the United Nations Framework Convention on Climate Change (UNFCCC).

**Link to findings:** <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	2022 EPA Automotive Trends Report
<b>Link to EPA Strategic Plan</b>	Strategic Goal 1: Tackle the Climate Crisis Strategic Objective 1.1: Reduce Emissions that Cause Climate Change
<b>Completion Date</b>	December 2022

**Purpose and brief description:** This annual report is part of EPA's commitment to provide the public with information about new light-duty vehicle greenhouse gas (GHG) emissions, fuel economy, technology data, and auto manufacturers' performance in meeting the Agency's GHG emissions standards. The data that EPA gets from our compliance and testing programs are important to the transportation and research communities for setting the baseline to inform policy and regulatory discussions.

**Question(s) that were addressed:** Specific questions include

- What are the new light-duty vehicle greenhouse gas (GHG) emissions, fuel economy, and technology data?
- What is the auto manufacturers' performance in meeting the agency's GHG emissions standards?

**Conclusions and/or (interim) findings:** The report found that since 2004, CO<sub>2</sub> emissions have decreased 25%, or 114 g/mi, and fuel economy has increased 32%, or 6.1 mpg. Manufacturers have continued to add new technology to their vehicles, with increasing penetration rates for EVs, PHEVs, hybrids, and advanced engine technologies. These technology trends have contributed to reduced emissions and improved fuel economy, even as the market continues to shift towards larger vehicles. All large manufacturers have achieved compliance with the GHG standards through at least model year 2020.

**Use of the conclusions and/or (interim) findings:** The data collected as part of this report support several important national programs, including EPA criteria pollutant and GHG standards, the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) Corporate Average Fuel Economy (CAFE) standards, and vehicle Fuel Economy and Environment labels. The analysis is a snapshot of the data collected by EPA in support of several important regulatory programs and is presented with the intent of providing as much transparency to the public as possible. The data show the

change and innovation in the industry since model year 1975, and the manufacturers' performance under EPA's GHG standards.

**Link to findings:** <https://www.epa.gov/automotive-trends/download-automotive-trends-report#Full%20Report>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	2022 Power Sector Programs – Progress Report
<b>Link to EPA Strategic Plan</b>	Strategic Goal 4: Ensure Clean and Healthy Air for All Communities Strategic Objective 4.1: Improve Air Quality and Reduce Localized Pollution and Health Impacts
<b>Completion Date</b>	September 2023

**Purpose and brief description:** Under the Clean Air Act, EPA implements regulations to reduce emissions from power plants, including the Acid Rain Program (ARP), the Cross-State Air Pollution Rule (CSAPR), the CSAPR Update, the Revised CSAPR Update, and the Mercury and Air Toxics Standards (MATS). These programs require fossil fuel-fired electric generating units to reduce emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and hazardous air pollutants including mercury (Hg) to protect human health and the environment. This reporting year marks the eight year of CSAPR implementation, the sixth year of the CSAPR Update implementation, the second year of Revised CSPAR Update Implementation, the twenty-eighth year of the ARP, and the sixth year of MATS implementation. This report summarizes annual progress through 2022, highlighting data that EPA systematically collects on emissions for all five programs and on compliance for the ARP and CSAPR. Commitment to transparency and data availability is a hallmark of these programs, and a cornerstone of their success.

**Question(s) that were addressed:** This annual activity assesses implementation of multiple regulations to reduce air pollution from power plants. Specific questions of interest include:

- Have the regulations met their emission reduction goals?
- What is the compliance record of air pollution sources controlled under these regulations?
- What is the air quality and environmental response of implementing these regulations?

**Conclusions and/or (interim) findings:** The ARP, CSAPR, CSAPR Update, Revised CSPAR Update, and MATS have delivered substantial reductions in power sector emissions of SO<sub>2</sub>, NO<sub>x</sub>, and hazardous air pollutants, along with significant improvements in air quality and the environment. Program highlights include, but are not limited to:

- 2022 Annual SO<sub>2</sub> emissions: 852,000 tons. 93% below 1995 | 10% below 2021.
- 2022 Annual NO<sub>x</sub> emissions: 753,000 tons. 87% below 1995 | 4% below 2021.
- 2022 ozone season NO<sub>x</sub> emissions: 324,000 tons. 87% below 1997 | 10% below 2021.
- 2022 CO<sub>2</sub> emissions: 1,683,000 tons. 22% below 1995 | 1% below 2021.



- Compliance: 100% compliance for power plants in the market-based ARP and CSAPR allowance trading programs.

In addition, SO<sub>2</sub>, NO<sub>x</sub>, and hazardous air pollutant emissions have declined steadily in recent years due to a variety of power industry trends that are expected to continue.

**Use of the conclusions and/or (interim) findings:** The ARP, CSAPR and the CSAPR Update are implemented through trading programs<sup>1</sup> designed to reduce emissions of SO<sub>2</sub> and NO<sub>x</sub> from power plants. Established under Title IV of the 1990 Clean Air Act Amendments, the ARP was a landmark nationwide cap and trade program, with a goal of reducing the emissions that cause acid rain. The success of the program in achieving significant emission reductions in a cost-effective manner, as demonstrated through past progress reports, led to the application of the market-based emissions trading tool for other regional environmental problems, namely interstate air pollution transport, or pollution from upwind emission sources that impacts air quality in downwind areas. MATS set limits on emissions of hazardous air pollutants from power plants. EPA published the final standards in February 2012, and the compliance requirements generally went into effect in April 2015, with extensions for some plants until April 2016 and a small number until April 2017. As such, 2022 is the sixth full year for which most sources covered by MATS have reported emissions data to EPA.

Exposure to mercury and other hazardous air pollutants at certain concentrations and durations can increase chances of neurological and developmental effects, cancer, and reproductive, respiratory, and other health problems. NO<sub>x</sub> emissions contribute to the formation of ground-level ozone and fine particle pollution, which cause a variety of adverse human health effects, while SO<sub>2</sub> emissions are linked with a number of adverse effects to human health and ecosystems. These adverse effects underline the continued need for pollution reduction under the ARP, CSAPR, CSAPR Update, the Revised CSAPR Update and MATS. These reports are critical for monitoring these programs to ensure they are continuing to deliver substantial environmental and human health benefits.

**Link to findings:** <https://www.epa.gov/power-sector/progress-report>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	Our Nation’s Air: Status and Trends Through 2022
<b>Link to EPA Strategic Plan</b>	Strategic Goal 4: Ensure Clean and Healthy Air for All Communities Strategic Objective 4.1: Improve Air Quality and Reduce Localized Pollution and Health Impacts
<b>Completion Date</b>	June 2023

**Purpose and brief description:** EPA is committed to protecting public health and the environment by improving air quality and reducing air pollution. In this review and annual report, EPA presents the trends in the nation’s air quality and summarizes the detailed information found at EPA’s Air Trends website.

<sup>1</sup> These emissions trading programs are also known as “allowance trading programs” or “cap-and-trade” programs.

**Question(s) that were addressed:**

- What are the national trends in air quality, including unhealthy air days and air pollutant emissions?

**Conclusions and/or (interim) findings:** Nationally, concentrations of the criteria air pollutants dropped significantly since 1970. Between 1970 and 2022, the combined emissions of the six common pollutants (particulate matter (PM2.5 and PM10), sulfur dioxide (SO2), nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO) and lead (Pb)) dropped by 78%. In addition, the number of unhealthy days (defined as the number of days in which the combined ozone and PM2.5 Air Quality Index was unhealthy for sensitive groups (orange) or above (red, purple, or maroon)) have declined from 2076 in 2000 to 597 in 2022. This progress occurred while the U.S. economy continued to grow, Americans drove more miles, and population and energy use increased.

**Use of the conclusions and/or (interim) findings:** Annual emissions estimates are used as one indicator of the effectiveness of the Air Program. EPA and states track direct emissions of air pollutants and emissions that contribute to the formation of key pollutants, also known as precursor emissions. Emissions data are compiled from many different organizations, including industry and state, tribal, and local agencies. The Air Quality Index (AQI) is a color-coded index EPA uses to communicate daily air pollution for ozone, particle pollution, NO2, CO and SO2. A value in the unhealthy range, above the national air quality standard for any pollutant, is of concern first for sensitive groups, then for everyone as the AQI value increases. Fewer unhealthy air quality days means better health, longevity, and quality of life for all of us. Understanding emission sources and AQI values helps EPA and states control air pollution and communicate valuable air quality information to the public.

**Link to findings:** <https://gispub.epa.gov/air/trendsreport/2023/#home>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	Title V Permitting Program Reviews
<b>Link to EPA Strategic Plan</b>	Strategic Goal 4: Ensure Clean and Healthy Air for All Communities Strategic Objective 4.1: Improve Air Quality and Reduce Localized Pollution and Health Impacts
<b>Completion Date</b>	September 2023

**Purpose and brief description:** EPA periodically reviews state and local permitting programs, including fees, under Title V of the Clean Air Act as part of its responsibility to oversee delegated and approved air permitting programs. In general, the purpose of these program reviews is to identify good practices, document areas needing improvement, and learn how EPA can help the permitting agencies improve their performance.

**Question(s) that were addressed:** To identify good practices, document areas needing improvement, and learn how EPA can help the permitting agencies improve their performance.

**Conclusions and/or (interim) findings:** Conclusions and findings varied and were specific to the program being evaluated. Example recommendations included conducting annual financial reviews to

ensure the continued sustainability of fees and monitoring progress on reducing the backlog of renewal permits.

**Use of the conclusions and/or (interim) findings:** The reviews assess the overall effectiveness of the planning, permitting, monitoring and compliance, and enforcement programs to identify good practices implemented by the state/tribal agency, areas needing improvement within the state/tribal program, and ways in which EPA can improve oversight.

**Link to findings:** <https://www.epa.gov/title-v-operating-permits/epa-oversight-operating-permits-program>

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	OIG Report: The EPA Must Improve Controls and Integrate Its Information System to Manage Fraud Potential in the Renewable Fuel Standard Program
<b>Link to Report</b>	<a href="#">The EPA Must Improve Controls and Integrate Its Information System to Manage Fraud Potential in the Renewable Fuel Standard Program</a>
<b>Completion Date</b>	September 2023

**Purpose and brief description:** To determine whether the EPA Moderated Transaction System, or EMTS, and Quality Assurance Program, or QAP, include controls to identify and reduce the generation and trading of invalid Renewable Identification Numbers, or RINs, which are used to demonstrate compliance with the renewable fuel standards as overseen by the EPA Office of Transportation and Air Quality, or OTAQ

**Focus of the report:** To determine whether the EPA’s Moderated Transaction System and Quality Assurance Program include controls to identify and reduce the generation and trading of invalid RINs that are used to demonstrate compliance with renewable fuel standards as overseen by the EPA’s Office of Transportation and Air Quality.

**Overview of main results/findings:** The EPA’s nonintegrated information system is causing problems with the Renewable Fuel Standard (RFS) program administration and RIN compliance oversight. It is challenging for the EPA to respond to information requests without placing a significant burden on staff resources to synthesize data from the various systems. Further, OIG found data-quality problems that raised concerns about the accuracy and completeness of the EPA’s RIN and RFS reporting data, as well as data-accessibility problems that affected OECA’s pre-inspection processes. The EPA must take interim steps to upgrade or replace the applications in use, including the Data Analysis and Reporting Tool (DART), and must determine how to integrate its systems in the coming years to effectively administer an expanding RFS program.

**Recommendations and responses:**

- Recommendation 1: Improve adherence to the five- and ten-business-day reporting requirements for Renewable Identification Number transactions in Renewable Fuel Standard regulations.
  - OAR agrees with the recommendation and is implementing corrective action.

- Recommendation 2: Develop a process to identify and review instances in which Renewable Identification Number generation exceeds registered or reported renewable fuel production capacity.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 3: Develop a risk-based selection process to verify Renewable Identification Number transactions entered in the EPA Moderated Transaction System.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 4: Develop a process to reduce the likelihood of Quality Assurance Program auditor conflicts of interest during Quality Assurance Program reviews.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 5: Communicate relevant requirements, expectations, and consequences from Renewable Fuel Standard regulations to Quality Assurance Program auditors to minimize the likelihood that they verify Renewable Identification Numbers that are invalid.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 6: Annually review the scope of consulting services that Quality Assurance Program auditors are performing for renewable fuel producers to identify prohibited relationships.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 7: Integrate key applications to reduce staff burden and to allow better oversight of Renewable Identification Number and Renewable Fuel Standard program requirements and engage the Office of Enforcement and Compliance Assurance in the integration process to ensure all inspection and enforcement data needs are addressed in the integrated system.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 8: Enhance or replace the Data Analysis and Reporting Tool to facilitate external information requests and Office of Enforcement and Compliance Assurance inspections.
  - *OAR agrees with the recommendation and is implementing corrective action.*

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	OIG Report: The EPA Needs to Address Increasing Air Pollution at Ports
<b>Link to Report</b>	<a href="#">The EPA Needs to Address Increasing Air Pollution at Ports</a>
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General initiated this evaluation to determine what steps, if any, the EPA is taking to address the increase in air pollution from oceangoing vessels, or OGVs, at U.S. maritime ports.

**Focus of the Report:** To determine what steps, if any, the EPA is taking to address the increase in air pollution from oceangoing vessels at U.S. maritime ports.

**Overview of main results/findings:** The EPA has set a strategic goal of ensuring clean and healthy air for all communities. The increase in maritime traffic since 2020 has heightened air pollution concerns in many near-port communities. Without assessing the air-monitoring network or implementing a plan for enhancing the network, including modeling, the EPA may not be able to efficiently address air emissions from OGVs. In addition, without performance measures for the Ports Initiative, the EPA cannot determine the initiative’s success. With the \$3 billion in Inflation Reduction Act funding for the planning, procurement, and installation of zero-emission technology at ports, it will be essential for the EPA to evaluate the air-monitoring network and to establish performance measures. While the validation of low-cost air monitors was outside the scope of the work, OIG identified the use of such monitors by near-port community groups during our evaluation and noted that the EPA does not use the data from these monitors. OIG suggests that the EPA consider creating a plan for evaluating new and low-cost monitoring technologies. As part of this plan, the EPA should consider developing guidance for incorporating these technologies into the Agency’s air-monitoring network and related regulatory decisions.

**Recommendations and responses:**

- Recommendation 1: Assess the air-monitoring network around ports and in near-port communities and create a plan to enhance the air-monitoring network where any gaps are identified.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 2: Set quantifiable performance measures for the Ports Initiative, including a plan for identifying the measures’ baselines.
  - *OAR agrees with the recommendation, and discussions about corrective action are ongoing.*

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	OIG Report: The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers
<b>Link to Report</b>	<a href="#">The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers</a>
<b>Completion Date</b>	February 2023

**Purpose and brief description:** To determine whether the EPA effectively uses its oversight and enforcement authority to ensure that all residential wood heaters reaching consumers are properly tested and certified in accordance with established standards.

**Focus of the report:** To determine whether EPA effectively uses its oversight and enforcement authority to ensure that all residential wood heaters reaching consumers are properly tested and certified in accordance with established standards.

**Overview of main results/findings:** The EPA does not have an effective wood heater program, and wood heaters sold to the public may not meet PM2.5 emission standards. The 2015 NSPS and the certification test methods lack specificity and allow for too much flexibility. Independent data show that at least some certified wood heaters do not meet emission standards. Although the EPA has withdrawn some flawed test methods, wood heaters certified prior to these withdrawals remain available for sale until their certifications are scheduled for renewal, which could be as late as 2027 for some appliances. Given their life spans, these wood heaters could potentially remain in homes for decades. Further, the EPA's certificate-of-compliance process lacks internal controls, and the Agency does not exercise its authority to ensure successful program oversight. OECA conducts cursory, administrative reviews of certification test reports, and the OAR does not have an established role in reviewing certification test reports, leaving the process without the subject-matter experts who could identify deficiencies. Instead, OECA relies upon third-party certifiers who are not always independent from the testing lab that conducted the certification test. Moreover, the EPA did not exercise its authority to observe emission tests or conduct compliance audit tests. Because the EPA did not implement effective internal controls, certification test reports contained deficiencies that should have been detected during the certificate-of-compliance process. Because of the flawed test methods and the EPA's lack of effective oversight, state regulators and the public cannot rely on the wood heater program to ensure that wood heaters reaching consumers comply with emission standards. Millions of federal, state, and local dollars are potentially wasted on changeout programs. Despite the interim measures the Agency has taken to address immediate issues, such as developing a corrective action list and reviewing certification test reports for previously certified appliances, significant improvements are needed to regain the public's trust in the wood heater program and to assure stakeholders that certified appliances comply with clean air standards.

**Recommendations and responses:**

- Recommendation 4: Incorporate the EPA's certification test report expectations set forth in the April 2022 corrective action list into the 2023 revisions to the New Source Performance Standards for residential wood heaters.

- *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 5: Develop and adopt an EPA cord wood test method that is supported by data to provide the public reasonable assurance that certified appliances meet emission standards.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 6: Establish mechanisms to promote independence between emissions testing labs and third-party certifiers.
  - *OAR agrees with the recommendation and is implementing corrective action.*

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	OIG Report: The EPA Should Enhance Oversight to Ensure that All Refineries Comply with the Benzene Fenceline Monitoring Regulations
<b>Link to Report</b>	<a href="#">The EPA Should Enhance Oversight to Ensure that All Refineries Comply with the Benzene Fenceline Monitoring Regulations</a>
<b>Completion Date</b>	September 2023

**Purpose and brief description:** To determine to what extent oversight of the benzene fenceline monitoring requirements by the EPA and delegated authorities ensure that refineries take corrective action and lower benzene concentrations, as required, when they exceed the action level.

**Focus of the report:** To determine to what extent oversight of the benzene fenceline monitoring program by the EPA and delegated state and local agencies ensure that refineries take corrective action and lower benzene, as required, when measured benzene concentrations exceed the action level.

**Overview of main results/findings:** The EPA should enhance oversight of the benzene fenceline monitoring requirements to ensure that all refineries that exceed the action level take appropriate corrective actions to address exceedances and reduce their benzene concentrations to the action level or below. This is particularly important for refineries that exceed the minimal risk level of 29 µg/m<sup>3</sup> so that nearby communities do not experience continued benzene concentrations that may increase the risk for adverse health effects. If the EPA and delegated authorities fail to ensure that these refineries take appropriate corrective actions, communities could be exposed to higher benzene concentrations than if appropriate corrective actions were taken. Further, communities with environmental justice concerns could face disproportionate impacts from potentially harmful benzene concentrations.

**Recommendation and Response:**

- Recommendation 3: Review all approved site-specific monitoring plans to identify which ones rely solely on modeling, as opposed to additional monitoring, to account for nearfield sources. Take appropriate steps to ensure that the site-specific monitoring plans identified are amended to incorporate additional monitoring to account for contributions to benzene concentrations from nearfield sources, as required by EPA regulations.
  - *OAR agrees with the recommendation and is implementing corrective action.*

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	OIG Report: The EPA's Vulnerability Tracking and Remediation and Information Technology Procedures Review Processes Are Implemented Inconsistently
<b>Link to Report</b>	<a href="#">The EPA's Vulnerability Tracking and Remediation and Information Technology Procedures Review Processes Are Implemented Inconsistently</a>
<b>Completion Date</b>	July 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General initiated this evaluation to assess the EPA's compliance with the fiscal year 2022 inspector general reporting requirements for the Federal Information Security Modernization Act of 2014.

**Focus of the report:** An independent evaluation of the EPA's compliance with the *U.S. Department of Homeland Security Fiscal Year 2022 Inspector General FISMA Reporting Metrics*

**Overview of main results/findings:** OIG concluded that the EPA achieved an overall maturity level of Level 3 (Consistently Implemented) for the five security functions and nine domains outlined in the FY 2022 Inspector General Federal Information Security Modernization Act of 2014 (FISMA) Reporting Metrics. This means that the EPA consistently implemented its information security policies and procedures, however quantitative and qualitative effectiveness measures are lacking. OIG identified that the EPA has deficiencies in the following areas:

- Updating information security procedures in a timely manner to meet the requirements of National Institute of Standards and Technology publications within one year of their publication.
- Tracking and remediating vulnerabilities identified for the Analytical Radiation Data System in a timely manner.

**Recommendations and responses:**

- Recommendation 2: Develop and implement a plan for prioritizing and scheduling the installation of patches that address vulnerabilities in the Analytical Radiation Data System within the time frames as set forth in CIO 2150-P-17.2, Information Security – Interim System and Information Integrity Procedures.
  - *OAR agrees with the recommendation and is implementing corrective action.*
- Recommendation 3: Assign responsibilities for the plan developed in Recommendation 2 to include documenting associated plans of actions and milestones in the Agency tracking system.
  - *OAR agrees with the recommendation and is implementing corrective action.*



<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	U.S. Government Accountability Office (GAO) Report: Climate Change: State and Local Efforts to Reduce Greenhouse Gas Emissions from Vehicles
<b>Link to Report</b>	<a href="#">Climate Change: State and Local Efforts to Reduce Greenhouse Gas Emissions from Vehicles</a>
<b>Completion Date</b>	August 2023

**Purpose and brief description:** The Explanatory Statement on the Consolidated Appropriations Act, 2022 included a provision for GAO to examine the extent to which states and Metropolitan Planning Organizations (MPOs) collect performance information on transportation-related greenhouse gas emissions, among other things. This report describes activities selected state DOTs and MPOs have taken related to estimating, analyzing the effects of transportation investments on, and using reduction targets for on-road greenhouse gas emissions. GAO reviewed federal statutes, regulations, executive orders, and other information on greenhouse gas emissions. GAO also interviewed federal officials as well as officials from a non-generalizable selection of 10 state DOTs and 10 MPOs. GAO selected states that varied in greenhouse gas emission policies, population, and geographic area, and generally selected the largest MPO from each of these states.

**Focus of the report:** This report describes examples of how selected state departments of transportation (state DOT) and MPOs approach 1) estimating on-road greenhouse gas emissions, 2) analyzing the effects of transportation investments on on-road greenhouse gas emissions, and 3) using reduction targets for on-road greenhouse gas emissions.

**Overview of main results/findings:**

- Estimating emissions- GAO found examples of state DOTs and MPOs estimating on-road greenhouse gas emissions using different types of data as the basis of those estimates. These entities more commonly used data on vehicle miles traveled (e.g., annual traffic count data), while others used fuel data (gallons of fuel taxed by the state). The selected state DOTs that do not currently estimate on-road greenhouse gas emissions cited a number of reasons. For example, Montana state DOT officials said the majority of roads in the state are rural with no congestion issues. Officials from selected MPOs provided examples of resource challenges they face, such as not having readily available data or staff with the right subject matter expertise.
- Analyzing the effects of transportation investments- GAO found examples of state DOTs and MPOs analyzing the effects of transportation investments on greenhouse gas emissions. For example, officials from an MPO in Massachusetts said that they estimate emissions changes for every project the MPO funds. However, selected state DOTs and MPOs reported challenges to reliably quantifying the effects of specific investments on greenhouse gas emissions.
- Using reduction targets-GAO found a few examples of selected state DOTs and MPOs that have targets for reducing on-road greenhouse gas emissions. For example, the MPO representing the Washington, D.C. metropolitan area set targets to reduce on-road greenhouse gas emissions by 50 percent from 2005 levels by 2030, and 80 percent by 2050. However, selected state DOT and MPO officials provided examples of challenges to meeting reduction targets, such as having few ways to incentivize consumers to adopt particular fuels or vehicles.

**Recommendations and responses:** GAO had no recommendations for EPA.

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	GAO Report: Renewable Fuel Standard: Actions Needed to Improve Decision-Making in the Small Refinery Exemption Program
<b>Link to Report</b>	<a href="#">Renewable Fuel Standard: Actions Needed to Improve Decision-Making in the Small Refinery Exemption Program</a>
<b>Completion Date</b>	November 2022

**Purpose and brief description:** GAO was asked to review issues related to EPA's and DOE's implementation of the small refinery exemption program. This report examines (1) information, policies, and procedures EPA and DOE use to make decisions about exemptions; and (2) the extent to which exemption decisions are timely. GAO analyzed data and documents related to exemptions from 2013 through 2021 and interviewed agency officials and industry stakeholders.

**Focus of the report:** This report examines (1) information, policies, and procedures that the U.S. Environmental Protection Agency (EPA) and Department of Energy (DOE) use to make decisions about small refinery exemptions from the Renewable Fuel Standard (RFS) and (2) the extent to which decisions about exemptions are timely.

**Overview of main results/findings:** The U.S. Environmental Protection Agency (EPA) does not have assurance that its decisions about small refinery exemptions under the Renewable Fuel Standard (RFS) are based on valid information. In addition, EPA and the Department of Energy (DOE) do not have policies and procedures specifying how they are to consult and make exemption decisions.

**Information-** Small refinery exemption decisions for compliance years 2019 through 2021 were based on an EPA conclusion that small refineries do not experience disproportionate economic hardship from the RFS. This conclusion relies on a potentially flawed assumption—that all parties pay and receive one price for the tradeable credits used to demonstrate compliance with the RFS. GAO found that EPA has not analyzed whether this assumption is valid. GAO's analysis showed that small refineries have paid more on average for compliance credits than large refineries. Without reassessing its conclusion, EPA does not have assurance that its small refinery exemption decisions are based on valid information.

**Policies and Procedures:** EPA has generally documented its decisions. However, EPA has no policies or procedures for how it assesses petitions and makes exemption decisions. Similarly, DOE does not have policies or procedures for how it provides consultation to EPA. Administration of the program has been inconsistent, and the number of exemptions granted and denied has varied from year to year. Consequently, agency decisions appear ad hoc, resulting in market uncertainty. This can harm small refineries and renewable fuel producers by undermining their ability to plan for infrastructure upgrades and renewable fuel demand.

## Recommendations and responses:

- Recommendation 1: The Administrator of EPA should reassess EPA's conclusion that all small refineries recover their RFS compliance costs in the price of the gasoline and diesel they sell, including by fully examining and documenting RIN market performance and RIN pass-through in all relevant fuel markets.
  - *EPA does not agree with this recommendation and will not take any action.*
- Recommendation 3: The Administrator of EPA should identify and communicate what information refineries would need to submit to demonstrate disproportionate economic hardship.
  - *EPA partially concurred with this recommendation and said it would take steps to implement it.*
- Recommendation 5: The Administrator of EPA should develop policies and procedures for making small refinery exemption decisions.
  - *EPA partially concurred with this recommendation and said it would take steps to implement it.*
- Recommendation 6: The Administrator of EPA should develop policies and procedures to ensure that EPA meets statutory deadlines to issue decisions, including tracking when petitions are considered complete.
  - *EPA partially concurred with this recommendation and said it would take steps to implement it.*
- Recommendation 7: The Administrator of EPA should assess the effect of small refinery exemption decision timing on the benefit provided to small refineries, as well as the effect on fuel markets, and reconsider petition requirements, such as that of three quarters of current year financial information.
  - *EPA partially concurred with this recommendation.*

<b>Lead Office</b>	Office of Air and Radiation
<b>Title</b>	GAO Report: Wildfire Smoke: Opportunities to Strengthen Federal Efforts to Manage Growing Risks
<b>Link to Report</b>	<a href="#">Wildfire Smoke: Opportunities to Strengthen Federal Efforts to Manage Growing Risks</a>
<b>Completion Date</b>	March 2023

**Purpose and brief description:** GAO reviewed issues related to the effects of wildfires on air quality and public health. This report primarily examines: (1) EPA risk management actions related to air quality and public health from wildfire smoke and coordination efforts with other federal agencies; and (2) opportunities for EPA to improve the management of these risks. GAO reviewed laws, regulations, and other documents; interviewed federal officials and 15 stakeholder entities, including tribal, state, and local

agencies; and analyzed actions to reduce risks using criteria, including GAO's Disaster Resilience Framework.

**Focus of the report:** Objectives were to: (1) describe key federal roles related to managing risks to air quality and public health from wildfire smoke; (2) identify the actions the Environmental Protection Agency (EPA) has taken to help manage these risks and the extent to which EPA coordinates with other federal agencies on these actions; and (3) examine how EPA could better help manage these risks.

**Overview of main results/findings:** GAO identified opportunities for EPA to better manage the growing risks from wildfire smoke by building on its actions to help communities prepare for and respond to wildfire smoke events. In particular, EPA could take a more coordinated approach to its actions that align with leading practices for collaboration. EPA's actions are spread across program and regional offices and conducted in an ad hoc manner with no dedicated program or budget. By developing a coordinated approach to guide these actions, EPA could better ensure that the agency directs limited resources toward its highest priorities. EPA also has opportunities to enhance its role in supporting hazard mitigation through methods to reduce the likelihood of catastrophic wildfires and resulting smoke events. For example, EPA could work with federal land management agencies—the Forest Service and agencies within the Department of the Interior—to strengthen federal coordination. EPA and the land management agencies have identified areas where their respective agency missions and goals for wildfire risk mitigation are not aligned. For example, land management agency officials said that EPA's air quality requirements can limit the use of certain land-management methods, such as prescribed burns, that have the potential to reduce smoke from future wildfires. By better aligning their goals for wildfire risk mitigation, the federal agencies can more effectively reduce risks to air quality and public health from wildfire smoke over the long term.

**Recommendations and responses:**

- Recommendation 1: The Administrator of EPA should develop and document a coordinated approach for EPA's actions to help communities prepare for and respond to the air quality and public health risks of wildfire smoke. The approach should align with leading practices for collaboration, including establishing goals, identifying and leveraging resources, and clarifying key stakeholder roles and responsibilities.
  - *EPA agreed with the recommendation.*
- Recommendation 2: The Administrator of EPA should work with the Secretaries of Agriculture and the Interior to better align air quality and land management goals for wildfire risk mitigation and establish joint strategies for achieving those goals.
  - *EPA agreed with the recommendation.*
- Recommendation 5: The Administrator of EPA should, in consultation with federal land management agencies, identify and develop additional information on reducing risks from wildfire smoke to air quality and public health through wildfire risk mitigation.
  - *EPA agreed with the recommendation.*

- Recommendation 6: The Director of EPA’s Office of Air and Radiation should work with EPA’s tribal, state, and local partners to evaluate options for providing incentives for and supporting wildfire risk mitigation and establish a plan for implementing appropriate options, seeking additional authority from Congress if needed.
  - *EPA agreed with the recommendation.*

## Office of Chemical Safety and Pollution Prevention

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	Reducing Use of Animals in Chemical Testing
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Estimated Completion Date</b>	March 2024

**Purpose and brief description:** OCSPP and the Office of Research and Development (ORD) have been world leaders in advancing the science of moving away from the use of animals for toxicity testing. In June of 2020, EPA released, “New Approach Methods Work Plan: Reducing Use of Animals in Chemical Testing,” which provides a workplan to develop metrics for reducing the use of mammalian laboratory animals in both research and for safety evaluations for pesticides and industrial chemicals. Additionally, the U.S. Government Accountability Office (GAO) released a report to Congress in 2019 recommending that Federal agencies develop metrics to assess the progress made toward reducing, refining, and replacing animal use in testing. EPA implemented activities and policies over the past several years that demonstrate significant reductions in the number of animals used in testing and saving resources for the Agency and stakeholders. OCSPP primarily uses laboratory animal data for assessing the risks of pesticides and industrial chemicals under FIFRA and TSCA. This effort will support metrics that show progress regarding the move away from this historical paradigm towards replacing animal studies with new approach methods that are more efficient and more human relevant.

**Question(s) that were addressed:** What metrics will be used to demonstrate progress in animal reduction efforts? What are the existing statutes, programmatic regulations, policies, and guidance that inform testing requirements across EPA programs, which may or may not allow flexibility for NAM implementation?

**Conclusions and/or (interim) findings:** OPP reports animal savings based on its Part 158 data requirements and study waivers. For example, for repeat dosing studies, OPP recommended granting waivers for 43 studies, which saved an estimated 10,024 test animals. OPPT and ORD have developed their own tracking metrics that should be available by the end of 2023. Additionally, a report on statutory and regulatory requirements across EPA programs has been drafted as a deliverable for the EPA NAM workplan that indicates that the environmental laws providing the Agency’s authority are written broadly

in most cases and generally the statutes do not preclude the use of scientific information or data from alternative methods, such as NAMs.

**Use of the conclusions and/or (interim) findings:** The metrics are used to track progress in animal reduction efforts across programs in OCSPP and ORD. The report on statutory and regulatory requirements will be used to better understand the flexibility and potential challenges for utilizing NAMs and reducing animal use across different EPA programs.

**Link to findings:**

- Link to OPP metrics: <https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/strategic-vision-adopting-new-approach-0>
- Other findings (ORD and OPPT metrics, statutory and regulatory requirements report) will be publicly available in near future.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	ESA Effects Determinations for Listed Species
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Completion Date</b>	Continuous Activity

**Purpose and brief description:** The Endangered Species Act (ESA) requires that the actions of federal agencies do not jeopardize the continued existence of federally threatened or endangered species or destroy or adversely modify their critical habitat. EPA is developing a process to incorporate ESA determinations into its new active ingredient registration process and to work towards more routine considerations of ESA determinations for registration review decisions. EPA anticipates integrating ESA considerations into its new active ingredient registrations and registration review decisions at an increasing frequency over the next 5 years.

**Question(s) that were addressed:** Do OCSPP’s processes for developing ESA effects determinations warrant further revision? Should OCSPP develop a new suite of performance measures to measure current or new processes, and if so, what are the options?

**Conclusions and/or (interim) findings:** For FY 2023, 12 of 12 (100%) of risk assessments supporting new active ingredient regulatory decisions included consideration of ESA. This reflected a focusing of priorities for ESA on conventional new active ingredients as well as “no effects” findings for lower risk biopesticide new active ingredients. Amongst the registration decisions for new AIs are the first new AI registrations that implemented ESA mitigations as part of the new a.i. regulatory decision. For registration review, 7 of 9 (78%) of risk assessments supporting registration review included consideration of ESA. Each of these results exceeded their respective targets for FY 2023. EPA exceeded its registration review targets because it is conducting very few registration review risk assessments. As the number of registration review risk assessments increases, the percentage of them that can incorporate ESA will decrease. To help accommodate the increased forthcoming workload, in FY 2023, EPA introduced two new draft proposed strategies designed to help EPA reduce exposures to listed species more efficiently: (1) the Vulnerable

Species Pilot; and (2) Herbicide Strategy. These proposed draft initiatives are intended to allow EPA to leverage its resources to more broadly implement ESA into its regulatory decision making.

**Use of the conclusions and/or (interim) findings:** These results for FY 2023 indicate that EPA is following its ESA workplan for incremental implementation of ESA into its regulatory decision making, with the current focus being on conventional new active ingredients.

**Link to findings:** EPA's ESA workplan and associated updates are available online at the following url: <https://www.epa.gov/endangered-species/epas-workplan-and-progress-toward-better-protections-endangered-species#workplan>.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	Pesticide Registration Review
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Completion Date</b>	Continuous Activity

**Purpose and brief description:** Review will assess the degree of progress and timely completion of docket openings, draft risk assessments, and case completions for the second cycle of registration review.

**Question(s) that were addressed:** Do OCSPP's processes for meeting registration review statutory timeframes warrant further revision? Should OCSPP develop a new suite of performance measures to measure current or new processes, and if so, what are the options?

**Conclusions and/or (interim) findings:** In FY 2023, EPA completed 15 registration review cases, which exceeded the annual target of 8. 25 dockets were opened for registration review cases, exceeding the target of 20. For draft risk assessments, 10 were completed, falling short of the FY 2023 target of 16.

**Use of the conclusions and/or (interim) findings:** The results indicate that EPA is proceeding in alignment with its registration review workplan with regard to case completions. The draft risk assessment results are indicative of IT challenges in FY 2023 which prevented EPA from being able to issue requests to registrants for data necessary to complete its risk assessments, as well as resource constraints.

**Link to findings:** Registration Review Completed Actions can be found at <https://www.epa.gov/pesticide-reevaluation/completed-registration-review-actions-fy-2023-quarters-1-2-and-3>

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	TSCA Risk Evaluation and Management Activities
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7.1: Ensure Chemical and Pesticide Safety
<b>Estimated Completion Date</b>	December 2024

**Purpose and brief description:** OCSPP’s Office of Pollution Prevention and Toxics (OPPT) will continue to stand up a project management program that eventually will support all major activities in the office. A primary area in which this effort is expected to contribute is the planning and execution of risk evaluation and risk management actions taken by EPA under TSCA. This activity informed the understanding of how is meeting TSCA’s mandates and how this can be improved, as well as what appropriate measures are for tracking performance.

**Question(s) that were addressed:** Can the processes currently used to develop TSCA risk evaluations and risk management actions be improved?

**Conclusions and/or (interim) findings:** Interim findings are that using the system to identify efficiencies is highly dependent on accurate data entry and timely updates. Efforts are underway to improve this process through training and system automation. The system itself needs some improvements in the areas of user interface and ease of data accessibility. There are many efficiencies that can be introduced into the risk evaluation/management processes and are currently being piloted.

In the meantime, OPPT is making changes to the risk evaluation process to streamline the process. Those improvements include:

- Shifting to an annual prioritization process that onboards five or six chemicals for risk evaluation each year, resulting in finalizing five or six risk evaluations.
- Shifting data-gathering efforts, including engagement with industry and test orders as necessary, about uses, hazards, and exposures earlier.
- Prioritizing evaluation of substances expected not to require TSCA test orders.
- Deploying our scientific resources more strategically during a risk evaluation by focusing on uses likely to contribute to unreasonable risk from a chemical.
- Maximizing the use of existing Agency science.
- Exploring changes to the systematic review process to find efficiencies, including limiting the systematic review done on exposure information that pre-dates a regulation, sending multiple risk evaluations for chemicals that are similar for a single combined peer review, and conducting letter peer review for a less scientifically novel risk evaluations.

**Use of the conclusions and/or (interim) findings:** During the year, OPPT used its iterative experience to support collaboration activities with the respective divisions and system developers, which produced many opportunities for improvement of the system/process. These improvements should improve the timeliness of the risk evaluation/risk management processes and improve the integrity of the data derived



from these efforts. Collaboration is underway with the respective divisions to move the process forward and bring it to fruition. The end goal is to solidify these processes to ensure the most efficient and effective results as possible while focusing on data integrity.

**Link to findings:** The findings from this effort will be apparent in the timing of OPPT’s completion of draft and final risk evaluations. The status of all ongoing and completed risk evaluations is available at <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/ongoing-and-completed-chemical-risk-evaluations-under>.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	Safer Choice Program
<b>Link to EPA Strategic Plan</b>	Goal 7: Ensure Safety of Chemicals for People and the Environment Objective 7. 2: Promote Pollution Prevention
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The Pollution Prevention (P2) Program seeks to alleviate environmental problems by leveraging business-relevant approaches to achieve significant reductions in the generation of hazardous releases to air, water, and land; reductions in the use of hazardous materials, which also advances EPA’s chemical risk reduction and management goals under the Toxic Substances Control Act (TSCA); reductions in the generation of greenhouse gases; and reductions in the use of water. As a result of these preventative approaches, the P2 Program helps businesses and others reduce costs and access market opportunities. The review will assess the degree of progress and effects of the P2 Programs – including Safer Choice – as well as the utility of performance measures (APG, LTPG, internal operational metrics) for the Program.

**Question(s) that were addressed:** What are the effects of EPA’s P2 Program on different stakeholders’ outcomes? What is the potential pace of the Safer Choice Program when appropriately resourced? Effects of the Safer Choice program on stakeholder outcomes:

- Helps reduce unintended consequences to human health and the environment from ingredients in products by leveraging EPA’s expertise in safer chemistry.
- Safer Choice has conducted maintenance of the Safer Chemical Ingredients List (SCIL), resulting in the removal of three PFAS with the fourth and final PFAS scheduled for removal in January 2024.
  - Safer Choice held its Partner & Stakeholder Summit in 2022 and 2023. Outcomes include setting program priorities for the upcoming year and developing solutions to issues affecting manufacture and use of safer ingredients.
  - The 2022 and 2023 Summits included sessions on environmental justice. Outcomes of these sessions include increasing access to safer products in underserved communities and increasing awareness of safer products.
- Makes it easy for consumers to find products with safer ingredients.

- Safer Choice re-launched its Facebook page in FY 2022 after years of inactivity. The page has reached **>52k people** and **>15.2k total followers** at the end of FY 2023. Safer Choice also created and posted content on EPA's Instagram and LinkedIn, gaining **>60k views**. Further, EPA leadership reached **>14k people** by participating in a trade association podcast and a podcast aimed at house cleaners.
- As a result of >20 stakeholder meetings in FY 2023, Safer Choice partners and stakeholders promoted the Safer Choice label in at least **2 television ads, an in-store shelf talker, and a social media influencer campaign**. During Safer Choice's coordinated FY 2023 campaigns, Safer Choice content was posted across social media, including **>100 Instagram posts** with #EPASaferChoice.

**Potential pace if appropriately resourced:** If appropriately resourced, Safer Choice could surpass its 2018 measures (see The Safer Choice Performance Measures webpage at <https://www.epa.gov/saferchoice/safer-choice-performance-measures>). The previous administration reduced both FTE and extramural funding for Safer Choice and the enduring effects of this disinvestment are reflected in the program's FY 2021-FY 2023 metrics. The FTE and funding reductions also meant that no new program initiatives were undertaken, and the program's focus was maintenance of its product review (i.e., the functions illustrated in the metrics). While the Safer Choice program brought on new FTE at the end of FY 2022, several of these staff are required to spend time on projects not related to product review such as grants (i.e., IJJA and IRA hires) in FY 2023. In FY 2023, Safer Choice staff also began to dedicate resources to initiatives that were on hold during the previous administration such as the Safer Choice Summit and updates to the Safer Choice Standard, neither of which contribute to the product review metrics. Lastly, while three FTE were brought on in FY 2023 to assist with product review, thorough training is required before they can contribute in a way to improve the program metrics.

**Conclusions and/or (interim) findings:** At current resource levels, the Safer Choice program is prioritizing maintenance of core functions of the program, including product certification for existing products and confirming the status of chemicals listed on the Safer Chemical Ingredients List (SCIL). The program's FY 2023 product and chemical review metrics are listed below:

- Number of new products certified by the program: 172
  - FY 2023 goal: 200 products
- Total number of Safer Choice and DfE certified products: 1,788
  - FY 2023 goal: 2000 products
- Number of chemicals added to the SCIL: 19
  - FY 2023 goal: 25 chemicals
- Total number of chemicals listed on the SCIL: 1071
- Time to review Safer Choice product submissions: 91% of submissions reviewed within eight weeks of EPA receipt
  - FY 2023 goal: 80%

- Total volume of Safer Choice- and DfE-certified products: 2.0 billion lbs
- Product formulation adjustments made to meet the Safer Choice Standard: 103

**Use of the conclusions and/or (interim) findings:** Disinvestment from the Safer Choice and DfE programs by the previous administration caused a drop in the number of certified products. In FY 2021-FY 2023, the Safer Choice Program prioritized maintenance of existing partnerships and was not able to invest in broadening the number of certified products and expanding to new product sectors. While many of the resources have been reestablished, it will take time for Safer Choice to fully recover from disinvestment. Providing support for expanding the Safer Choice program to new sectors (a priority for the current Administration) will increase the following metrics over time: number of new products certified by the program, the total number of certified products, number of chemicals added to the SCIL, total numbers of chemicals added to the SCIL and the total volume of Safer Choice- and DfE-certified products. Expansion of the Safer Choice and/or DfE programs will further EPA’s mission, advance environmental justice, and further progress towards meeting the measures and mission of the P2 program.

**Link to findings:** The Safer Choice Performance Measures webpage (<https://www.epa.gov/saferchoice/safer-choice-performance-measures>) will be updated to reflect FY 2023 metrics (due to be published in January 2024).

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	OIG Report: The EPA Adhered to Tribal Consultation Policies for Pesticide Actions but Could Update Guidance to Enhance the Meaningful Involvement of Tribal Governments
<b>Link to Report</b>	<a href="#">The EPA Adhered to Tribal Consultation Policies for Pesticide Actions but Could Update Guidance to Enhance the Meaningful Involvement of Tribal Governments</a>
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General conducted this evaluation to determine whether the EPA adhered to its tribal consultation policies during the development of:

- The 2014 EPA Plan for the Federal Certification of Applicators of Restricted Use Pesticides within Indian Country.
- The 2017 Certification of Pesticide Applicators rule revision.
- The 2020 proposed revisions to the 2014 EPA Plan for the Federal Certification of Applicators of Restricted Use Pesticides within Indian Country.

**Focus of the report:** The OIG reviewed documentation and evaluated the EPA’s RUP consultations based on their adherence to the EPA consultation policy criteria outlined within various documents. Specifically, the OIG reviewed the 1984 Indian Policy, the EPA’s 2011 tribal consultation policy, and other documents guiding the EPA’s tribal consultation processes. The OIG interviewed tribal members from seven tribes; a tribal pesticide group; OITA staff; an OCSP staff member; EPA regional staff in Regions 8, 9, and 10; and members of an EPA workgroup to determine adherence to and understand tribal consultation policy

processes and procedures. The OIG also conducted a survey to assess possible challenges and gain insight from tribes on their consultation experiences with the EPA.

**Overview of main results/findings:** The OIG found that EPA has several policies that guide the Agency’s communication and coordination with tribal governments. The Office of International and Tribal Affairs and the Office of Chemical Safety and Pollution Prevention adhered to these policies during the development of three actions related to restricted-use pesticides: the 2014 EPA Plan for the Federal Certification of Applicators of Restricted Use Pesticides within Indian Country, the 2017 Certification of Pesticide Applicators rule revision, and the 2020 proposed revisions to the aforementioned 2014 EPA plan. However, the OIG identified opportunities for the EPA to enhance the meaningful involvement of tribal governments in decision-making processes that affect Indian Country. Specifically, while the 2011 EPA Policy on Consultation and Coordination with Indian Tribes states that the EPA should hold meaningful consultations prior to the EPA taking actions or implementing decisions that may impact tribes, meaningful is not clearly defined or described in the 2011 policy. Additionally, the EPA did not always allow tribes sufficient time to prepare for consultations, and in one instance, there was a significant time lapse between the initial tribal consultation and the Agency action. The EPA can contribute to meaningful interactions with tribes by ensuring timely notification to tribes to prepare for consultations and by having additional consultation opportunities when there is a significant time lapse between the initial consultation and the Agency action. According to the EPA, the Agency is currently updating its 2011 tribal consultation policy. Because the Office of International and Tribal Affairs and the Office of Chemical Safety and Pollution Prevention adhered to tribal consultation policies in connection with the three restricted-use pesticide actions we reviewed, we do not make recommendations in this report. Instead, we offer suggestions for the EPA to consider as it updates its 2011 tribal consultation policy and subsequent guidance documents to assist program and regional offices with implementing the policy.

**Recommendations and responses:** There were no recommendations for OCSPP or OITA.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	OIG Report: The EPA’s January 2021 PFBS Toxicity Assessment Did Not Uphold the Agency’s Commitments to Scientific Integrity and Information Quality
<b>Link to Report</b>	<a href="#">The EPA’s January 2021 PFBS Toxicity Assessment Did Not Uphold the Agency’s Commitments to Scientific Integrity and Information Quality</a>
<b>Completion Date</b>	March 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General conducted this evaluation to determine whether the EPA followed applicable policies and procedures to develop and publish the January 19, 2021 perfluorobutane sulfonic acid toxicity assessment. Two weeks after publication, the EPA removed the toxicity assessment from its website, citing political interference and Scientific Integrity Policy violations. The EPA republished the toxicity assessment in April 2021.

**Focus of the report:** The EPA’s Scientific Integrity Policy, established in 2012, states that science is the backbone of the EPA’s decision-making and that the Agency depends on the integrity of its science to protect human health and the environment. All EPA employees—including scientists, managers, and political appointees—must follow the Scientific Integrity Policy.

**Overview of main results/findings:** The OIG concluded that EPA did not follow the typical intra-agency review and clearance process during the development and publication of the January 2021 perfluorobutane sulfonic acid, or PFBS, toxicity assessment. During final clearance, a political appointee directed that a last-minute review be conducted of the uncertainty factors used to calculate toxicity values, resulting in a scientific disagreement that caused delay, confusion, and significant changes to the near-final, peer-reviewed work product. These changes included replacing single toxicity values with unprecedented toxicity ranges. Users of the PFBS toxicity assessment— for example, regulated entities cleaning up PFBS contamination—could have selected a less stringent value within this range, which may have been less costly but also less protective of human health. While EPA staff expressed scientific integrity concerns about the last-minute review and risks to public health, the EPA lacked policies and procedures to address these concerns. Without updates to policies and procedures, the Agency cannot fulfill its commitment to scientific integrity and information quality.

**Recommendations and responses:** The OIG made a total of five recommendations in this report, none of which were for OCSPP:

- Three to the assistant administrator for Research and Development to reduce procedural confusion and strengthen existing policies, procedures, and guidance by clarifying if and when comments expressing scientific disagreement can be expressed; making clear if and when toxicity ranges are acceptable; and using the OIG as a resource for high-profile scientific integrity concerns that relate to political interference or that assert risk to human health or the environment.
- One to the assistant administrator for Mission Support to update policies and procedures on environmental information quality to require additional quality assurance reviews for EPA products.
- One to the deputy administrator to strengthen the EPA’s culture of scientific integrity, transparency, and accountability of political leadership actions when changes occur as a result of policy decisions.

The EPA disagreed with all five recommendations, which remain unresolved. Dispute resolution talks continue at the most senior levels of the agency.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	OIG Report: The EPA Lacks Complete Guidance for the New Chemicals Program to Ensure Consistency and Transparency in Decisions
<b>Link to Report</b>	<a href="#"><u>The EPA Lacks Complete Guidance for the New Chemicals Program to Ensure Consistency and Transparency in Decisions</u></a>
<b>Completion Date</b>	August 2023

**Purpose and brief description:** The U.S. Environmental Protection Agency Office of Inspector General conducted this audit to determine the extent to which the EPA is using and complying with applicable records management requirements, quality assurance requirements, and employee performance standards to review and approve new chemicals under the Toxic Substances Control Act of 1976.

**Focus of the report:** The OIG conducted this audit in response to complaints submitted to the OIG Hotline in the summer of 2021 regarding the EPA's new chemicals review process. The complaints expressed concerns about recordkeeping and quality assurance activities, including potential violations of the EPA's Records Management Policy, improper quality assurance processes, and the prioritization of reviews of new chemicals over the development of standard operating procedures. The hotline complaints also expressed concerns related to employee performance standards, such as the use of the TSCA statutory deadlines to perform reviews quickly rather than for the purpose of protecting human health and the environment.

**Overview of main results/findings:** The EPA has not complied with applicable recordkeeping and quality assurance requirements when implementing the New Chemicals Program. Specifically, the New Chemicals Division, or NCD, has not finalized guidance for many of the program's activities, such as standard operating procedures for recordkeeping and conducting exposure and hazard assessments. According to the EPA's Guidance for Preparing Standard Operating Procedures (SOPs), developing and using standard operating procedures are integral parts of a successful quality system, as they provide individuals with the information to properly perform a job. They also facilitate consistency in the quality and integrity of a product or end result. In addition, prior to September 2021, the NCD's Toxic Substances Control Act recordkeeping applications did not track edits to records that were developed during the new chemicals review process, which affected transparency. The NCD also used multiple recordkeeping applications, which were not integrated and were frequently inaccessible. The EPA's Records Management Policy requires each EPA program office to create, receive, and maintain records that provide adequate and proper documentation of its activities and decisions. These deficiencies existed because the NCD lacked sufficient staff resources to conduct reviews within the statutory time frames, as well as to develop and finalize guidance. The absence of final guidance increases the risk that the New Chemicals Program does not meet its legislative intent to prevent unreasonable risk to human health and the environment. Furthermore, the EPA has the authority to collect fees to offset the costs of implementing the requirements under the Toxic Substances Control Act, but it has fallen short of collecting the amount of fees it originally projected. Finally, complaints submitted to the OIG Hotline alleged that NCD staff were pressured to focus on deadlines instead of potential risks when conducting new chemical reviews. We found no evidence that the NCD explicitly includes the Toxic Substances Control Act statutory 90-day review requirement as an employee performance standard.

**Recommendations and responses:** The OIG recommended that the Assistant Administrator for Chemical Safety and Pollution Prevention:

1. Develop and implement a plan to regularly review the New Chemicals Division's guidance documents, including standard operating procedures, to ensure that all required guidance is developed, current, signed, and finalized.
2. Develop a process to periodically assess the effectiveness of the New Chemicals Division's official recordkeeping system within the Toxic Substances Control Act Confidential Business Information systems and update the applications and systems as needed, while maintaining the use of version controls to preserve edits made to records. 23-P-0026 18
3. Develop and implement a plan to identify root causes for frequent technical issues and prioritize the creation and implementation of plans of action and milestones based on the severity of the

technical issues within the Toxic Substances Control Act Confidential Business Information systems.

4. Conduct periodic reviews of the New Chemicals Division’s workforce and workload analysis, and update as needed, to regularly balance the New Chemicals Division’s workload with the staff resources needed to execute new chemicals review work, including updating and finalizing guidance and maintaining and updating Toxic Substances Control Act Confidential Business Information systems.

EPA agrees with all four recommendations and is implementing corrective actions.

<b>Lead Office</b>	Office of Chemical Safety and Pollution Prevention
<b>Title</b>	GAO Report: EPA Chemical Reviews: Workforce Planning Gaps Contributed to Missed Deadlines
<b>Link to Report</b>	<a href="#">EPA Chemical Reviews: Workforce Planning Gaps Contributed to Missed Deadlines</a>
<b>Completion Date</b>	February 2023

**Purpose and brief description:** GAO was asked by Congress to review EPA’s implementation of its chemical review responsibilities under TSCA. In 2016, Congress amended TSCA to establish new deadlines for reviewing chemicals already in commerce, including an initial set of 10 existing chemicals. It also provided that EPA make a formal determination before new chemicals can be manufactured.

**Focus of the report:** This report evaluates the extent to which (1) EPA met selected TSCA deadlines for reviewing existing and new chemicals since June 2016, and (2) EPA engaged in workforce planning for implementing its chemical review responsibilities. GAO reviewed relevant laws, regulations, and workforce planning documents, and collected EPA data on new chemical review times and its workforce. GAO also interviewed EPA officials and representatives from industry and environmental health stakeholder organizations.

**Overview of main results/findings:** Since 2016, the Environmental Protection Agency has missed most deadlines for reviewing existing and new chemicals under the Toxic Substances Control Act, as amended. Once prioritized, existing chemicals are reviewed in two main phases —risk evaluation and risk management—and TSCA established specific deadlines for each phase. GAO found that EPA completed the first risk evaluation step (i.e., scoping) for the initial 10 existing chemical reviews on time. However, EPA missed all but one subsequent risk evaluation and risk management deadlines for these chemicals. Additionally, TSCA as amended provides that a person may only manufacture a new chemical if such person submits information to EPA and the agency makes an affirmative determination on the risk of injury to health or the environment. However, GAO found that among those pre-manufacture reviews that EPA completed from 2017 through 2022, the agency typically completed the reviews within the 90-day TSCA review period less than 10 percent of the time. EPA missed the chemical review deadlines due in part to several contributing factors and is implementing some related improvements (e.g., modernizing information systems). However, according to EPA, resource constraints, including insufficient staff capacity, remain the primary reason for missed chemical review deadlines. EPA has engaged in some initial workforce planning activities for its chemical review responsibilities, but significant workforce

planning gaps contribute to missed chemical review deadlines. For example, in March 2021, EPA conducted a skills gap assessment, which included hiring targets for mission-critical occupations. However, EPA officials told GAO the assessment no longer reflects current workforce needs, and that EPA has not created a strategic workforce plan to develop long-term strategies for recruiting, developing, and retaining staff. GAO has identified five principles with which federal agencies' strategic workforce planning efforts should align. EPA officials told GAO that while they agree that these principles are relevant and reasonable for its TSCA workforce planning efforts, they have not developed a process or timeline to fully align such efforts with these principles. Without doing so, EPA will likely continue to struggle to recruit, develop, and retain the workforce it needs to meet TSCA deadlines for completing existing and new chemical reviews.

**Recommendations and responses:** GAO recommended that EPA develop a process and timeline to fully align its workforce planning efforts for implementing its TSCA chemical review responsibilities with workforce planning principles. EPA agreed with the recommendation but indicated that insufficiency of resources is the primary factor, among others GAO noted, for missed deadlines. EPA agrees with the GAO's recommendation and is implementing corrective action.

## Office of Enforcement and Compliance Assurance

<b>Lead Office</b>	Office of Enforcement and Compliance Assurance
<b>Title</b>	OIG Report: The EPA Is Not on Track to Reach Its National Compliance Initiative Goals to Stop Aftermarket Defeat Devices and Tampered Vehicles
<b>Link to Report</b>	<a href="#">The EPA Is Not on Track to Reach Its National Compliance Initiative Goals to Stop Aftermarket Defeat Devices and Tampered Vehicles</a>
<b>Completion Date</b>	January 2023

**Purpose and approach:** The U.S. Environmental Protection Agency's Office of Inspector General initiated this evaluation to determine the:

- EPA's progress toward achieving the goals and measures in the EPA's fiscal years 2020–2023 National Compliance Initiative, or NCI, titled Stopping Aftermarket Defeat Devices for Vehicles and Engines.
- Extent to which existing measures track and promote the achievement of the NCI's goals.

**Focus of the report:** This report assessed: (1) the effectiveness of EPA's progress toward achieving the goals and measures in the EPA's fiscal years 2020–2023 National Compliance Initiative (NCI), *Stopping Aftermarket Defeat Devices for Vehicles and Engines*; and (2) the extent to which existing measures track and promote the achievement of the NCI's goals.



### Overview of main results/findings:

- The Office of Enforcement and Compliance Assurance, or OECA, is not on track to achieve ten (25 percent) of the 40 measures and deliverables in its National Compliance Initiative, or NCI, strategic plan.
- EPA has not met some of the measures and deliverables because OECA and the regions inconsistently interpreted the strategic plan's requirements.

### Recommendations and responses:

1. Develop guidance for the regions that outlines how to interpret, track, and report metrics and that defines vague terms used in the EPA's Stopping Aftermarket Defeat Devices for Vehicles and Engines National Compliance Initiative strategic plan. *EPA agrees with the recommendation and has implemented corrective action.*
2. Update the EPA's Stopping Aftermarket Defeat Devices for Vehicles and Engines National Compliance Initiative strategic plan so that the National Compliance Initiative goals can be achieved in the event of a pandemic or other challenge. *EPA agrees with the recommendation and is implementing corrective action.*
3. In collaboration with EPA regions, revise and reissue the strategic plan for the Stopping Aftermarket Defeat Devices for Vehicles and Engines National Compliance Initiative. In addition, ensure the strategic plan includes quantifiable deliverables that are linked to known compliance-rate baselines that promote the success of the initiative, as well as a mechanism to acquire and implement post-training feedback from regions and states. *EPA agrees with the recommendation and is implementing corrective action.*
4. Work with the Office of General Counsel to provide training for headquarters and regional enforcement staff and to release enforcement data, as appropriate and consistent with applicable legal requirements, that states can use to target and deter the installation and use of aftermarket defeat devices within their jurisdictions. *EPA agrees with the recommendation and is implementing corrective action.*
5. Use the OIG's state questionnaire results, as well as feedback from regions and states, to identify and implement a strategy to overcome barriers and incentivize voluntary complementary work by the states to stop aftermarket defeat devices and tampering. *EPA agrees with the recommendation and is implementing corrective action.*

<b>Lead Office</b>	Office of Enforcement and Compliance Assurance
<b>Title</b>	OIG Report: The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers
<b>Link to Report</b>	<a href="#">The EPA's Residential Wood Heater Program Does Not Provide Reasonable Assurance that Heaters Are Properly Tested and Certified Before Reaching Consumers</a>
<b>Completion Date</b>	February 2023

**Purpose and approach:** The U.S. Environmental Protection Agency Office of Inspector General initiated this evaluation to determine whether the EPA effectively uses its oversight and enforcement authority to ensure that all residential wood heaters reaching consumers are properly tested and certified in accordance with established standards.

**Focus of the report:** The report assessed the effectiveness of the EPA's wood heater program by examining three key program areas: certification tests, the EPA's review of applications for certificates of compliance, and compliance monitoring.

**Overview of main results/findings:**

- The EPA's residential wood heater program does not provide reasonable assurance that wood heaters are properly tested and certified before reaching consumers.
- EPA lacks internal controls to ensure that certification test reports are valid and that certification tests are conducted appropriately.

**Recommendations and responses:**

1. Develop internal controls for the residential wood heater program to improve the certification process and oversight, including but not limited to:
  - a. Issuing a standardized certification test report template. *EPA agrees with the recommendation and has implemented corrective action.*
  - b. Developing policies and procedures that detail how to conduct in-depth reviews of certification test reports. *EPA agrees with the recommendation and is implementing corrective action.*
  - c. Periodically observing certification testing. *EPA's approach to this recommendation is still under consideration.*
  - d. Developing and implementing guidance for conducting systematic compliance audit tests. *EPA agrees with the recommendation and is implementing corrective action.*
2. In consultation with the Office of Air and Radiation, define roles and responsibilities within and between the Office of Enforcement and Compliance Assurance and the Office of Air and Radiation for the residential wood heater program, so that sufficient subject-matter expertise and resources are leveraged to ensure that certification test reports are

substantively reviewed. *EPA agrees with the recommendation and is implementing corrective action.*

3. Develop and implement a plan to demonstrate whether residential wood heaters certified using the test methods based on ASTM E3053 comply with the New Source Performance Standards for residential wood heaters. *EPA agrees with the recommendation and has implemented corrective action.*

<b>Lead Office</b>	Office of Enforcement and Compliance Assurance
<b>Title</b>	OIG Report: The EPA Should Enhance Oversight to Ensure that All Refineries Comply with the Benzene Fenceline Monitoring Regulations
<b>Link to Report</b>	<a href="#">The EPA Should Enhance Oversight to Ensure that All Refineries Comply with the Benzene Fenceline Monitoring Regulations</a>
<b>Completion Date</b>	September 2023

**Purpose and approach:** The U.S. Environmental Protection Agency Office of Inspector General initiated this audit to determine to what extent oversight of the benzene fenceline monitoring requirements by the EPA and delegated authorities ensures that refineries take corrective action and lower benzene concentrations, as required, when they exceed the action level.

**Focus of the report:** This report assessed the extent to which oversight of the benzene fenceline monitoring requirements by the EPA and delegated authorities ensures that refineries take corrective action and lower benzene concentrations, as required, when they exceed the action level.

**Overview of main results/findings:**

- Oversight by the EPA and delegated authorities has not ensured that all refineries that exceed the action level reduce their benzene concentrations at their fencelines.
- Identified barriers that could prevent the EPA and delegated authorities from determining whether refineries exceed the action level.

**Recommendations and responses:**

1. Provide guidance to delegated authorities on what constitutes a violation of the benzene fenceline monitoring regulations to assist the delegated authorities in taking action when a violation may have occurred. *EPA agrees with the recommendation and is implementing corrective action.*
2. Develop an internal strategy to address refineries that fail to reduce their benzene concentrations to 9 micrograms per cubic meter or below after initially exceeding the action level. The strategy should include best practices for: *(EPA agrees with the recommendation and is implementing corrective action.)*

- a. Monitoring benzene concentrations to determine whether a refinery has exceeded the action level and continues to exceed 9 micrograms per cubic meter in subsequent two-week sampling periods.
  - b. Verifying that the refinery submits an appropriate corrective action plan that addresses the root cause and actions.
  - c. Taking action at refineries that fail to undertake root cause analyses or implement appropriate corrective actions—such as Clean Air Act section 114 information requests, inspections, and enforcement actions—to reduce benzene concentrations to 9 micrograms per cubic meter.
  - d. Coordinating between the Office of Enforcement and Compliance Assurance, the EPA regions, and the delegated authorities.
3. Provide guidance to the EPA regions to periodically review all reported benzene monitoring data to identify any gaps in data for refineries. *EPA agrees with the recommendation and is implementing corrective action.*
  4. In consultation with applicable EPA regions and delegated authorities, investigate OIG-identified benzene monitoring data gaps and ensure submission of missing data if the data are available. *EPA agrees with the recommendation and is implementing corrective action.*
  5. Provide guidance in the form of best practices to the EPA regions for investigating missing benzene monitoring data, securing the submission of the data if the data are available, and evaluating enforcement options. *EPA agrees with the recommendation and is implementing corrective action.*

## Office of Environmental Justice and External Civil Rights

<b>Lead Office</b>	Office of Environmental Justice and External Civil Rights
<b>Title</b>	OIG Report: The EPA Needs to Further Refine and Implement Guidance to Address Cumulative Impacts and Disproportionate Health Effects Across Environmental Programs
<b>Link to Report</b>	<a href="#">The EPA Needs to Further Refine and Implement Guidance to Address Cumulative Impacts and Disproportionate Health Effects Across Environmental Programs</a>
<b>Completion Date</b>	August 2023

**Purpose and approach:** The U.S. Environmental Protection Agency Office of Inspector General initiated this audit to determine what actions the EPA has taken—in accordance with its mission, its program goals, and applicable executive orders—to identify and address any disproportionate health effects to disadvantaged communities located on or near the 35th Avenue Superfund site in Birmingham, Alabama.

**Focus of the report:** Without policies, guidance, and performance measures, EPA programs may not be addressing cumulative impacts and disproportionate health effects on overburdened communities. Such policies, guidance, and performance measures are critical to advancing the EPA’s environmental justice and equity goals.

**Overview of main results/findings:**

- The EPA Is Required to Achieve Environmental Justice and Address Cumulative Impacts and Disproportionate Health Effects
- Region 4 Considered Cumulative Impacts Primarily Within Individual Programs Rather than Across Programs
- The EPA Lacks Policies, Guidance, and Performance Measures Related to Cross-Program Cumulative Impacts or Disproportionate Health Effects
- Recent Agency Actions Address Cumulative Impacts but Do Not Explicitly Address How the EPA Will Work Across Different Programs
- Not Identifying Cumulative Impacts Across Programs Limits the EPA’s Ability to Determine Disproportionate Health Effects

**Recommendations and responses:**

1. Develop and implement policies and guidance consistent with Executive Orders 12898, 13985, and 14008 to increase and improve coordination between EPA programs to assess and address cumulative impacts and disproportionate health effects in Agency decision-making, programs, policies, and activities.

*EPA agrees with the recommendation and is implementing corrective action.*

2. Develop and implement performance measures to monitor progress in identifying and addressing cumulative impacts and disproportionate health effects across EPA programs.

*EPA agrees with the recommendation and is implementing corrective action.*

- For each recommendation that you list, please include one of the following responses, in line with any public responses you have issued:
  1. EPA’s approach to this recommendation is still under consideration.
  2. EPA agrees with the recommendation and is implementing corrective action.
  3. EPA agrees with the recommendation and has implemented corrective action.
  4. EPA does not agree with this recommendation and will not take any action.

## Office of Land and Emergency Management

<b>Lead Office</b>	Office of Land and Emergency Management
<b>Title</b>	OLEM Population Analysis
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	July 2023

**Purpose and brief description:** This is a descriptive study. The purpose is to conduct an annual analysis to support evidence-based descriptions of who benefits from EPA’s cleanup and prevention work. This analysis is done by collecting data on the population living within three miles and within one mile of a Superfund site, Brownfields site, Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) facility, Leaking Underground Storage Tank (LUST) site, and/or Underground Storage Tank (UST) facility. Many of these sites and facilities exist in thousands of communities across the United States ranging from remote to large urban settings and are located in economically distressed communities. This analysis also contributes to the EPA’s *America’s Children and the Environment Report*, by estimating an indicator that is included in the report on the number of children and their socioeconomic/ demographic characteristics who live within one mile of a RCRA CA or Superfund site that may not have had all human health protective measures in place at the time of the analysis.

**Question(s) that were addressed:** Who benefits from EPA’s cleanup and prevention work related to Superfund sites, Brownfields sites, Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) facility, Leaking Underground Storage Tank (LUST) sites, and Underground Storage Tank (UST) facilities?

**Conclusions and/or (interim) findings:** To help describe who benefits from our cleanup work, EPA collected data on the population living within three and one mile(s) of these sites. Using census data, EPA found that approximately 207 million people live within three miles of a Superfund remedial site, RCRA Corrective Action facility, or Brownfields site, roughly 63 percent of the U.S. population, including 63 percent of all children in the U.S. under the age of five. While there is no single way to characterize communities located near our sites and facilities, this population is more minority, low income, linguistically isolated, and less likely to have a high school education than the U.S. population as a whole. As a result, these communities may have fewer resources with which to address concerns about their health and environment. OLEM also works with states, territories, tribes and industry to protect the environment and human health from potential releases at Underground Storage Tank (UST) facilities. The greatest potential threat from a leaking UST is contamination of groundwater, the source of drinking water for nearly half of all Americans. Approximately 94 percent of the US population lives within 3 miles of an active UST facility, and 74 percent of the US population lives within 3 miles of an open LUST release.

**Use of the conclusions and/or (interim) findings:** Results are included in EPA’s annual budget reviews with OMB, and in budget justifications for Congress. Results also are used in general communications with press, other government agencies, and the public. Results are also compared with previous years to identify whether there are any emerging or changes in trends from year-to-year. Results also indicate

populations sub-groups that are disproportionately located near to our sites, which may indicate a need for intervention.

**Link to findings:** <https://www.epa.gov/aboutepa/office-land-and-emergency-management-program-benefits#Programs>

<b>Lead Office</b>	Office of Land and Emergency Management
<b>Title</b>	High Resolution Site Characterization at Petroleum Underground Storage Tank Release Sites – Applicability, Benefits, and Costs
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	February 2023

**Purpose and brief description:** The primary goals of this study were to quantify the costs and benefits of High Resolution Site Characterization (HRSC) investigations and their impacts on overall project costs and time at petroleum UST release sites that have been identified by the “implementing agency” as requiring further investigation to assess risk and the need for further cleanup, and identify situations where HRSC is likely to provide a benefit in site characterization compared to the use of only traditional investigation techniques.

**Question(s) that were addressed:** There are approximately 536,000 underground storage tanks (USTs) nationwide and approximately 58,000 releases that are currently in cleanup. Uncertainty and inadequate site characterization are believed to be factors in sites cleanups not being completed in a timely fashion. The study assessed (1) whether HRSC is a way of providing information that can lead to site cleanups being completed more promptly and; (2) identifying in what situations have states and practitioners found HRSC to improve site corrective actions, timeliness, and costs.

**Conclusions and/or (interim) findings:** The study found a general consensus among the interviewees that HRSC could lead to cleanups at LUST sites being completed more quickly and at lower cost because HRSC provides more detailed information about a site relative to traditional investigation techniques, which allows for more efficiency and certainty in site characterization and remediation. There was consensus among the experts that HRSC can provide time and cost savings because accurate site characterization will result in a more efficient site remediation strategy. In evaluating three specific LUST scenarios, a Delphi panel predicted average cost savings of 19 percent at catastrophic release sites, 15 percent at sites where remediation is stalled, and 0 to 24 percent cost savings at typical release sites compared to total corrective action costs if HRSC was not used in the initial site investigation. In addition, the Delphi panel reported that HRSC could save an average of 3 to 8 years to reach case closure compared to a site using only traditional investigation techniques across the same three release scenarios.

**Use of the conclusions and/or (interim) findings:** EPA OUST has reached out to EPA regional offices and states to provide the information in the study. EPA wrote an article for LUSTline (read by federal and state regulators as well as industry) outlining the findings of the study and encouraging the expanded use

of HRSC at LUST sites. EPA OUST is developing guidance on the design, use and interpretation of HRSC at Indian country LUST sites for use by EPA regional project managers and other interested parties.

**Link to findings:** Provide a web link to primary report or findings (if applicable). [High Resolution Site Characterization at Petroleum Underground Storage Tank Release Sites – Applicability, Benefits, and Costs. IEC April 2023](#)

<b>Lead Office</b>	Office of Land and Emergency Management
<b>Title</b>	FY 2023 Redevelopment Economics at Federal Facilities
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Estimated Completion Date</b>	January 2024

**Purpose and brief description:** Cleaning up contaminated sites at federal facilities can serve as a catalyst for economic growth and community revitalization. The Superfund Federal Facilities Program facilitates the redevelopment of federal facility sites across the country by assisting other federal agencies (OFAs) expedite activities related to CERCLA response actions, while protecting human health and the environment. Collaborative efforts among OFAs; developers; and state, local, and tribal partners encourage restoration of sites. Since federal facility Superfund sites often encompass thousands of acres with buildings, roads, and other infrastructure, their effective and efficient cleanup and reuse can play a pivotal role in a community's economic growth. EPA has initiated efforts to collect economic data at a subset of federal facility Superfund sites.

**Question(s) that were addressed:** The analysis will provide current, reliable business-related information for a subset of federal facility Superfund sites in reuse and continued use. Some innovative business owners and organizations reuse Superfund sites for a variety of purposes. These uses can help economically revitalize communities near Superfund sites. FFRRO has initiated efforts to collect economic data at a subset of federal facility Superfund sites.

- What information can EPA provide about Federal Facility Superfund sites in reuse and continued use, including examples of innovative and successful reuses?
- How does the remediation and reuse of Federal Facility Superfund sites economically impact communities?

**Conclusions and/or (interim) findings:** The FY 2023 Federal Facilities Superfund Economic Analysis is an update and expansion of research efforts in 2016, and 2018-2022. These efforts provide current, reliable business-related information for a subset of federal facility Superfund sites in reuse and continued use. EPA highlights a subset of successful Federal Facility Superfund sites in reuse to serve as a model for other redevelopment successes.

The successful reuse of Federal Facility Superfund sites requires a team of stakeholders, including OFAs; developers; reuse authorities; state, tribal and local partners; and communities, to implement locally



driven reuse strategies that benefit the community and protect the environment. Because Federal Facility Superfund sites often encompass hundreds of acres with buildings, roads and other infrastructure, their effective and efficient cleanup and reuse can play a pivotal role in a community's identity and economic development.

**Use of the conclusions and/or (interim) findings:** The summary of the results will be shared on [Redevelopment Economics at Federal Facilities](#) website. In addition, economic data are included in budget justifications to Congress and are used in general communication with other Federal agencies and the public.

**Link to findings:** The summary of the results will be shared on [Redevelopment Economics at Federal Facilities](#) website. In addition, economic data are included in budget justifications to Congress and are used in general communication with other Federal agencies and the public.

<b>Lead Office</b>	Office of Land and Emergency Management / Office of Resource Conservation and Recovery (ORCR)
<b>Title</b>	Analyses of Economic Benefits at RCRA Corrective Action Facilities, After Cleanup
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	September 2023

**Purpose and brief description:** Cleaning up contaminated sites serves as a catalyst for economic growth and community revitalization and can help to preserve existing business operations. For several years the Resource Conservation and Recovery Act (RCRA) Corrective Action Program has conducted annual updates of a study to document evidence of its benefits. Last updated with data from 2022, the current RCRA economic benefits study provides information on currently active businesses now operating at former RCRA Corrective Action (CA) facilities that are now in reuse or continued use after cleanup and remediation. Economic impacts associated with facilities in reuse highlight how cleanup performed under RCRA CA can set the stage for a wide range of new development. These developments can often attract new businesses and bolster local economies. In some cases, reuse priorities are incorporated into the remedial design process, resulting in cleanups that directly facilitate future reuse. Such facilities can serve as models of what is possible when EPA and RCRA-authorized states, other state and local entities, and facility stakeholders work together to address cleanup and consider reuse priorities early in the cleanup process. This study additionally reveals how cleanup performed under RCRA CA can also facilitate safe, continued operations of long-standing facility businesses, while also protecting human health and the environment through remediation.

**Question(s) that were addressed:** The ongoing analysis of economic benefits provides current, reliable business-related information for a subset of RCRA Corrective Action Facilities now in reuse or continued use after they have been cleaned up. The study helps to highlight the significant economic benefits that can occur when such facilities are remediated. The analyses furthermore help the RCRA cleanup program characterize the many types of redevelopments that can occur at RCRA Corrective Action facilities. To leverage these economic findings, the program is also producing facility case study profiles that showcase

the cleanup and current uses occurring at a given facility, so that they can serve as examples of what may be replicable at other RCRA cleanups.

**Conclusions and/or (interim) findings:** EPA’s analyses of 126 RCRA cleanups revealed that these cleaned up facilities support 1,242 on-site businesses, which provide economic benefits including: \$45.7 billion in annual sales revenue; over 112,728 jobs; and \$10.8 billion in estimated annual employment income. Additionally, the RCRA program also sought to further assess potential environmental justice (EJ) disparities at the facilities included in this study. These analyses revealed that approximately 25% of the 126 study facilities are located within communities with potential EJ concerns. This means that with these facilities now having been cleaned up, a significant number of businesses are operating at these same locations, helping to generate thousands of jobs and millions of dollars in annual income for these communities. Such findings reveal the breadth of environmental and economic benefits made possible as a result of the RCRA Cleanup program. Moreover, we find that a considerable proportion of these benefits are accruing to potentially disadvantaged communities, in direct support of the environmental justice goals set forth by the Administration.

**Use of the conclusions and/or (interim) findings:** Economic data are included in budget justifications to Congress and are used in general communication with key stakeholders and the public. The most recent results were released in an EPA Press Release, and a new webpage was launched to make these findings and associated facility case studies broadly available to the public (See link below).

**Link to findings:** <https://www.epa.gov/hw/redevelopment-economics-rcra-corrective-action-facilities#method>

*[Please note: This link connects to last year’s Economic Benefits Summary Report, which is in the process of being updated to instead include the latest updated analyses and results as described above.]*

<b>Lead Office</b>	Office of Land and Emergency Management / Office of Resource Conservation and Recovery (ORCR)
<b>Title</b>	Hazardous Waste and Home: An Analysis of Treatment and Disposal Sites in the U.S.
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	June 2023

**Purpose and brief description:** The paper, “Hazardous Waste and Home Values: An Analysis of Treatment and Disposal Sites in the U.S.” was published in the Journal of the Association of Environmental Resource Economists on June 1, 2023.

**Question(s) that were addressed:** Investigate the impacts of hazardous waste discovery/investigation, cleanup, and corrective action completion (managed under Resource Conservation and Recovery Act (RCRA)) on the average welfare of housing prices nation-wide.

**Conclusions and/or (interim) findings:**

- On average and all else equal, homes within 250 meters of a Treatment Storage Disposal Facility (TSDF) are eight percent lower in value; though the association diminishes with distance, home prices are significantly deflated at least four and a half kilometers away from the TSDF.
- Cleanup activities impact home prices within 750 meters of the TSDF, with home prices potentially deteriorating further once a cleanup is initiated (mixed support for this conclusion) and home prices rebounding with an average appreciation of five to seven percent once cleanup is completed.
- Extrapolating results to all single-family homes within 750 meters of a TSDF that has experienced cleanup since the RCRA Corrective Action program began indicates that the program has increased housing stock value by \$323 million.

**Use of the conclusions and/or (interim) findings:** The findings in the paper may be used in internal and external presentation when discussing the impact of the RCRA program. There may be other evidence-based research that builds on these findings.

**Link to findings:** <https://www.journals.uchicago.edu/doi/abs/10.1086/726157?journalCode=jaere>

<b>Lead Office</b>	Office of Land and Emergency Management
<b>Title</b>	Redevelopment Economics at Remedial Sites (non-federal facility)
<b>Link to EPA Strategic Plan</b>	Goal 6: Safeguard and Revitalize Communities Objective 6.1: Clean Up and Restore Land for Productive Uses and Healthy Communities
<b>Completion Date</b>	February 2023

**Purpose and brief description:** Cleaning up contaminated sites can serve as a catalyst for economic growth and community revitalization. The Superfund Remedial Program protects human health and the environment while facilitating the redevelopment of sites across the country. Collaborative efforts among state, local, and tribal partners, redevelopers and other federal agency programs encourage restoration of sites. Since Superfund sites often encompass buildings, roads, and other infrastructure, their effective and efficient cleanup and reuse can play a pivotal role in a community's economic growth. EPA has initiated efforts to collect economic data at a subset of Superfund sites. The analysis will provide current, reliable business-related information for a subset of Superfund sites in reuse and continued use. These uses can help economically revitalize communities near Superfund sites.

**Question(s) that were addressed:** What are the economic outcomes associated with reuse of non-federal Superfund remedial sites?

**Conclusions and/or (interim) findings:** The Superfund Redevelopment Program ensures EPA and its partners have the tools to return Superfund sites to productive use. EPA has collected data showing that at 671 non-federal facility sites that are in reuse, 10,253 businesses are generating \$74.1 billion in sales revenue and employ 236,802 people who earned a combined income of \$18.6 billion. The 2022 annual

sales total of \$74.1 billion generated by businesses operating at these sites is nearly 4 times the \$18.9 billion (inflation adjusted) the EPA has spent cumulatively at these sites. Over the last 12 years (2011-2022) these businesses' ongoing operations generated at least \$590 billion (inflation adjusted) in sales, which is more than 31 times the \$18.9 billion (inflation adjusted) the EPA has spent cumulatively at these sites.

**Use of the conclusions and/or (interim) findings:** Economic data are included in budget justifications to Congress and are used in general communication, including the annual Superfund Accomplishments Reports, with key stakeholders, state and local governments, external partners, and the public. Community development organizations, local government, developers etc. can use this data to illustrate potential returns from Superfund site reuse. Internally, EPA considers these findings to be a key data point and results are also compared with previous years to identify whether there are any emerging or changes in trends from year-to-year.

**Link to findings:** <https://www.epa.gov/superfund-redevelopment/redevelopment-economics-superfund-sites>

## Office of Mission Support

<b>Lead Office</b>	Office of Mission Support
<b>Title</b>	Diversity, Equity, Inclusivity, Accessibility Plan Implementation
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 3: Advancing EPA's organizational Excellence and Workforce Equity
<b>Estimated Completion Date</b>	September 2026

**Purpose and brief description:** In line with President Biden's Executive Order 14035 on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce, EPA established and is actively implementing the actions identified in the Diversity, Equity, Inclusion, and Accessibility (DEIA) Plan (<https://work.epa.gov/deia/diversity-equity-inclusion-and-accessibility-strategic-plan>).

**Question(s) that were addressed:** EPA has until September 2026 to address the below questions that this activity will address.

- Are Agency recruitment, hiring, promotion, retention, professional development, performance evaluations, pay and compensation policies, reasonable accommodations access, and training policies and practices equitable?
- What is the status and effects of existing diversity, equity, inclusion, and accessibility initiatives or programs?
- What are the number and nature of institutional resources available to support human resources activities?

**Conclusions and/or (interim) findings:** In FY2023, EPA conclusions and findings (including interim findings): EPA established the EPA’s Office Inclusive Excellence to lead the agency’s DEIA efforts. The Office of Inclusive Excellence, in line with the Government-wide DEIA Strategic Plan and the DEIA Maturity Model, will be headed by a senior executive and has been properly allocated FTE and resources to lead and coordinate DEIA efforts across the agency. The DEIA Data Catalog was also completed in FY 2023. All DEIA-related reports currently available are documented in the Data Catalog to promote greater transparency and awareness. The following items are included in the Data Catalog as DEIA Data Points: race, ethnicity/national origin, disability, gender, and veteran status. In addition to the name of the report, the catalog details the following information: Data Provider, Collection System, Reporting System, Visualization System and Point of Contact.

- The Data Catalog identifies the following data being available to all employees: Diversity Dashboard, Employee Viewpoint Survey Results, and the MD-715 Report. Supervisors have access to the Workforce Demographic Dashboard. The Applicant flow data and the Workforce Profile Dashboard data are granted strictly to positions on a need to know basis.

**Use of the conclusions and/or (interim) findings:** EPA will use the results of the above concluded activities to determine whether and to what extent agency practices result in inequitable employment outcomes, and whether agency actions may help to overcome systemic societal and organizational barriers and intends to address those gaps in 2024

**Link to findings:** Not applicable. Once all findings are available, OMS will make them available to the public, which is in line with [EPA’s Policy on Evaluations and Other Evidence-Building Activities](#), or explain while they will not be made publicly available.

<b>Lead Office</b>	Office of Mission Support
<b>Title</b>	Facility Climate Resiliency Assessments
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 3: Advancing EPA’s organizational Excellence and Workforce Equity
<b>Completion Date</b>	September 2023

**Purpose and brief description:** Climate resiliency has been an integral component of EPA’s site planning and facility support for more than a decade. As a part of the FY 2022 - 2026 Strategic Plan, EPA’s Office of Mission Support commits to identifying, assessing, and addressing vulnerabilities and future risks in facilities through conducting in-depth climate resiliency assessments at all 18 owned laboratories. The assessments characterize each facility’s likelihood of exposure to climate and natural hazards and the potential magnitude of consequences to the Agency’s assets, workforce, operational functions, and the internal and external systems relied upon at the site. The team uses information from national, state, and local datasets and site-specific documentation, such as facility master plans and past safety, health and environmental management audits, and fleet electrification assessments, as well as individual interviews with facilities teams and other key staff from all divisions at the site to characterize EPA’s risk. Improving the Agency’s understanding, preparation and mitigation to climate change impacts protects EPA’s assets, workforce, and mission continuity.

**Question(s) that were addressed:** List all policy, science/research, regulatory, programmatic and/or operational questions the activity is intended to address.

1. Which hazards have affected your facility, workforce, and/or the delivery of utilities, goods, and/or services upon which your facility relies?
2. For each hazard, were there consequences to your facility's 1) ability to continue executing its mission (including key research); 2) physical assets; 3) receipt of critical utilities, goods, services or access to the facilities?
3. If relevant, does your facility have temporary measures to prevent or protect against flooding (e.g., barricades, flood gates)? Has your facility taken other measures against flood risk such as waterproofing or raising sensitive components or base elevation of critical facilities?
4. What are the local codes/requirements/guidelines that your facility adheres to during the renovation and construction of facilities to mitigate risk associated with natural hazards (e.g., high winds, flooding, wildfires)?
5. Does your facility use its own warning/evacuation alarm for natural hazards (e.g., tornadoes, tsunamis)?
6. Does your facility have any unique features in place to protect against [hazard] damage?
7. Are you aware of your local jurisdiction's hazard mitigation plan and whether your facility's surrounding community has any local hazard mitigation groups that meet to prepare for current and future hazards?
8. Has your facility implemented any other hazard risk reduction projects, policies, or programs to reduce damage, disruption, and/or loss from current and future hazards and future projected conditions as hazards grow more frequent and intense?
9. Which buildings and facilities are critical for field or laboratory research? What are the functions of these buildings and facilities and why are they important?
10. What are the hours of operation for the work? Is there someone on the staff at all hours? Are the hours regular? Does the research require access to the site, lab, or field on a daily or weekly basis?
11. How sensitive is your work to disruption? To access? To communications and internet? To power? To water? Other? Can it withstand disruption of one day? Of one week? Briefly describe the consequences of disruption on your laboratory or field research/work.
12. What do you consider to be the most sensitive assets that your research and work rely on? Where are they located? Why do you consider them sensitive?

Additional questions expand upon the extent to which facilities have made improvement or changes to mitigate hazard-specific vulnerabilities (ex. Tsunamis, wildfires, earthquakes, etc.)

**Conclusions and/or (interim) findings:** The outcome of each of climate resilience assessment at EPA's laboratories is a report with project recommendations. The recommendations range from updating planning procedures to capital improvement projects to help ensure the facility's resilience against the most likely and consequential risks associated with future climate hazards. To date, the assessments have

produced over 70 different resiliency recommendations, with the most common being a feasibility and planning studies, and retrofits and new capital improvement projects. In support of the OMS implementation plan, EPA also developed a facility hazard exposure map in 2023 to holistically display the baseline risk and likelihood of exposure to 15 different hazards across EPA’s regional offices and owned laboratories.

**Use of the conclusions and/or (interim) findings:** Once a report is finalized, a workgroup is comprised of Office of Real Property, Safety, and Security (ORPSS) leadership and representatives from the site and associated programs or regions, meets to vote and prioritize the project recommendations using a schema that ORPSS developed to weigh a variety of factors. The project recommendation schema is a tool the assessment uses that allows EPA staff on site and in OMS to collectively examine the recommended projects from the assessments against the specific asset’s likelihood of exposure, vulnerability, and magnitude consequences to the asset’s physical structure, workforce, operations, and other internal and external connections, as well as, technical feasibility, availability, and cost, to determine if any projects are a very-high priority to OMS. Projects that the workgroup decides are very high priority are then shared with EPA’s Office of Resources and Business Operations (ORBO) to determine the funding pathway and timeline.

In 2023, OMS awarded its first high priority project resulting from the resiliency assessment, a feasibility study at EPA’s Gulf Breeze Laboratory campus to improve the resilience of the main Causeway that allows access to and from site. The assessments have also prompted a conversation within the Agency to begin examining the more complex challenges posed by climate change and how they may impact long-term feasibility of some laboratories in their current locations, given their exposure to many hazards or those with severe consequences.

**Link to findings:**

In response to Executive Order 14008, OMS will conduct climate resilience assessments at EPA’s 18 owned laboratory locations by the end of 2026. Once all assessments are complete, OMS will make them available to the public on its [Climate Resiliency website](#). This is in line with EPA’s Policy on Evaluations and Other Evidence -Building Activities and an explanation of why they will not be made publicly available.

<b>Lead Office</b>	Office of Mission Support
<b>Title</b>	Implementing Multifactor Authentication and Encryption
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 3: Advancing EPA’s organizational Excellence and Workforce Equity
<b>Estimated Completion Date</b>	September 2024

**Purpose and brief description:** Executive Order 14028 – Improving the Nation’s Cybersecurity mandates that Agencies implement a Zero Trust Architecture in accordance with the National Institute of Standards and Technology (NIST) standards and guidance and requires the implementation a Multifactor Authentication (MFA) for Federal Information Systems Modernization Act (FISMA) Systems. The Agency has identified the implementation of MFA as a Long-Term Performance Goal for the FY 2022-2026 EPA

Strategic Plan. This activity standardizes information collection regarding MFA for all FISMA systems into the Agency’s Governance Risk and Compliance (GRC) Information Security management system, and provides visibility into compliance for internal IT security stakeholders.

**Question(s) that were addressed:**

- What FISMA systems currently have implemented MFA?
- What FISMA systems that do not currently have MFA, require MFA to be implemented?

**Conclusions and/or (interim) findings:** As of FY2023, 79 percent of the 118 FISMA systems are in compliance with MFA standards set forth by NIST.

**Use of the conclusions and/or (interim) findings:** By providing visibility to internal stakeholders, data collection efforts are driving compliance and assisting with FISMA reporting requirements by providing visibility to internal stakeholders.

**Link to findings:** This is privileged information pertaining to EPA system security and will not be made available to the public. Information and any findings also will be shared with appropriate EPA staff and management.

## Office of Research and Development

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Assessing End User Satisfaction of ORD’s Research Products
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 1: Ensure Scientific Integrity and Science-Based Decision Making
<b>Completion Date</b>	August 2023

**Purpose and approach:** To measure ORD’s progress on its Long-Term Performance Goal of the percentage of research products that meet partner’s needs, ORD distributed 279 surveys to research product users in EPA Program Offices, Regions, other federal and non-federal partners to solicit feedback on the products. This survey seeks to gather input from partners to address any potential quality, usability, and/or timeliness issues that may have been experienced with ORD product use and delivery. The activity is meant to be a catalyst to identify and improve operational inefficiencies during research product development and provide data to further the continuous improvement of ORD research.

**Question(s) that were addressed:** This survey gathers input from partners to answer three key questions: What is the quality, usability, and timeliness of ORD research products?

**Conclusions and/or (interim) findings:** ORD found that 96 percent of ORD’s research products assessed in FY 2022 had met partner needs. This finding indicates that ORD’s research is of high quality, usable, and timely.



**Use of the conclusions and/or (interim) findings:** The survey data collected provided important insights into ORD’s contributions to its partners’ missions and the data was used to support research planning and engagement activities. The data collected will inform staff-level and management discussions with ORD’s partners ranging from technical improvements to the quality, usability, and timeliness of ORD’s research products to broader improvements to ORD’s relationship with its product user base. This measure has also provided an additional mechanism for managers to ensure that peer review and clearance processes are strictly adhered to for each product prior to its delivery. The results from this survey have highlighted the need for consistent engagement with ORD partners throughout the product life cycle and the importance of communicating products to the partner once it has been delivered.

**Link to findings:** Results are published in the Annual Performance Report

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Biofuels and the Environment: Third Report to Congress (RtC3) External Review Draft (ERD)
<b>Link to EPA Strategic Plan</b>	Goal 1: Tackle the Climate Crisis Cross Agency Strategy 1: Ensure Scientific Integrity and Science Based Decision Making
<b>Completion Date</b>	January 2023

**Purpose and approach:** This report helps EPA understand the unintended consequences of the updated Renewable Fuel Standard (RFS2) program, including effects on land, air, and water resources. This deliverable is a statutorily required report that EPA must deliver to the U.S. Congress every three years under Section 204 of the Energy Independence and Security Act of 2007 (EISA). It is intended to report on the impacts to date and likely future impacts of the RFS Program on environmental issues, resource conservation, invasive or noxious plants, and imported fuels and environmental impacts.

**Question(s) that were addressed:** This activity increased ORD’s understanding of the unintended consequences of the updated Renewable Fuel Standard (RFS2) program. The RtC3 included more than 70 scientists from across four federal agencies (EPA, USDA, DOE, USGS). Overall, the RtC3 included a literature review and new analyses. The literature review used the HERO database to compile all 13,603 peer-reviewed journal articles that cited any article in the RtC2. These were screened with SWIFT Active Screener for relevance and sent to Chapter Teams (1,555 papers). Those papers were then the foundation of the literature review of the RtC3. The new analyses included (1) three studies on attribution, (2) two studies on the effects of land use change on the environment, and (3) collaboration with the National Renewable Energy Lab (NREL) to assess the lifecycle effects from soybean biodiesel.

**Conclusions and/or (interim) findings:** The RFS Program itself played a relatively minor role in the increase in corn ethanol in the United States from 2002 through 2012 but played a more significant role for corn ethanol more recently and for other biofuels throughout the RFS2. As the effect of the RFS Program on domestic corn ethanol production and consumption and associated land use changes for each year evaluated varies through time and includes zero each year, estimates of environmental effects also vary through time and include zero each year. This holds for most endpoints examined, with small but negative potential effects nationally on air quality, soil quality, water quality, habitat for threatened

and endangered (T&E) species, and other effects. Local effect may be larger in some areas for some effects, but this could not be quantified for the RtC3. Though adoption is improving, additional conservation measures—such as further adoption of conservation tillage and cover crops—would help reduce the impacts of biofuels generally and the RFS Program specifically on the environment.

**Use of the conclusions and/or (interim) findings:** The Biofuels RtC3 will be used by Congress and EPA to better understand the impacts to date of the RFS Program in order to improve the administration of the Program. Congress requested the research, but other portions of EPA also use and contribute to the research, especially the Office of Transportation and Air Quality (OTAQ) and Regions 5 and 7. In addition, the report will inform several other activities, including the 4<sup>th</sup> Report to Congress on Biofuels and the Environment (Biofuels RtC4) and associated research efforts (ACE 409.7), and the OTAQ Biological Evaluation (BE) of impacts to threatened and endangered species.

**Link to findings:** The RtC3 website is here (<https://cfpub.epa.gov/ncea/biofuels/recordisplay.cfm?deid=353055>). This includes all the FR Notices, Downloads, and other communications material. The team has also given dozens of presentations/briefings which are not listed here.

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Other Test Method 52 (OTM-52) Method for Determination of Combustion Efficiency from Enclosed Combustion Devices Located at Oil and Gas Facilities
<b>Link to EPA Strategic Plan</b>	Goal 1: Tackle the Climate Crisis Cross Agency Strategy 1: Ensure Scientific Integrity and Science Based Decision Making
<b>Completion Date</b>	March 2023

**Purpose and approach:** Oil and natural gas liquid condensate storage tanks can emit methane and volatile organic compounds, including hazardous air pollutants such as benzene. Regulations require storage tank emissions to be controlled and this has resulted in installation of hundreds of Enclosed Combustor Devices (ECDs) at well pad facilities in Wyoming and other oil and gas producing states. Because of the ubiquitous nature of ECDs, and the difficulty and cost associated with in-field stack testing, certain regulations allow the ECD manufacturers to demonstrate emission control performance under ideal conditions prior to field installation. Currently, there is little information on how ECDs perform in real-world field conditions with variable tank vapor flowrates, stream compositions, and process configurations. In collaboration with Wyoming Department of Environmental Quality (WYDEQ), ORD and Region 8 developed a Next Generation Emission Measurement (NGEM) approach for cost-efficient in-field ECD field performance testing. In cooperation with three Wyoming oil and gas operators, the NGEM approach was tested in comparison to reference methods on working well pads in a 10-day intensive field campaign. The goals of the study were to improve understanding of ECD operating performance and process variables and assess the feasibility of the new measurement approach for in-field determination of ECD combustion efficiency.

**Question(s) that were addressed:** This research area, under EPA’s Air, Climate and Energy research program (ACE), supported planned activities in the FY 2019-2022 Strategic Research Action Plan (StRAP)

and under Region 8 RARE project, advanced methods for in-field determination of enclosed combustion device (ECD) combustion efficiency. The current regulatorily required measurement method for the determination of enclosed combustion device (ECD) control efficiencies is both costly and complex to implement. This method for in-field determination of ECD combustion efficiency was developed for review by Office of Air Quality Planning and Standards/Air Quality Assessment Division/Measurement Technology Group, and posted on EPA's Air Emission Measurement center website (link below) as an Other Test Method (OTM). These methods may be considered for use in federally enforceable state and local programs [e.g., Title V permits, State Implementation Plans (SIP)] provided they are subject to an EPA Regional SIP approval process or permit veto opportunity and public notice with the opportunity for comment. This research area answered the following question: can we develop and demonstrate a lower cost, easier to use, and more accurate approach for in-field determination of ECD combustions efficiency?

**Conclusions and/or (interim) findings:** This lower cost "outlet only" test method can be flexibly applied to achieve testing objectives ranging from quick operational checks to higher accuracy assessments with effective performance levels comparable to existing reference methods.

**Use of the conclusions and/or (interim) findings:** This method for in-field determination of ECD combustion efficiency has been posted on EPA's Air Emission Measurement center website as an OTM. The OTM may additionally support state and EPA regulatory, compliance, and emission inventory/reporting activities in the future. Overall, the results of this EPA and WYDEQ collaboration will be broadly transferable and will help reduce the environmental impacts of oil and gas production in the U.S. and internationally.

**Link to findings:** Link to main EPA's Emission Measurement Center (EMC) Other Test Methods page: <https://www.epa.gov/emc/emc-other-test-methods#Other%20Test%20Methods>; Stovern, M., J. Beck, and E. Thoma. OTM-52: Method Determination of Combustion Efficiency from Enclosed Combustors Located at Oil and Gas Production Facilities. US Environmental Protection Agency, Cincinnati, OH, USA, 2023. [https://www.epa.gov/system/files/documents/2023-09/otm-52\\_method-for-determination-of-combustion-efficiency-from-enclosed-combustors\\_clean\\_8\\_31\\_2023-004.pdf](https://www.epa.gov/system/files/documents/2023-09/otm-52_method-for-determination-of-combustion-efficiency-from-enclosed-combustors_clean_8_31_2023-004.pdf)

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Methods to evaluate environmental benefits and consequences of changing energy systems
<b>Link to EPA Strategic Plan</b>	Goal 1: Tackle the Climate Crisis, Cross Agency Strategy 1: Ensure Scientific Integrity and Science Based Decision Making
<b>Completion Date</b>	August 2023

**Purpose and approach:** EPA's Office of Research and Development (ORD) has been building tools for helping state and municipal decision makers meet air, quality, and climate objectives: [GLIMPSE](#) and [COMET](#). GLIMPSE is a decision support tool being developed at EPA to assist EPA program offices, states, researchers and others with long-term environmental and energy planning. City-based Optimization Model for Energy Technologies (COMET) is an energy-environment-economic optimization model designed to capture the whole energy system at the city level. EPA/ORD also utilized its national level energy system modeling tool, The Integrated MARKAL-EFOM System (TIMES) model with regional

coverage of the United States (EPAUS9rT), for analysis for industrial sector decarbonization and as part of a modeling comparison study of Net Zero CO2 emissions pathways for North America.

**Question(s) that were addressed:**

- What are viable pathways for decarbonizing steel production?
- What are potential pathways to achieve Net Zero CO2 emissions?
- How can user needs for related tools be met?

**Conclusions and/or (interim) findings:**

- For the industrial sector work, this research identified viable pathways for decarbonizing steel production. It also underscored that a range of scenarios need to be explored to gather insights on which pathways are techno-economically feasible, while also minimizing the air pollution exposure impacts on local communities.
- The Net Zero work highlighted energy transition pathways to achieve Net Zero CO2 emissions. Browning et. al (2023) showed broad agreement in energy system trends that included deep decarbonization of the power sector, as well as increased end-use electrification of buildings and transportation, and to a lesser extent, industry.
- In addition, a goal of this work was to develop tools for supporting national, state and municipal decision makers to enable them to evaluate the effectiveness of climate policies. To that end, advancements were made in providing more publicly available tools and resources for users and potential users of GLIMPSE and COMET.

**Use of the conclusions and/or (interim) findings:** The energy system models method presented here are designed to aid evaluation of Green House Gas mitigation strategies and understand the GHG and air pollution emissions implications of decarbonization pathways.

- The US Global Change Research Program’s 5th National Climate Assessment (NCA5), which provides the latest climate science to help decision makers understand and use climate information and inform climate responses like mitigation, is incorporating findings and scenarios from the EMF37 study.
- EPA held a highly attended public webinar on August 15, 2023, which described how COMET and GLIMPSE can be used to support state and municipal planning in evaluation of their plans for decarbonization and reaching net zero.
- The Agency also updated the GLIMPSE website to include a detailed users guide. EPA also included GLIMPSE as one of the multi-sector analysis tools for quantifying energy savings and greenhouse gas (GHG) reductions as part of the Inflation Reduction Act’s Climate Pollution Reduction Act (CPRG).

**Link to findings:**

- Browning, M., J. McFarland, J. Bistline, G. Boyd, M. Muratori, M. Binstead, C. Harris, T. Mai, G. Blanford, J. Edmonds, A. Fawcett, O. Kaplan, and J. Weyant. Net-zero CO2 by 2050 scenarios for

the United States in the Energy Modeling Forum 37 study. Energy and Climate Change, 4: 100104, (2023). <https://doi.org/10.1016/j.egycc.2023.100104>

- External Webinar: Tools for Helping State and Municipal Decision-Makers Meet Air Quality, Climate, and Energy Objectives: GLIMPSE and COMET <https://www.epa.gov/air-research/tools-helping-state-and-municipal-decision-makers-meet-air-quality-climate-and-energy>
- Link to the GLIMPSE as a resource for the CPRG: <https://www.epa.gov/inflation-reduction-act/quantifying-energy-savings-and-greenhouse-gas-ghg-reductions>

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Community health effects of hurricane-related flooding
<b>Link to EPA Strategic Plan</b>	Goal 1: Tackle the Climate Crisis Goal 6: Safeguard and Revitalize Communities Cross Agency Strategy 1: Ensure Scientific Integrity and Science Based Decision Making Cross Agency Strategy 4: Strengthen Tribal, State, and Local Partnerships and Enhance Engagement
<b>Completion Date</b>	September 2023

**Purpose and approach:** Hurricanes are increasing in frequency and intensity. These storms can cause damages that may last for years. This product aimed to better understand assets, and vulnerabilities affected by hurricanes and hurricane-related flooding. We also focused on mold as a specific flooding outcome and tested for mold in homes and evaluated effectiveness of mold cleaning in areas that experienced hurricane-related flooding. This research was conducted in three communities that experienced severe hurricane-related flooding: Robeson County, North Carolina, Houston, Texas, and Piñones, Puerto Rico. This research area increased ORD’s understanding of the overall community impacts and mold impacts in homes.

**Question(s) that were addressed:**

- The Robeson County, North Carolina community was impacted by flooding from Hurricanes Matthew (2016) and Florence (2018). Because of the COVID-19 pandemic, this study focused on how COVID-19 impacted relationship building and the research processes through autoethnographic narratives written by EPA researchers and community liaisons.
- In Houston, Texas, we evaluated the moldiness of homes that have been sanitized after Hurricane Harvey (2017). We used a 48-hour air sample at various time points and conducted qPCR to quantify the Environmental Relative Moldiness Index (ERMI). This helps to understand the effectiveness of mold sanitation.
- In Piñones, Puerto Rico, we evaluated fungal levels in households from dust samples collected between 2018-2019, after Hurricane Maria (2017). Molds were quantified using qPCR and Shannon Diversity Index for fungal populations. Homes were in five separate regions and had different levels of reported water damage during Hurricane Maria. These methods help us

understand the quantity and diversity of mold growth in homes in the years following major hurricanes.

**Conclusions and/or (interim) findings:** From our study in Robeson County, we learned through the autoethnographic narratives how important it was to be flexible and adaptable in the research process. This led to a more authentic, respectful study design. In Houston, we established that mold sanitation takes time, with samples taken more than 25 days after sanitation having less moldiness compared to those taken sooner after sanitation. In Piñones, we found that homes with greater reported water damage had more mold, and those with significant remediation actions showed reduced mold levels after remediation.

**Use of the conclusions and/or (interim) findings:** These results can help inform researchers who intend to do community-engaged research, as well as informing disaster recovery agencies and plans for mold accumulation and sanitation procedures after hurricane-related flooding. This product addresses to community resiliency as it relates to recovery after hurricane-related flooding; additionally, it addresses the challenges that climate change presents, particularly because hurricanes are expected to increase in frequency and intensity due to climate change.

**Link to findings:**

- Vesper S, Libuit KG, Esguerra N, Cross A. Assessment of mold contamination in hurricane-damaged homes in Houston, Texas after sanitization by volunteers. *Annals of Civil and Environmental Engineering*. 2022; 6: 003-007. <https://www.civilenvironjournal.com/articles/acee-aid1033.pdf>
- Bolaños-Rosero B, Cavallín-Calanche HE, Hernández-González X, Godoy F, Vesper S. Impact of Hurricane Maria on mold levels in the homes of Piñones, Puerto Rico. *Air Quality, Atmosphere, and Health*. 2023.16:661–668. <https://doi.org/10.1007/s11869-022-01297-7>

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Protecting Coastal Communities and Contaminated Sites with Resilient Coastal Wetlands
<b>Link to EPA Strategic Plan</b>	Goal 1: Tackle the Climate Crisis Goal 6: Safeguard and Revitalize Communities Cross Agency Strategy 1: Ensure Scientific Integrity and Science Based Decision Making Cross Agency Strategy 4: Strengthen Tribal, State, and Local Partnerships and Enhance Engagement
<b>Completion Date</b>	September 2023

**Purpose and approach:** States and their constituent coastal communities recognize that wetlands are a critical environmental component of community resilience because of the beneficial ecosystem services they provide. One such service—the ability to protect adjacent upland areas and contaminated sites by mitigating the impacts of storms and floods—is of growing interest and importance to communities facing extreme events of greater frequency and intensity, especially where human-made buffers are too

costly or less desirable for ecological or social reasons. Other ecosystem services, such as water purification, provision of fish and wildlife habitat, and carbon sequestration, are also of great value to community and regional stakeholders. In the context of the Clean Water Act, the SHC program is committed to helping communities build resilience to optimize health and well-being outcomes through development of tools, methods, and frameworks to support healthy and resilient ecological and human communities. The goal of the Resilient Coastal Wetlands and Communities Workshop was to synthesize and share knowledge and lessons learned from across regions, organizations, and communities that are engaged in research, management, and planning for coastal resilience.

**Question(s) that were addressed:** The Resilient Coastal Wetlands and Communities Workshop (24-25 May 2022) brought together U.S. Environmental Protection Agency researchers along with a host of other partners and stakeholders virtually, for a cross-organizational and cross-regional exploration of three scientific themes: characterizing and measuring wetlands resilience; adapting management to support wetlands resilience; and linking wetlands resilience to the health and resilience of coastal communities, including those that are overburdened and underserved. The workshop focused on EPA and other partner efforts in the Northeast and mid-Atlantic regions, but the tools, approaches, and lessons learned are relevant nationally. This Workshop Proceedings presents the results of the workshop presentations and interactive audience discussions. The aim was to generate and share new information and opportunities that will further advance our collective understanding of how to protect and boost the resilience of our coastal wetlands, and the communities that depend on them.

**Conclusions and/or (interim) findings:** This Proceedings synthesizes the results of research presentations and collaborative discussions and explores emerging insights and opportunities to further advance our ability to achieve resilient coastal wetlands and communities. Results are presented in two main sections. The first is a cross-organizational and cross-regional examination of three scientific themes: 1) defining and measuring wetlands resilience; 2) adapting management to support wetlands resilience; and 3) linking wetlands resilience to community resilience. The second main section presents a synthesis of the workshop community's evaluation of where we stand in the areas of: 1) existing strengths, 2) challenges and gaps for improvement, and 3) emerging principles. An example of an identified existing strength is translating scientific information using tools and approaches that help practitioners identify, gather, and summarize data in a manner that facilitates management decision making at several levels.

**Use of the conclusions and/or (interim) findings:** With these Proceedings, the ideas gleaned from the workshop community will be used to collectively drive continued improvements in effective implementation of strategies to achieve resilient and sustainable coastal wetlands that in turn support healthy and thriving coastal communities. Thus, these research results are of interest to all resource managers, practitioners, decision makers, conservationists, restoration specialists, consultants and community members interested in coastal wetland resilience and sustainability, community resilience, and climate change adaptation. This Product (Proceedings) has been published online and widely disseminated to all partners, collaborators, and workshop participants. [Note: This product was one of five StRAP3 products ORD identified for focused state engagement and was tracked by IOAA for delivery to the states because of its utility to state/local agencies.]

**Link to findings:** Workshop web page (contains all workshop materials, links to publications, and presentation slide decks): <https://resilience-workshop.tetrattech.com/>

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	SHC Research Area (RA) 5: Chemicals of Immediate Concern
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	August & September 2023

**Purpose and approach:**

- House dust, soil, and drinking water are important sources of residential lead (Pb) exposure, a metal contaminant that can lead to dire health consequences, especially in children younger than 5 years old. To better understand Pb levels in United States (US) homes, the American Healthy Homes Survey (AHHS) I and II were conducted (2005-2006 and 2018-2019, respectively) through collaboration between EPA and the Department of Housing and Urban Development (HUD). While the AHHS I and II were designed to monitor changes in the prevalence of Pb-based paint in homes, the studies also included sampling of house dust and soils from residences where children reside. In the present study, AHHS II advances previous research findings by addressing gaps in the scientific knowledgebase related to potential exposure pathways including analysis of drinking water samples for Pb contamination, exploring connections between a home’s exterior and Pb-levels in interior household dust, and developing advanced methodologies for collecting and analyzing samples across a range of media for the presence and speciation of Pb.
- There is strong scientific evidence for multiple pathways of human exposure to lead (Pb) in residential settings, particularly for young children; however, less is known about maternal exposure during pregnancy and children’s exposure during early lifestages. The current analysis supports the federal government’s commitment (via the Federal Pb Action Plan) to advancing scientific understanding of Pb exposures and their relationship to blood lead levels (BLL), particularly in an understudied population.

**Question(s) that were addressed:**

- How is drinking water in US homes associated with exposure risk to Pb, As, and Cu?
- How are United States house dust Pb concentrations associated with soil, paint, and house age?
- How do lead speciation, bioaccessibility, and sources for contaminated house dust and soils compare in similar United States residences?
- What is the relationship between residential house dust and maternal exposure to lead during pregnancy?

**Conclusions and/or (interim) findings:**

- 18 of 678 (2.6%) of samples analyzed exceeded 5 µg Pb L<sup>-1</sup> (Mean = 1.0 µg L<sup>-1</sup>). 1.5% of samples exceeded 10 µg As L<sup>-1</sup> (Mean = 1.7 µg L<sup>-1</sup>) and 1,300 µg Cu L<sup>-1</sup> (Mean = 125 µg L<sup>-1</sup>). Private well samples were more likely to exceed metal(loid) concentration thresholds than public water



samples. Pb concentrations were correlated with Cu and Zn, indicative of brass as a common Pb source for the samples evaluated.

- mean and median vacuum dust Pb concentrations were 124  $\mu\text{g Pb-1}$  and 34  $\mu\text{g Pb g-1}$ , respectively. Vacuum-collected dust concentrations and surface dust wipe Pb loading rates were significantly correlated within homes ( $\alpha < .001$ ;  $r \geq 0.4$ ). At least one wipe sample exceeded current house dust Pb loading health standards (10  $\mu\text{g ft-2}$  or 100  $\mu\text{g Pb ft-2}$  for floors and 40 windowsills, respectively) in homes (22%). House dust Pb was strongly correlated with mean soil Pb ( $r = 0.64$ ) and Pb-based paint ( $r = 0.57$ ). Soil Pb and paint Pb were also correlated ( $r = 0.6$ ).
- House dust Pb as chemically unique compared to exterior soils, although paint Pb is expected to be a major source for both. Interior house dust and exterior soil Pb were shown to consist of unique Pb phases, resulting in species-driven changes in Pb exposure.
- Demographic (e.g., race/ethnicity, income, education, marital status) and housing characteristics (e.g., year home built, paint condition, own or rent home, attached garage) were associated with both maternal blood and surface wipe concentrations during pregnancy.

#### **Use of the conclusions and/or (interim) findings:**

Collectively, this body of research is expected to inform strategic decision-making among public health practitioners working to reduce Pb exposure, governmental and regulatory partners developing guidance and setting thresholds for action, and the broader scientific community that is focused on reducing adverse outcomes associated with Pb exposure. Specifically, public health practitioners may use this body of research to investigate, identify, and mitigate sources of lead exposure in homes, regulators may use these findings in developing guidance on lead concentrations in residential soil, and these findings are relevant to the broader research community by providing advanced data collection and analysis methods in public health lead-related research.

#### **Link to findings:**

- American Healthy Homes Survey II Lead Findings FINAL REPORT. U.S. Department of Housing and Urban Development Office of Lead Hazard Control and Healthy Homes. October 29, 2021. [https://www.hud.gov/sites/dfiles/HH/documents/AHHS II Lead Findings Report Final 29oct21.pdf](https://www.hud.gov/sites/dfiles/HH/documents/AHHS%20II%20Lead%20Findings%20Report%20Final%2029oct21.pdf)
- Karen Bradham, Clay Nelson, Tyler Sowers, Darren Lytle, Jennifer Tully, Michael Schock, Kevin Li, Matthew Blackmon, Kasey Kovalcik, David Cox, Gary Dewalt, Warren Friedman, Eugene Pinzer, Peter Ashley. A national survey of lead and other metal(loids) in residential drinking water in the United States. *Journal of Exposure Science & Environmental Epidemiology* 33, pages 160–167 (2023). <https://doi.org/10.1038/s41370-022-00461-6>
- Tyler Sowers, Clay Nelson, Matthew Blackmon, Kevin Li, Marissa Jerden, Alicia Kirby, Kasey Kovalcik, David Cox, Gary Dewalt, Warren Friedman, Eugene Pinzer, Peter Ashley, Karen Bradham. United States house dust Pb concentrations are influenced by soil, paint, and house age: Insights from a national survey. In journal review: *Journal of Exposure Science and Epidemiology*.
- Tyler Sowers, Matthew Blackmon, Richard Wilkin, Matt Rovero, Sharon Bone, Marissa Jerden, Clay Nelson, Karen Bradham. Comparing lead speciation, bioaccessibility, and sources for

contaminated house dust and soils collected from similar United States residences. In journal review Environmental Science and Technology.

- Tyler Sowers, Clay Nelson, Gary Diamond, Matthew Blackmon, Marissa Jerden, Alicia Kirby, Matthew Noerpel, Kirk Scheckel, David Thomas, Karen Bradham. High Lead Bioavailability of Indoor Dust Contaminated with Paint Lead Species. Environ. Sci. Technol. 2021, 55, 402–411. <https://dx.doi.org/10.1021/acs.est.0c06908?ref=pdf>

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	SHC Research Area (RA) 9: Benefits from Remediation, Restoration, and Revitalization
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	March 2023

**Purpose and approach:** Brownfields are sites whose current or past use impedes their utilization by the community. Many of these sites contain dangerous contaminants that can impact the health of community members, and even those that do not contain contaminants may be barriers to efficient use of the community ecosystem. Thus, the remediation and eventual restoration of brownfields is a key driver of health and wellness within communities and is one of the rare environmental actions that has the potential to not just remove an environmental hazard but to put in place a salutogenic feature that actively enhances community health and wellbeing. Before such actions can be taken there must be sufficient knowledge of the health hazards posed by brownfields as well as the potential benefits of the remediation and restoration of brownfields. Within this product we examine multiple aspects of the hazards presented by brownfields as well as the benefits of their remediation using a variety of research approaches including toxicology, epidemiology, case studies, and systematic reviews.

**Question(s) that were addressed:**

- What are the health hazards posed by brownfields?
- What are the potential benefits of remediation and restoration of brownfields?

**Conclusions and/or (interim) findings:**

- These studies paint a picture of how exposure to brownfields impacts serum metal concentrations which in turn accelerate the aging process. It also highlights the cumulative impacts faced by individuals as socioeconomic disadvantage may also lead to alterations in epigenetics leading to increased mortality risk. Additionally, other built environmental features such as locating primary residences near major roadways and overall building quality may increase exposure to, and thus serum concentrations of, the same metals associated with accelerated aging. This product also added information on the impacts of brownfields on birth outcomes of pre-term birth and low birth weight. Residing within one mile of a brownfield was associated with increased risks of pre-term birth and low birth weight. Importantly, this study also examined features of the brownfields

that might be particularly strongly associated with these outcomes and found that pre-term birth was particularly associated with residence near brownfields containing metals (arsenic, cadmium, lead, mercury), benzene, and aromatic hydrocarbons.

**Use of the conclusions and/or (interim) findings:**

- Findings may be used to inform strategic decision-making about the role of greenspace in brownfield remediation. Importantly, work within this product showed that greenspace is associated with lower risks of birth defects in a national study. Tetralogy of Fallot, cleft lip, and transverse limb deficiency were just a few of the birth defects observed less frequently in areas with more abundant greenspace even after adjusting for factors such as maternal race, age at delivery, season of conception, folic acid intake, smoking, alcohol usage, and employment, highlighting the robustness of these results. Combined with the previous associations, this suggests that greenspace may be a beneficial factor, whereas brownfields degrade the health of communities, presenting evidence in favor of the continued remediation of brownfields from a health benefits perspective.

**Link to findings:**

- Slawsky, Erik D., et al. "Beneficial Use Impairments, Degradation of Aesthetics, and Human Health: A Review." *International Journal of Environmental Research and Public Health* 19.10 (2022): 6090.
- Slawsky, Erik D., et al. "A cross-sectional study of brownfields and birth defects." *Birth Defects Research* 114.5-6 (2022): 197-207.
- Lodge, Evans K., et al. "The effect of residential proximity to brownfields, highways, and heavy traffic on serum metal levels in the Detroit Neighborhood Health Study." *Environmental Advances* 9 (2022): 100278.
- Lodge, Evans K., et al. "Objectively measured external building quality, Census housing vacancies and age, and serum metals in an adult cohort in Detroit, Michigan." *Journal of Exposure Science & Environmental Epidemiology* (2022): 1-10.
- Lodge, Evans K., et al. "Serum lead, mercury, manganese, and copper and DNA methylation age among adults in Detroit, Michigan." *Environmental Epigenetics* 8.1 (2022): dvac018.
- Keeler, Corinna, et al. "Is residential proximity to polluted sites during pregnancy associated with preterm birth or low birth weight? Results from an integrated exposure database in North Carolina (2003–2015)." *Journal of Exposure Science & Environmental Epidemiology* (2022): 1-8.
- Weber, Kari A., et al. "Assessing associations between residential proximity to greenspace and birth defects in the National Birth Defects Prevention Study." *Environmental research* 216 (2023): 114760.
- Ward-Caviness, Cavin K., et al. "Epigenetic predictors of all-cause mortality are associated with objective measures of neighborhood disadvantage in an urban population." *Clinical Epigenetics* 12 (2020): 1-10.,

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	SHC Research Area (RA) 10: Community-Driven Solutions
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	March-September 2023

**Purpose and approach:** This Research Area addresses the cumulative impacts and risks from contamination, climate (e.g., natural disasters and extreme events), and other stressors on the environment and the health of vulnerable groups, such as children, the elderly, and pregnant women. To support overburdened and underserved communities with EJ concerns, SHC identified critical information to improve local planning; community, state, and federal permitting; and rulemaking and enforcement. This research area focuses on improving environmental equity, benefits, and resilience for both individuals and communities from the adverse effects of climate change and exposure to both chemical and non-chemical stressors from the built, natural, and social environments.

**Question(s) that were addressed:**

- How are childhood neighborhood-level SES characteristics and environmental factors associated with adult socioeconomic outcomes?
- What health benefits are associated with redevelopment and revitalization activities?
- What are cumulative detrimental health impacts associated with urban blight and lack of access to health-promoting amenities?
- What is the relationship between cumulative exposure to non-chemical stressors during pregnancy and early life and adverse effects on growth, development and disease susceptibility of offspring at childhood and later life stages?
- What is the relationship between community capacity and application of EPA scientific tools and resources related to wildfire smoke and public health?
- What is the state of the science related to social vulnerability to hazards and disasters?
- How is EPA’s Equitable Resilience Builder used by communities to increase equity in community resilience planning?

**Conclusions and/or (interim) findings:**

- The k-means clustering of US census tracts based on income, incarceration, employment, and residence variables from the Opportunity Atlas yielded seven distinct clusters at the national level, and between five and nine clusters for each of the EPA regions. The national-level clusters were distributed somewhat regionally with the highest opportunity clusters occurring in the Northern Midwest and Northeastern US, and the lowest opportunity clusters occurring in rural areas of the Southwest and Southeast US. For clusterings within each EPA region, clusters were spatially distributed more heterogeneously, although it appears that clusters of high opportunity were almost always present in larger metropolitan areas.

In the meta-regression of opportunity and environmental factors, most of the examined environmental factors had some predictive ability. Some were consistently associated with worse opportunity census tracts, e.g., lead paint indicator, food deserts, proximity to certain pollutant sources, and overall environmental quality. By contrast, some factors were largely associated with better opportunity census tracts, notably greenness index, as well as several of the hazard indices related to hazardous air pollutants, and PM2.5 whose positive associations with better opportunity is hypothesized to result from an underlying association with economic activity. There was variety across the regions in environmental factors that showed predictive value and in the magnitude of associations for the same environmental factors.

- The results demonstrate that greener residential environment is associated with reduced allostatic load and inflammation indices after adjusting for socio-demographic, behavioral and environmental co-variables. There was a strong interaction effect of residential greenness and time spent outdoors on allostatic load and inflammation: spending more time outdoors only produced significant beneficial effects in those study participants who resided in greener environments. Other important results included findings that insomnia was associated with increased allostatic load and inflammation, and that daily screen time of more than 2 hours was associated with increased allostatic load. These findings are building upon our pilot study under StRAP2 (FY16-19) which was the first study to link residential greenness to a reduced allostatic load. This new research involved a comprehensive set of biomarkers as well as detailed assessment behavioral factors. These results are novel.

Additionally, this research demonstrated a potential pathway linking greener residential environments to improved health. We demonstrated that greener settings were associated with more diverse ambient air microbiome, which previous research linked to improve immune system functioning. These findings are novel. Further research under StRAP4 will include assessing an association between ambient air microbiome and human microbiome, and between human microbiome and allostatic load to fully characterize the pathway to health which involves beneficial exposure to diverse environmental antigens and microbes.

- Overall, the pollutant-induced adverse developmental effects were exacerbated by the various maternal conditions (obesity, stress, nutritional imbalance), although the impacts on some of the biomarkers were subtle and sex-specific. Physical exercise and certain dietary supplements appeared to have mitigative influences on maternal obesity and ozone exposure. Specifically, results from our studies indicated an age-related pattern in pulmonary effects of O3 exposures, with adolescent and young adult animals being more susceptible to altered respiratory function, and induction of lung cell inflammation and injury.
- In these communities some dimensions of community capacity appeared more important than others for creating an effective local smoke team. Specifically, when bringing a diverse group of community members together to collaborate on developing a public health response, subject matter expertise was less important than the presence of existing strong interorganizational relationships. One reason for this is because relationships are what motivated individuals to join the team and level of knowledge could be increased through educational sessions during team meetings.

- The literature review summary is available as an EPA report, *Equitable Resilience to Flooding: A resource for practitioners on understanding economic, health, and social vulnerabilities and inequities in response and recovery*. The summary identifies specific inequities that appear in the research literature on social vulnerability to flooding that are rooted in existing economic, health, and social conditions and embedded in disaster relief and recovery policies and programs. Summarizing the literature this way highlights the structural nature of vulnerability and inequities, not as inherent to particular population groups but rather created by social systems. The case study workshops demonstrated how the Equitable Resilience Builder process and the activities worked in practice and how they could be improved, particularly in terms of how to put equity at the center. The workshops resulted in a specific set of recommendations for LGROW to include in a watershed scale resilience plan that they are developing for the Lower Grand River watershed, which touches 10 counties and 26 municipalities. As a technical assistance provider for these local governments, LGROW had already identified technical recommendations for enhancing resilience but felt that they were missing community input and recommendations on equity, which the ERB workshops provided.

#### **Use of the conclusions and/or (interim) findings:**

- This body of research explores short and long-term health outcomes from childhood social and environmental exposures, the health impacts of blighted communities and health benefits associated with redevelopment and revitalization, and real-world application of EPA-developed resources designed to support community-led action. Collectively, this research can be used to educate decision-makers about potential health outcomes associated with exposure to chemical and non-chemical stressors as well as potential benefits of specific redevelopment and revitalization efforts. The findings may be used to assist partners in deciding how to leverage different EPA tools and resources to address real problems by demonstrating the real-world application.

#### **Links to findings:**

- Sarah Zelasky, Chantel L Martin, Christopher Weaver, Lisa K Baxter, Kristen M Rappazzo. Identifying groups of children’s social mobility opportunity for public health applications using k-means clustering. Submitted to *Heliyon* 4/11/2023
- Sarah Zelasky, Anna Liles, Chantel L Martin, Christopher Weaver, Lisa K Baxter, Kristen M Rappazzo. Associations between environmental exposures and clusters of social mobility opportunity outcomes for children. Planned submission to *Population and Environment*.
- Jennifer N. Styles, Andrey I. Egorov, Shannon M. Griffin, Jo Klein, J.W. Scott, Elizabeth A. Sams, Edward Hudgens, Chris Mugford, Jill R. Stewart, Kun Lu, Ilona Jaspers, Scott P. Keely, Nichole E. Brinkman, Jason W. Arnold, Timothy J. Wade. Greater vegetated land cover and tree cover near residence are associated with increased outdoor air bacterial diversity in a metropolitan area in North Carolina. Submitted to the *Science of the Total Environment* on 03/02/2023.
- Andrey I. Egorov, Shannon M. Griffin, Jennifer N. Styles, Jason Kobylanski, Jo Klein, Lindsay Wickersham, Rebecca Ritter, Elizabeth Sams, Edward E. Hudgens, Timothy J. Wade. Time outdoors and residential tree cover are associated with reduced allostatic load. Submitted to *Environmental Pollution* on 03/27/2023.

- Impacts of a perinatal exposure to manganese coupled with maternal stress in rats: Maternal somatic measures and the postnatal growth and development of rat offspring. *Neurotoxicol Teratol.* 2022 Mar-Apr;90:107061. doi: 10.1016/j.ntt.2021.107061 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9128072/>
- Perinatal High-Fat Diet Influences Ozone-Induced Responses on Pulmonary Oxidant Status and the Molecular Control of Mitophagy in Female Rat Offspring. *Int J Mol Sci.* 2021 Jul 14;22(14):7551. doi: 10.3390/ijms22147551. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8304403/>
- Impacts of a perinatal exposure to manganese coupled with maternal stress in rats: Tests of untrained behaviors. *Neurotoxicol Teratol.* 2022 May-Jun;91:107088. doi: 10.1016/j.ntt.2022.107088. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9133146/>
- Impacts of a perinatal exposure to manganese coupled with maternal stress in rats: Learning, memory and attentional function in exposed offspring. *Neurotoxicol Teratol.* 2022 May-Jun;91:107077. doi: 10.1016/j.ntt.2022.107077. <https://pubmed.ncbi.nlm.nih.gov/35189282/>
- Acute Ozone-Induced Transcriptional Changes in Markers of Oxidative Stress and Glucocorticoid Signaling in the Rat Hippocampus and Hypothalamus are Sex-Specific. *Int J Mol Sci.* 2023 Mar 29;24(7):6404. doi: 10.3390/ijms24076404. <https://pubmed.ncbi.nlm.nih.gov/37047376/>
- Assessing environmental health disparities in vulnerable groups: Interactions between chemical stressors and social factors that impact children's health and development. EPA 600/R-23/101 [https://cfpub.epa.gov/si/si\\_public\\_file\\_download.cfm?p\\_download\\_id=546839&Lab=CPHEA](https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=546839&Lab=CPHEA)
- Garfield County Public Health Wildfire Smoke Preparedness Plan: <http://www.garfield-county.com/filesgcco/sites/16/2023-Garfield-County-public-health-wildfire-smoke-preparedness-plan.pdf>
- Butte-Silver Bow Local Smoke Response Plan: [http://www.co.silverbow.mt.us/DocumentCenter/View/29476/Butte-Silver-Bow-Local-Smoke-Response-Plan\\_Final?bidId=](http://www.co.silverbow.mt.us/DocumentCenter/View/29476/Butte-Silver-Bow-Local-Smoke-Response-Plan_Final?bidId=)
- Building Equitable Resilience. Eisenhauer, E. AND J. Finley. Building Equitable Resilience. To be Presented at National Adaptation Forum, Baltimore, MD, October 24 - 27, 2022. [https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?Lab=CPHEA&dirEntryId=357779](https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CPHEA&dirEntryId=357779)
- Equitable Resilience to Flooding: A resource for practitioners on understanding economic, health, and social vulnerabilities and inequities in response and recovery. Eisenhauer, E., and J. Finley. 2023. Equitable Resilience to Flooding. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. EPA 600/X-23/214.

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	Air, Climate, and Energy (ACE) Research Area (RA) 3: Public health and environmental responses to air pollution
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	September 2023

**Purpose and approach:** Health effects from exposures to air pollutants may be modified by co-pollutant exposures or may be experienced differently on days with different multi-pollutant profiles. Disentangling these effects aids policy evaluation and supports NAAQS review. This research investigates the interactions on health effects between the effects of single air pollutants (e.g., PM2.5) when other co-pollutants (e.g., ozone) reach set thresholds (e.g., 50% of current NAAQS) or on days with a specific multi-pollutant profile as estimated through hierarchical clustering techniques. The research assesses how pre-exposure to criteria pollutants affects subsequent responsiveness to more recent exposures in both healthy and vulnerable populations.

**Question(s) that were addressed:**

- To what extent does exposure to air pollutants over a long-term (>30 days) modify the response to short-term (hours to <30 days) exposures to air pollutants?

**Conclusions and/or (interim) findings:**

- Findings indicate long-term conditions are associated with the impact of short-term exposures.
- We observed no evidence of association between short-term PM2.5 exposure and hospitalization among the overall population. However, there was some evidence of modification with positive associations between short-term PM2.5 exposure and hospitalizations (all-cause, respiratory, and cardiovascular related) among individuals with higher long-term PM2.5 exposure; people with COPD living in areas with higher long-term PM2.5 concentrations were more likely to experience hospitalization after short-term increases in PM2.5 than those living in areas with lower long-term PM2.5 concentrations.
- During the study period, 7 coal-fired power plants (CFPPs) installed scrubbers and 7 CFPPs retired their coal units. The average concentration for reported monthly SO2 air emissions from the CFPP-scrubber group dropped from 4,933 tons pre-intervention to 342 tons post-intervention. The CFPP-retired group emitted a monthly average of 909 tons of SO2 pre-intervention compared to <1 ton post-intervention. Findings were imprecise and generally null among those living within 0- <4 miles regardless of the intervention type. The results suggest that living near CFPPs that installed scrubbers to reduce SO2 air emissions resulted in a reduction of preterm birth among residents 4- <10 miles from CFPPs compared to those living 10- <15 miles from CFPPs.



### Use of the conclusions and/or (interim) findings:

- This study may help identifying those at higher risk of poor health outcomes from spikes in short-term air pollution, and further research could inform potential need to strengthen public health recommendations for those living in areas with higher annual pollution levels.
- No research to-date has evaluated the association between residential proximity to CFPPs and preterm birth within North Carolina although the state has a long history of dependence on coal combustion for electricity and a consistently higher prevalence of preterm birth than the nation. Understanding environmental factors that contribute to adverse birth outcomes is important because preterm birth is strongly associated with infant mortality and an increased risk for later morbidities. This study adds to the growing body of literature investigating associations between living near power plants and adverse birth outcomes. Even after these efforts to reduce SO<sub>2</sub> emissions, CFPPs in North Carolina remain the dominant anthropogenic source of ambient SO<sub>2</sub>. The United States and many countries around the world are making important decisions regarding the move away from or reinvestment in coal for electricity generation, thus research that considers the climate and health impacts of living near a CFPP can inform such decisions.

### Link to findings:

- Cowan, Kristen N., Lauren H. Wyatt, Thomas J. Luben, Jason D Sacks, Cavin Ward-Caviness, and Kristen M. Rappazzo. Interaction between long-term and short-term residential exposure to PM 2.5 and the association with hospitalizations among a cohort of people with Chronic Obstructive Pulmonary Disease (COPD) in North Carolina, 2002-2015. Submitted to Environmental Health.
- Wilkie, Adrien A., David B. Richardson, Thomas J. Luben, Marc L. Serre, Courtney G. Woods, Julie Daniels. Did implementing emissions strategies to reduce SO<sub>2</sub> at 14 large coal-fired power plants in North Carolina impact the prevalence of preterm birth among nearby residents? Results from difference-in-differences study design using administrative birth records in North Carolina (2003-2015). Under review at Environmental Epidemiology.

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	ACE Research Area (RA) 7: Emerging approaches to improve air quality and exposure characterization
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	September 2023

**Purpose and approach:** Under the Clean Air Act, EPA requires the reporting of the air quality conditions through the Air Quality Index as a standard for public health guidance. Wildfire smoke can cause localized extreme degradations in air quality that may not be captured by the regulatory monitoring network. Without representative air quality information during wildfire smoke episodes, the public is limited in their understanding of their potential smoke exposure and what actions they should take to protect themselves. This research seeks to increase air quality information in areas impacted by wildfire smoke to

improve the ability of public health agencies and the wildfire incident command team to provide timely and accurate air quality information. The project takes advantage of the growing commercial market of lower-cost sensor technologies for expanding wildfire smoke monitoring options and adding to local measurements of Air Quality Index. Commercially available sensors have been evaluated in simulated smoke conditions. A major focus has been on fine particulate matter (PM2.5) and carbon monoxide (CO) sensors as these pollutants are of the greatest concern for public health near wildfires.

**Question(s) that were addressed:**

- How can commercial air quality sensors be optimized for wildfire smoke scenarios?

**Conclusions and/or (interim) findings:** We've identified and piloted several commercial technologies for measuring PM2.5 and CO in wildfire smoke and tested them in laboratory and field settings. Commercial multipollutant systems have had varied performance, with some sensors showing low precision and low accuracy specifically for measuring PM2.5. CO sensors had more uniform performance across different manufacturers, although some CO sensors exhibited a 1 – 3 day warm up period before the sensor reported accurate data. The volatile organic compound (VOC) sensors were not strongly correlated with hydrocarbon measurements in simulated wildfire smoke demonstrating that VOC sensors require continued development to be used for this application.

We have developed several variations of the vehicle add on mobile monitoring systems (VAMMS) that can measure latitude, longitude, elevation, and PM2.5 at 1-second resolution. Additional prototypes have been developed that also measure black carbon, brown carbon, and CO. We have constructed 24 VAMMS units, of these, 3 units have the extended measurements of multiple pollutants. To date, the VAMMS have been successfully used at 16 wildfires and 3 prescribed fires and provided spatially resolved PM2.5 concentrations in areas with complex terrain and weather patterns, helping to inform incident management teams on where and when smoke is most concentrated.

**Use of the conclusions and/or (interim) findings:** The results of this research are lower-cost sensor solutions for expanding smoke monitoring. This project has laid the foundation for the Wildfire SMOke Air monitoring Response Technology (WSMART) pilot project. The WSMART project provides short-term loans of the sensor technologies developed in this project to the Interagency Wildland Fire Air Quality Response Program and public health agencies impacted by wildfire smoke. Additionally, the information gained in this project has provided a base level of knowledge on how lower-cost sensors perform for wildfire smoke. This information is being used by tribal, local, and state air quality agencies that are impacted by wildfire smoke, and who have been granted the means to expand their monitoring networks through the American Rescue Plan Enhanced Air Quality Monitoring for Communities - Competitive Grant. This research has also spurred sensor manufacturers to focus on CO sensor technology to better align their commercial offerings for monitoring for wildfire smoke air quality impacts.

**Link to findings:**

- <https://www.epa.gov/sciencematters/epa-scientist-serves-air-resource-advisor-mckinney-fire-modeling-smoke-and-air>
- <https://www.epa.gov/sciencematters/epa-research-improves-air-quality-information-public-airnow-fire-and-smoke-map>

- <https://www.epa.gov/sciencematters/epa-expands-air-monitoring-capabilities-support-wildfire-impacted-states-tribes-and>
- <https://www.epa.gov/sciencematters/multi-faceted-epa-research-addressing-threats-public-health-wildfire-smoke>
- <https://www.epa.gov/sciencematters/evaluating-low-cost-air-sensor-performance-near-wildfires>

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	ACE Research Area (RA) 8: Novel approaches to assess human health and ecosystem impacts and risks
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	September 2023

**Purpose and approach:** Recent research demonstrates that specific, sensitive populations may have an outsized environmental health risk relative to the general population. Here, we describe efforts which seek to correct this by employing novel electronic health record cohorts and other administrative data sets capable of capturing populations unlikely to participate in traditional studies. This product provides estimates of health effects of air pollutants on individuals with increased sensitivity to air pollution due to underlying clinical conditions or the sociodemographic environment in which they live - two components of air pollution sensitivity poorly captured in existing studies. This work falls within the Clean Air Act regulatory framework.

**Question(s) that were addressed:**

In what ways do air pollutants effect the health of individuals with increased sensitivity to air pollution due to underlying clinical conditions or the sociodemographic environment in which they live?

**Conclusions and/or (interim) findings:** In the research for this product, we observed differences in associations between air pollution and health outcomes in different populations.

For the Chronic Kidney Disease (CKD) analysis, we observed an association between PM2.5 and decreased eGFR (indicating poorer kidney function) but positive associations between O3 and NO2 and eGFR. We observed no association between PM2.5 or O3 and CKD diagnosis, but inverse associations between NO2 and CKD diagnosis. The associations with PM2.5 lend support to a growing body of research demonstrating deleterious impacts of PM2.5 on multiple organ systems. The results with NO2 as a pollutant of interest are not in the expected direction but provide an intriguing opportunity for further research.

We observed that gestational exposure to PM2.5 may be associated with increased prevalence of pulmonary valve atresia/stenosis, TOF, and AVSD and exposure to O3 may be associated with AVSD. Associations for pulmonary valve atresia/stenosis may be stronger for non-Hispanic Black gestational parents, and associations for TOF may be weaker for non-Hispanic Black gestational parents. This indicates racial disparities of impacts of air pollution on congenital heart defects.

Those with left ventricular hypertrophy or neutrophil to lymphocyte ratio >2.5 had stronger associations between PM2.5 and sudden death, while those living in areas with more greenspace had weaker associations. This research may help to elucidate mechanisms between PM2.5 and sudden death.

**Use of the conclusions and/or (interim) findings:** This product provides information that is of immediate need to partners (e.g., Office of Air Quality Planning Standards, (OAQPS) as they develop regulatory language, communications, outreach tools and other approaches to reduce the environmental health burden in the United States. These studies advance knowledge and reduce uncertainties around air pollutant health impacts in vulnerable populations and reflect cumulative impacts of air pollutant exposures with existing health conditions.

**Link to findings:**

- <https://ehp.niehs.nih.gov/doi/abs/10.1289/isee.2022.O-OP-056>
- <https://epiresearch.org/wp-content/uploads/2023/07/Abstract-Book-2023-Final.pdf>
- <https://ehp.niehs.nih.gov/doi/abs/10.1289/isesisee.2018.O02.03.01>
- [https://www.ahajournals.org/doi/10.1161/circ.143.suppl\\_1.P067](https://www.ahajournals.org/doi/10.1161/circ.143.suppl_1.P067)

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	ACE Research Area (RA) 9: Wildland Fires (Integrated Science Focus)
<b>Link to EPA Strategic Plan</b>	Goal 2: Take Decisive Action to Advance Environmental Justice and Civil Rights; Objective 2.1: Promote Environmental Justice Efforts at the Federal, Tribal, State, and Local Levels
<b>Completion Date</b>	September 2023

**Purpose and approach:** An increasing incidence of large-scale wildfire combined with increased use of prescribe fire in land management practices are increasing the need for effective health risk communication such that individuals can make informed decisions about when and how to manage their exposures to smoke. Understanding your audience is one of the first guidelines for public health risk communication because that understanding should be used to contextualize the information into messaging that is relevant, accessible, and actionable. Understanding how individuals seek and communicate information about smoke is important because resources for wildfire smoke health risk communication are limited. The problem is there is little knowledge about which communication platforms and channels individuals look to for reliable information. The regulatory framework the research falls under is CAA.

**Question(s) that were addressed:**

- How do individuals seek and communicate information about wildfire smoke?

**Conclusions and/or (interim) findings:**

- Nearly 70 percent of the 1275 respondents reported they looked to federal agencies like USFS, CDC, EPA, and NWS for information about smoke, 45percent of the 1275 respondents reported

seeking information from state agencies, and 32 percent of the total respondents reported they looked to local agencies. Respondents reported looking to a broad range of information sharing platforms for information on current events. Individuals reported news media (43.5 percent), alert notification systems (42.3 percent), and government websites (41.8 percent). When asked about challenges to getting information about smoke, 1190 individuals responded and the most frequently reported challenges were knowing where to find information (50.1 percent), knowing what actions based on the information to take to protect their health (31.5 percent), and who to contact for help or more information (23.4 percent).

**Use of the conclusions and/or (interim) findings:**

- These findings may be used to inform strategic decision-making about public health communication campaigns designed to reduce the public health burden of wildfire smoke.

**Link to findings:**

[www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app](http://www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app)

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	GAO Report: Small Business Research Programs: Reporting on Award Timeliness Could Be Enhanced
<b>Link to Report</b>	<a href="#">Small Business Research Programs: Reporting on Award Timeliness Could Be Enhanced</a>
<b>Completion Date</b>	March 2023

**Purpose and approach:** The GAO reviewed the eleven agencies that participate in either or both the Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) programs in FY2016 through FY 2021. According to GAO’s review, in FY 2021, the agencies awarded nearly \$3 billion to small businesses. These small businesses rely on the timely issuance of SBIR and STTR awards in order to plan, develop and commercialize new technologies. The Small Business Administration (SBA) holds an oversight role for the two programs. In this role, SBA sets timeliness standards for award notification and issuance. SBA is mandated to report annually to Congress on overall outcomes for both programs including award timeliness. The FY 2019 National Defense Authorization Act included a provision for GAO to review the timeliness of award notification and issuance. For this review, the GAO examined, among other objectives, agencies’ timeliness in award notification and issuance and trends from FY 2016 through FY 2021, and the extent to which SBA reports on agencies’ award timeliness. To conduct this review, the GAO analyzed SBIR and STTR award data, administered a questionnaire to all participating agencies, and reviewed participating agency and SBA documentation. The GAO also interviewed SBA officials and conducted follow-up interviews with officials at other agencies as needed to clarify the information provided.

**Focus of the Report:** The GAO’s review examined agencies’ notification and issuance timeliness in FY 2021 and their timeliness trends since FY 2016, agencies’ efforts to implement prior GAO recommendations to evaluate the effectiveness of past practices and implement additional practices to

improve timeliness, if needed, and the SBA’s reporting on agencies’ award notification and issuance timeliness.

**Overview of main results/findings:** The GAO found that government-wide, agencies’ timeliness rates for issuance of SBIR and STTR awards remained similar from FY 2020 to FY 2021. Additionally, the participating agencies have more consistently met the required time frames for notifying awardees than the recommended time frames for issuing awards. With the goal of ensuring the success of EPA’s SBIR Program in providing small businesses opportunities to help protect human health and the environment, EPA took several steps to improve SBIR award timeliness and consistently meet SBA award timeliness guidelines. EPA submitted its FY 2022 annual report to SBA, which includes information on the Phase I and Phase II timelines, showing that EPA made 100% of its Phase I and Phase II awards (notifications and start of the period of performance) within the timeliness requirements.

**Recommendations and responses:** This report did not include any recommendations for EPA.

<b>Lead Office</b>	Office of Research and Development
<b>Title</b>	GAO Report: Utility-Scale Energy Storage: Technologies and Challenges for an Evolving Grid
<b>Link to Report</b>	<a href="#">Utility-Scale Energy Storage: Technologies and Challenges for an Evolving Grid</a>
<b>Completion Date</b>	March 2023

**Purpose and approach:** Per the GAO’s assessment, the U.S. electricity grid connects more than 11,000 power plants with around 158 million residential, commercial, and other consumers. Energy storage technologies have the potential to enable several improvements to the current U.S. electricity grid, such as reducing costs and improving reliability. These technologies also have the potential to enable the growth of solar and wind energy generation. During their assessment, the GAO reviewed agency documents and other literature; interviewed government, industry, academic, and power company representatives; conducted site visits; and convened a virtual meeting of experts in collaboration with the National Academies of Sciences, Engineering, and Medicine. This approach resulted in GAO identifying six policy options to help address energy storage challenges.

**Focus of the report:** The GAO’s assessment examined technologies that could be used to capture energy for later use within the electricity grid, challenges that could impact energy storage technologies and their use on the grid, and policy options that could help address energy storage challenges.

**Overview of main results/findings:** Through their review, the GAO identified planning, regulation, standardization and valuation as challenges that energy storage technologies face. To address these challenges, the GAO developed the following six high-level policy options to inform policymakers<sup>2</sup> of potential actions to address the challenges identified: maintain the status quo, integration, regulation, standardization, support manufacturing and adoption and provide incentives. In order to maintain the

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<sup>2</sup> For the purposes of this assessment, policymakers include Congress, federal agencies, state and local government, academic and research institutions, and industry.

status quo, GAO suggests that policymakers continue to leverage tax credits and funding and promote research and development. Additionally, policymakers could help integrate storage by establishing roadmaps, based on storage costs and benefits, and assessing storage in plans. For regulation, the GAO suggests that policymakers could revise and enact rules and requirements for how storage is defined, used, or owned by identifying market barriers, establishing targets or mandates, or modernizing ownership models. To improve standardization, the GAO suggests that policymakers could update or create new codes and standards and provide education on storage safety risks. Per the GAO, policymakers could better support the manufacturing and adoption of storage technologies by enacting battery reuse and recycling policies, conducting outreach, or targeting activities to support storage development and deployment. Finally, the GAO suggests that policymakers could provide incentives, such as loan guarantees or tax credits, or consider policies to encourage the capture of multiple revenue streams in order to incentivize storage deployment.

**Recommendations and responses:** This report did not include any recommendations for EPA.

## Office of Water

<b>Lead Office / Region</b>	Office of Water / Region 3
<b>Title</b>	EPA's Annual Assessment of the Jurisdictions' Progress toward Meeting the Chesapeake Bay Total Maximum Daily Load (Bay TMDL)
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities
<b>Completion Date</b>	September 2023

**Purpose and brief description:** Through the 2014 Chesapeake Bay Watershed Agreement, the Chesapeake Bay Program has committed to having 100% of pollution-reducing practices in place that would achieve all of the nitrogen, phosphorus and sediment reductions necessary to meet the goals outlined in the Bay TMDL by 2025. These estimates are generated by the Chesapeake Assessment Scenario Tool (CAST, or otherwise known as the Bay Watershed Model) and are derived from land use data, implementation and effectiveness of best management practices and the most up-to-date water quality monitoring data. The Chesapeake Bay Program assesses water quality by the amount of dissolved oxygen in the Bay, chlorophyll a (a measure of algae growth) and water clarity (using underwater grass acreage).

**Question(s) that were addressed:** The seven watershed jurisdictions, in coordination with local governments, businesses, non-governmental organizations and individuals have installed pollution-reducing best management practices to lower the amount of nitrogen, phosphorus and sediment entering tributaries of the Chesapeake Bay. The conservation practices reported by the seven watershed jurisdictions, along with land use, manure and fertilizer information, are entered into a sophisticated suite of modeling tools to estimate the progress that each jurisdiction is making in meeting their individual nitrogen, phosphorus and sediment goals as outlined in the Bay TMDL. By incorporating the best available

data into the computer simulations and pollution load estimates, EPA can more accurately track the jurisdictions' progress toward their pollution-reducing goals. Assessing the progress that each jurisdiction is making toward reducing nitrogen, phosphorus and sediment pollution entering not only the Chesapeake Bay, but also their local waterways, gives EPA and the larger partnership a more holistic view of how conservation practice installation and improved management actions are helping to improve Bay water quality.

**Conclusions and/or (interim) findings:** As of 2022, the best management practices (BMPs) in place to reduce pollution are estimated to achieve 51% of the nitrogen reductions, 60% of the phosphorus reductions and 100% of the sediment reductions needed to attain applicable water quality standards when compared to the 2009 loads. According to CAST, BMPs (pollution controls) put in place in the Chesapeake Bay watershed between 2009 and 2022 are estimated to lower nitrogen loads 14%, phosphorus loads 13% and sediment loads 5%, compared to 2009. As modeled based on the implementation of BMPs, the sediment load reductions have met the established target, nitrogen loads have decreased, and phosphorus loads have increased from 2021 to 2022.

**Use of the conclusions and/or (interim) findings:** EPA uses these estimates to evaluate whether jurisdictions are on track to meet the reduction goals as reflected in the Bay TMDL, the Watershed Implementation Plans, and two-year milestones, and whether increased levels of oversight are needed in order to assist the jurisdictions in meeting their water quality goals. In addition, funding and technical assistance is greater targeted towards those sectors (e.g., agriculture or stormwater) that may be off track.

**Link to findings:** Additional information on progress towards meeting the Chesapeake Bay Program's goals on Watershed Implementation Plans can be found: <https://www.chesapeakeprogress.com/clean-water/watershed-implementation-plans>

<b>Lead Office</b>	Office of Water
<b>Title</b>	Clean Water State Revolving Fund State Reviews (CWSRF)
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities. Objective 5.1: Ensure Safe Drinking Water and Reliable Water Infrastructure.
<b>Completion Date</b>	October 2023

**Purpose and brief description:** EPA completes annual reviews (51) of each Clean Water State Revolving Fund Program (CWSRF).

**Question(s) that were addressed:** These reviews assess if states are effectively implementing the Clean Water State Revolving Fund program in compliance with the Clean Water Act (CWA). The questions these reviews address include:

- Are states effectively implementing the CWSRF program in compliance with the CWA by leveraging non-federal funds?
- Are the states assisting disadvantaged communities with access to funding?
- Are the states applying fiscal integrity and controls?



- Are the states effectively using Bipartisan Infrastructure Law funds?
- Are the states complying with the EPA’s State and Tribal Assistance Grant Program requirements?
- What steps are the states taking to promote climate resiliency and equity through CWSRF funding?

**Conclusions and/or (interim) findings:** The Regions conduct the annual reviews as part of their oversight of state programs and where specific issues are identified next steps are also identified in the state-specific performance evaluation report (PER). Headquarters review of the PERs is ongoing.

**Use of the conclusions and/or (interim) findings:**

- These reviews will help assess if states are effectively implementing the CWSRF program in compliance with the CWA, increasing the amount of non-federal dollars leveraged, assisting disadvantaged communities with access to funding, applying fiscal integrity and controls, effectively using Bipartisan Infrastructure Law funds, and complying with the EPA’s State and Tribal Assistance Grant program requirements, and increasingly directing funding to projects that address climate resiliency and equity.
- Through these reviews and in its oversight role, EPA will determine if CWSRF programmatic goals are being met. These results will support planning and policy decision making, such as needed memos and trainings for the SRFs.

**Link to findings:** EPA CWSRF review results are reported out in 51 state specific Performance Evaluation Reports annually. EPA makes publicly available an annual report on the status of the national CWSRF program. EPA also shares project and financial data at the national and state level. The most recent annual reports are available at: <https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-reports>.

<b>Lead Office</b>	Office of Water
<b>Title</b>	Public Water System Supervision (PWSS) Program Reviews & Drinking Water Infrastructure Revolving Fund State Reviews
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.1: Ensure Safe Drinking Water and Reliable Water Infrastructure.
<b>Completion Date</b>	November 2023

**Purpose and brief description:** EPA annually conduct reviews of Public Water System Supervision (PWSS) primacy agencies (55 reviews) and each State Drinking Water State Revolving Fund (DWSRF) Program (51 reviews).

**Question(s) that were addressed:**

- For PWSS Program Reviews - Are primacy entities effectively implementing the range of activities in the PWSS Program to oversee community water system compliance with the Safe Drinking Water Act (SDWA)?

- For DWSRF Reviews - These reviews evaluate if states are effectively implementing the DWSRF program in compliance with the SDWA. The question these reviews address include:
  - Are states effectively implementing the DWSRF program in compliance with the SDWA by leveraging non-federal funds?
  - Are the states assisting disadvantaged communities with access to funding?
  - Are the states applying fiscal integrity and controls?
  - Are the states effectively using Bipartisan Infrastructure Law funds?
  - Are the states complying with the EPA's State and Tribal Assistance Grant Program requirements?
  - What steps are the states taking to promote climate resiliency and equity through DWSRF funding?

**Conclusions and/or (interim) findings:**

- For PWSS Program Reviews:
  - At the primacy agency level, EPA PWSS Annual Program Reports are used by the region to communicate areas of success, opportunities for improvement, and issues of concern.
  - OGWDW tracks completion of PWSS Annual Program Reports to ensure that EPA is providing the necessary oversight requirements as described in 40 CFR 141.17(a)(1). All primacy agencies continue to meet the requirements for primacy.
- For DWSR Reviews:
  - The Regions conduct the annual reviews as part of their oversight of state programs and where specific issues are identified next steps are also identified in the performance evaluation report. Headquarters review of all these PERs is ongoing.

**Use of the conclusions and/or (interim) findings:**

- For PWSS Program Reviews:
  - EPA regions use annual program reviews to document primacy agency accomplishments and follow up on specific corrective actions if improvements of the PWSS program have been identified for a primacy agency.
  - The reports inform the agency drinking water program whether there are any national trends or issues that warrant additional guidance or targeted outreach. Additional actions could include focused training to primacy agencies on a specific aspect of the SDWA or focused guidance necessary to explain new provisions/complex issues. In addition, to assist systems in identify solutions to their problems and provide them with access funding through EPA WaterTA. EPA WaterTA provides hands-on support for communities to assess their needs, identify potential solutions, and develop funding applications. EPA also has a number of long-standing technical assistance programs that support communities in identifying identify water challenges, developing plans, building capacity, and developing application materials to

access water infrastructure funding. These programs include the Area-Wide Optimization Program (AWOP), Creating Resilient Water Utilities (CRWU) and EPA’s cybersecurity assistance program.

- For DWSRF Reviews:
  - These reviews will help assess if states are effectively implementing the Drinking Water State Revolving Fund program in compliance with the Safe Drinking Water Act, increasing the amount of non-federal dollars leveraged, assisting disadvantaged communities with access to funding, applying fiscal integrity and controls, effectively using Bipartisan Infrastructure Law funds, and complying with the EPA’s State and Tribal Assistance Grant program requirements, and increasingly directing funding to projects that address climate resiliency and equity.
  - Through these reviews and in its oversight role, EPA will determine if DWSRF programmatic goals are being met. These results will support planning and policy decision making, such as needed memos and trainings for the SRFs.

**Link to findings:**

- For PWSS Program Reviews:
  - EPA provides the PWSS Annual Program Reviews documents to the primacy agency. The reports also are shared internally with the regions.
- For DWSR Reviews:
  - EPA DWSRF review results are reported out in 51 state specific Performance Evaluation Reports annually. EPA makes publicly available an annual report on the status of the national DWSRF program. EPA also shares project and financial data at the national and state level.

<b>Lead Office</b>	Office of Water
<b>Title</b>	Public Water System Supervision (PWSS) National Community Water System Non-Compliance Review
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.1: Ensure Safe Drinking Water and Reliable Water Infrastructure.
<b>Completion Date</b>	Ongoing

**Purpose and brief description:** EPA conducts a quarterly review of Community Water Systems with health-based violations of national drinking water regulations, based on EPA’s SDWIS database.

**Question(s) that were addressed:** This review looks at national and state trends of SDWA noncompliance. This evaluation is used to inform EPA’s technical, managerial, and financial training for states and public water systems, identifies needs and priorities for water system capacity building training, and informs EPA’s SDWA oversight activities. The questions addressed were:

- What is the national and local compliance with drinking water regulations?

- Are water systems violating certain rules or certain rule requirements with increased frequency?
- Are specific types/sizes of water systems or specific states having problems with compliance?

**Conclusions and/or (interim) findings:** National compliance rates remain at approximately 93%. Community Water Systems in continuous noncompliance of health-based regulations continues to decline. The Stage 2 Disinfectants and Disinfection Byproducts Rule continues to have the largest number of CWSs in violation.

**Use of the conclusions and/or (interim) findings:** Results of the review will be used to plan EPA’s FY 2024 training agenda and will inform the FY 2024 PWSS State Reviews. In addition, to assist systems in identify solutions to their problems and provide them with access funding through EPA WaterTA. EPA WaterTA provides hands-on support for communities to assess their needs, identify potential solutions, and develop funding applications. EPA also has a number of long-standing technical assistance programs that support communities in identifying identify water challenges, developing plans, building capacity, and developing application materials to access water infrastructure funding. These programs include the Area-Wide Optimization Program (AWOP), Creating Resilient Water Utilities (CRWU) and EPA’s cybersecurity assistance program.

**Link to findings:**

Quarterly compliance data can be found at: [https://ordspub.epa.gov/ords/sfdw\\_rest/f?p=108:200:](https://ordspub.epa.gov/ords/sfdw_rest/f?p=108:200:)

<b>Lead Office / Region</b>	Office of Water / Region 3
<b>Title</b>	Report to the Principals’ Staff Committee on the status and vulnerabilities of existing and future Chesapeake Bay monitoring networks
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2: Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	December 2022

**Purpose and brief description:** In March 2021, the Principals’ Staff Committee (PSC) requested a study and recommendations on how to improve Chesapeake Bay Program (CBP) monitoring networks. The monitoring networks include (1) CBP core networks supported primarily by EPA Chesapeake Bay Program funding, and (2) partnership networks supported by multiple federal and state agencies. The monitoring review was guided by leadership from the CBP Scientific, Technical Assessment and Reporting (STAR) team, the Chesapeake Bay Program Office Monitoring Team, with input from the CBP Scientific and Technical Advisory Committee (STAC) leadership.

**Question(s) that were addressed:** The report addressed shortcomings or needed resources to fill existing gaps and to provide recommendations on monitoring enhancement to support the Chesapeake Bay Program.

**Conclusions and/or (interim) findings:** The estimate to enhance the CBP core networks is \$5.4 million in the first year (\$1.8 million in capital costs and \$3.6 million for operation and maintenance). It is an estimate that could rise subject to operational and inflationary pressures.

**Use of the conclusions and/or (interim) findings:** With the additional funding that came to CBPO through the Infrastructure Investment and Jobs Act funds, EPA was able to partially fund the monitoring needs identified in this report.

**Link to findings:** To review the report, visit:

[http://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/FINAL\\_Enhancing\\_the\\_Chesapeake\\_Bay\\_Program\\_Monitoring\\_Networks\\_A-Report\\_to\\_the\\_Principals\\_Staff\\_Committee\\_10.13.22-1.pdf](http://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/FINAL_Enhancing_the_Chesapeake_Bay_Program_Monitoring_Networks_A-Report_to_the_Principals_Staff_Committee_10.13.22-1.pdf)

<b>Lead Office / Region</b>	Office of Water / Region 6
<b>Title</b>	Reinvigorating Potentially Responsible Parties (PRP) Management Conference
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2: Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	October 2023

**Purpose and brief description:** According to Clean Water Act Sections 121 and 320, EPA is to provide administrative and technical assistance to a management conference convened for the Lake Pontchartrain Basin and assist and support the activities of the management conference, including the implementation of recommendations of the management conference. The original PRP Management Conference convened in 2002 but dwindled over time due to lack of funding and interest. In 2023, the PRP team built a stakeholder list based on the original management conference members and researched additional organizations for contacts. The first stakeholder meeting was held in May 2023, and the reinvigorated PRP Management Conference meeting was held in September 2023. As of October 2023, 47 organizations are official members of the PRP Management Conference. Additionally, the PRP Executive Committee, of which EPA has one representative, rewrote the Management conference bylaws. The group will meet every six months and be a key participant in the revision of the PRP Comprehensive Conservation Management Plan and Comprehensive Habitat Management Plan (CCMP).

**Question(s) that were addressed:**

- What stakeholder groups have participated in PRP in the previous five fiscal years? This activity addressed Clean Water Act Sections 121 and 320 statutory requirements for an active management conference.

**Conclusions and/or (interim) findings:** Maintaining membership and participation in the PRP management conference will be an ongoing process.

**Use of the conclusions and/or (interim) findings:** EPA will use the management conference to vote on potential PRP funding proposals, participate and make comments on the CCMP revision, support planning and identifying priority investment areas in the Basin.

**Link to findings:** The EPA PRP website provides management conference information at:

<https://www.epa.gov/la/lake-pontchartrain-basin-restoration-program>.

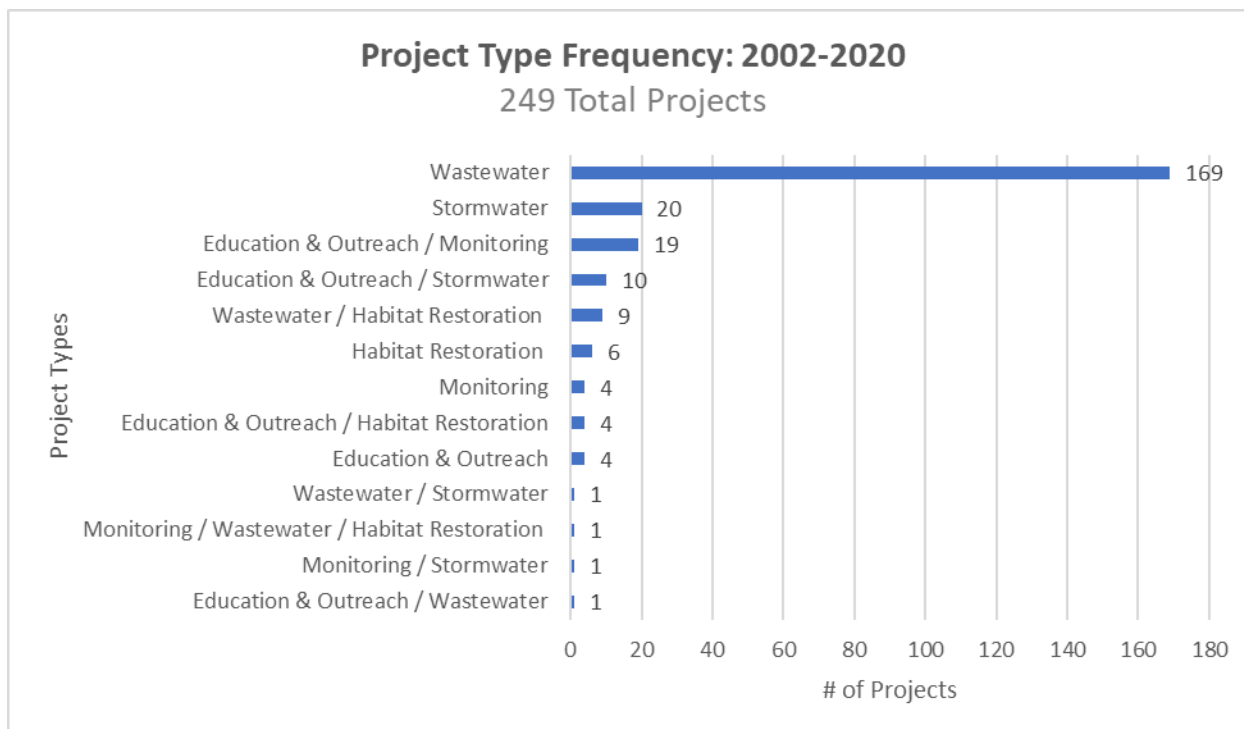
<b>Lead Office / Region</b>	Office of Water / Region 6
<b>Title</b>	What potentially responsible party program activities have been funded the most in the previous 5 fiscal years?
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2: Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	Summer 2023

**Purpose and brief description:** The PRP developed a matrix listing and describing all projects from the last five fiscal years. The activity identified the number of projects related to Comprehensive Conservation Management Plans recommended activities including habitat/coastal restoration, public education and outreach, sewerage repair designs, water quality assessment and improvement and nonpoint source pollution control. The PRP CCMP targets several eligible activities for funding, and the activities collectively contribute to the success of program outcomes and goals. Consistently funding some activities over others may limit the success, effectiveness and community support for the program.

**Question(s) that were addressed:**

- What PRP program activities have been funded the most since the program’s inception in 2002?

**Conclusions and/or (interim) findings:** This evidence building activity showed that the program overwhelmingly funded wastewater/sewage projects at 68%. Stormwater projects were the next highest project type at 20 projects (less than 1%). The results showed that the PRP needs to ensure that there is a greater variety of projects in future fiscal years.



**Use of the conclusions and/or (interim) findings:** The result of this activity demonstrated to the program that there needs to be a stronger emphasis on other aspects and recommendations of the CCMP and Comprehensive Habitat Management Plan (CHMP). The management conference, when meeting, will have the opportunity to suggest priority investment areas (identified in the CCMP) that can be emphasized in the grantee’s Requests for Proposals.

**Link to findings:** Internal document.

<b>Lead Office / Region</b>	Office of Water /Region 1 / Region 2
<b>Title</b>	Long Island Sound Study 2022 Report to Congress “Returning the Urban Sea to Abundance”
<b>Link to EPA Strategic Plan</b>	Goal 5: Ensure Clean and Safe Water for All Communities Objective 5.2: Protect and Restore Waterbodies and Watersheds
<b>Completion Date</b>	September 2023

**Purpose and brief description:** The purpose of the Long Island Sound Study Report to Congress, *Returning the Urban Sea to Abundance*, is to meet the statutory requirement under the Clean Water Act Section 119 for the Long Island Sound Office to issue biennial reports to Congress summarizing the progress made in implementing the Comprehensive Conservation and Management Plan (CCMP), any modifications to the CCMP, and recommendations concerning the CCMP. The report is a product of the program’s performance assessment and reporting practices. Evidence is gathered from required project partner reporting on activities and metrics accomplished from EPA-funded work analyzed using a Power BI application on an EPA SharePoint site.

**Question(s) that were addressed:** List all policy, science/research, regulatory, programmatic and/or operational questions the activity is intended to address. The objectives for this review were to assess:

- Progress made toward meeting the goals, actions, and schedules of the CCMP
- Status of the Ecosystem Targets
- How to demonstrate investments in Implementation Actions

**Conclusions and/or (interim) findings:** *Returning the Urban Sea to Abundance* highlights ongoing projects during 2020 and 2021 to restore the health of Long Island Sound. It builds upon the previous *Returning the Urban Sea to Abundance* report, which summarized progress made from 2015 to 2019 by the Long Island Sound Study (LISS) under the 2015 Comprehensive Conservation and Management Plan (CCMP). The CCMP established 20 ecosystem targets that incorporate environmental data and performance objectives to help track progress toward restoration and management goals. The 2015 CCMP also included specific Implementation Actions (IAs) to support achievement of ecosystem targets and overall goals and objectives. These actions are organized around four major themes: Clean Waters and Healthy Watersheds, Thriving Habitats and Abundant Wildlife, Sustainable and Resilient Communities, and Sound Science and Inclusive Management. The report characterizes the funding targeting each ecosystem target, progress made toward achieving the target, and the funding directed toward specific

actions supporting achievement of the target. It also highlights specific projects and success stories and identifies next steps for the program.

**Use of the conclusions and/or (interim) findings:** EPA uses the report and accompanying website, [Implementation Actions - Long Island Sound Study](#), to communicate program progress in achieving defined outcomes, evaluate funding investments, and modify future plans and activities to better achieve goals and targets. The EPA Long Island Sound Office will use the assessment of Implementation Action investments to target future work where further progress needs to be made. The assessment of the status of ecosystem targets will also be used to focus efforts on program activities and projects to bring ecosystem targets on track or keep them on schedule. The sections focused on future areas of investment will help guide program priorities.

**Link to findings:** See [Implementation Actions - Long Island Sound Study](#) and [Returning the Urban Sea to Abundance \(2020-2021\) - Long Island Sound Study](#).

<b>Lead Office / Region</b>	Office of Water / Region 3
<b>Title</b>	OIG Report: The EPA should Update its Strategy, Goals, Deadlines, and Accountability Framework to Better Lead Chesapeake Bay Restoration Efforts.
<b>Link to Report</b>	<a href="#">The EPA Should Update Its Strategy, Goals, Deadlines, and Accountability Framework to Better Lead Chesapeake Bay Restoration Efforts</a>
<b>Completion Date</b>	July 2023

**Purpose and brief description:** The OIG conducted this audit/evaluation to determine whether the EPA effectively uses the Accountability Framework for overseeing the seven Bay watershed jurisdictions’ progress in meeting their respective Chesapeake Bay Total Maximum Daily Load (Bay TMDL) pollutant reduction goals. The OIG reviewed extensive supporting documentation regarding the Bay TMDL, the Clean Water Act, and the Chesapeake Bay Program partnership. The OIG also conducted discussions with management and staff within Region 3 and with partners outside the Agency.

**Focus of the Report:**

- How did the Agency and the Chesapeake Bay region use regulatory authority to address nutrient and sediment pollution?
- What was the Chesapeake Bay restoration approach through the Bay TMDL?
- What is the Chesapeake Bay Program Accountability Framework?
- What are the challenges to achieving the Bay TMDL pollutant reductions?

**Overview of main results/findings:** The OIG determined that the Chesapeake Bay Program is not on track to reach the 2025 goals for nitrogen and phosphorus. Limitations in the EPA’s regulatory authority under the Clean Water Act prevent the Agency from using federal actions to fully achieve the Bay TMDL pollutant-reduction goals. While the EPA has assisted the partnership in achieving reductions for the portion of pollution covered by the Bay TMDL that falls under Clean Water Act regulatory authority, which



is point source pollution, the EPA has not fully embraced its leadership role to steer the partnership toward addressing the most significant sources of remaining pollution covered by the Bay TMDL, namely nonpoint source pollution.

**Recommendations and responses:**

- **OIG Recommendation 1:** Lead the Chesapeake Bay Program in developing a new strategy to specifically address nonpoint source pollution.
  - **EPA Response to OIG Recommendation 1:** EPA agrees with this recommendation and is implementing corrective action.
- **OIG Recommendation 2:** Lead the Chesapeake Bay Program in setting new jurisdictional goals and a new deadline to have all pollution controls and practices in place to meet Total Maximum Daily Load pollutant-reduction goals.
  - **EPA Response to OIG Recommendation 2:** EPA agrees with this recommendation and has implemented corrective action.
- **OIG Recommendation 3:** Lead the Chesapeake Bay Program in developing an effective assurance mechanism to ensure that nonpoint source load reductions will be achieved by jurisdictions under the Chesapeake Bay Total Maximum Daily Load.
  - **EPA Response to OIG Recommendation 3:** EPA agrees with this recommendation and is implementing corrective action.

<b>Lead Office</b>	EPA Region 6
<b>Title</b>	GAO Report: Lake Pontchartrain Basin: Additional Transparency and Performance Management Could Improve EPA’s Restoration Program
<b>Link to Report</b>	<a href="#">Lake Pontchartrain Basin: Additional Transparency and Performance Management Could Improve EPA’s Restoration Program</a>
<b>Completion Date</b>	May 2023

**Purpose and approach:** The House of Representatives Committee on Transportation and Infrastructure asked GAO to review restoration efforts in the Basin. The report examines (1) restoration efforts since 1995, (2) EPA’s implementation of relevant grants management requirements for its Lake Pontchartrain Basin Restoration Program, and (3) EPA’s management of the program’s performance. GAO reviewed documents concerning Basin restoration efforts and the program; interviewed representatives from EPA, other federal agencies, state and local governments, a nonprofit, and recipients of program funding; and compared EPA’s grants and performance management of the program against leading practices.

**Focus of the report:**

- (1) What efforts have been made to restore water quality and ecosystems in the Lake Pontchartrain Basin

- (2) What is the extent to which the EPA has followed relevant requirements for grants management of the PRP, and
- (3) What is the extent to which EPA has managed the performance of the PRP?

**Overview of main results/findings:**

1. Federal and nonfederal entities have made numerous efforts to restore the water quality and ecosystems in the Lake Pontchartrain Basin, which is an important water resource for the Basin. For example, through the Lake Pontchartrain Basin Restoration Program authorized in 2000, the U.S. Environmental Protection Agency (EPA) has awarded about \$31 million to administer and implement projects through this program.
2. EPA generally followed agency- and government-wide grants management regulations, policies, and procedures in managing Lake Pontchartrain Basin Restoration Program grants. However, EPA has not always ensured transparency by providing potential applicants with key grant information—such as expected funding levels and timelines—needed to make decisions about their grant applications.
3. EPA initially took actions to manage the program’s success with the development of the 1995 Comprehensive Conservation Management Program and the 2006 Comprehensive Habitat Management Plan as a guiding document. Although the document provided key impairments and suggested project activities, it did not include measurable outcomes, metrics or milestones. Without developing and using performance measures, EPA will not be positioned to know if the program is achieving the desired results.

**Recommendations and responses:** GAO made four recommendations to EPA:

1. The EPA Administrator should improve the availability of key grant information by making it publicly accessible in a central location, such as a website.
  - *EPA Response to OIG Recommendation - EPA agrees with the recommendation and has implemented corrective action.*
2. The EPA Administrator should define the geographic boundaries of the Lake Pontchartrain Basin to clarify which parishes and counties are included within the Basin’s boundaries to ensure that EPA convenes appropriate stakeholders to implement the PRP
  - *EPA Response to OIG Recommendation - EPA agrees with the recommended and has implemented corrective action.*
3. The EPA Administrator, in updating the comprehensive conservation and management plan, should collaborate with relevant stakeholders to ensure that the plan reflects the current state of the Lake Pontchartrain Basin and includes performance measures
  - *EPA Response to OIG Recommendation - EPA agrees with the recommendation and is implementing corrective action.*
4. The EPA Administrator should develop and document a process for overseeing the PRP
  - *EPA Response to OIG Recommendation - EPA agrees with the recommendation and is implementing corrective action.*

# Section 3: FY 2023 Activities in EPA's Learning Agenda Priority Areas

<b>Title</b>	EPA Learning Agenda: Grant Commitments Met
<b>Lead Office</b>	Office of the Administrator
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 4: Strengthen Tribal, State, and Local Partnerships and Enhance Engagement
<b>Estimated Completion Date</b>	September 2025

**Purpose and brief description:** Grant Commitments Met is one of the Learning Priorities in the [EPA Learning Agenda](#). EPA awards over \$5 billion in annual funding to grants and other assistance agreements. New Agency funding provided by the [American Rescue Plan](#),<sup>3</sup> the [Bipartisan Infrastructure Law](#),<sup>4</sup> and [Inflation Reduction Act](#)<sup>5</sup> to fund grants and other assistance agreements underscores the importance of this Learning Priority.<sup>6</sup> EPA helps to protect human health and the environment through these grants and the work of its grantees. The management and tracking of the individual grant awards are dispersed amongst staff at EPA headquarters and EPA's ten regional offices, which makes tracking results at the national level challenging.

The Grant Commitments Met work is guided by the overarching learning question: *How can EPA assess the extent to which commitments achieve the intended environmental and/or human health results and identify possible next steps in establishing a comprehensive grant reporting system?*

In the initial phase (Year 1 / FY 2021) of work, EPA addressed the question: *How do EPA's existing grant award and reporting systems identify and track grant commitments?* EPA organized an extensive survey that gathered 462 responses from grant programs across the Agency. The survey responses were analyzed to identify what data (e.g., outputs and outcomes) are being collected and how programs are reporting on grant activities across EPA. Year 1 also included a request for National Program Managers (NPMs) to provide background information on EPA's grant programs. EPA analyzed the survey responses

<sup>3</sup> H.R.1319: American Rescue Plan Act of 2021

<sup>4</sup> H.R.3684: Infrastructure Investment and Jobs Act

<sup>5</sup> H.R.5375: Inflation Reduction Act of 2022

<sup>6</sup> The American Rescue Plan, Bipartisan Infrastructure Law and Inflation Reduction Act provide around \$100 million, \$60.89 billion, and \$350 million in additional EPA funding, respectively, for a total of around \$61.34 billion in additional funding. See <https://www.epa.gov/arp/about-epas-american-rescue-plan-arp-funding>, <https://www.epa.gov/infrastructure/explore-epas-bipartisan-infrastructure-law-funding-allocations>, <https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-programs-fight-climate-change-reducing-embodied>, accessed January 23, 2023.

and other documents to identify what data grant programs collect and how programs report on activities across EPA. The effort culminated in the [Year 1 Report](#), published in September 2022.

In the second year of the project (Year 2 / FY 2022), EPA addressed the question: *What EPA practices and tools (1) effectively track grantee progress towards meeting workplan grant commitments including outputs and outcomes, and/or (2) support communication of national program level outputs and outcomes?* Year 2 data efforts included approximately 30 in-depth interviews and some additional analysis of data previously collected in the Year 1 survey. Grant programs were selected with pre-defined considerations for individual or small group interviews with project officers or NPMs. This process built upon previous efforts as an in-depth study of a smaller number of programs to understand what the data can tell us about the effectiveness of EPA grant programs. The effort resulted in a [Year 2 Report](#), published in March 2023.

In the third year of the project (Year 3 / FY 2023), EPA addressed the question: *What could EPA do to prepare grant programs to report on consistently defined outputs and outcomes?* To address this question, EPA developed draft common Agencywide definitions for outputs, a potential list of common behavioral change outcomes and environmental human health outcomes (including climate and equity related metrics), and common approaches for collecting output and outcome data. To accomplish this, EPA relied on the Strategic Plan, additional analysis of survey data and national program documents collected in Year 1, Year 2 interview data, and feedback from an advisory group comprised of key EPA staff including representatives from all ten region and all program offices.

**Question(s) that were addressed:**

- How do EPA's existing grant award and reporting systems identify and track grant commitments?
- What EPA practices and tools (1) effectively track grantee progress towards meeting workplan grant commitments including outputs and outcomes, and/or (2) support communication of national program level outputs and outcomes?
- What could EPA do to prepare grant programs to report on consistently defined outputs and outcomes?

**Conclusions and/or (interim) findings:** Based on the analysis completed in FY 2023 – including of survey data and national program documents collected in Year 1, Year 2 interview data, and feedback from an advisory group comprised of key EPA staff including representatives from all ten region and all program offices -- EPA drafted common Agencywide definitions for outputs, a potential list of common behavioral change outcomes and environmental human health outcomes (including climate and equity related metrics), and common approaches for collecting output and outcome data.

**Use of the conclusions and/or (interim) findings:** In FY 2024, EPA will conduct a pilot study with four EPA grant programs to test the application of the draft common measures and definitions.

**Link to findings:** Findings from FY 2021 and FY 2022 are published on the Agency's Evidence Act site: <https://www.epa.gov/evaluate/evidence-act>. Findings from the work completed in FY 2023 – 2024 will be published in an additional report in FY 2024.

<b>Title</b>	EPA Learning Agenda: Workforce
<b>Lead Office</b>	Office of Mission Support
<b>Link to EPA Strategic Plan</b>	Cross-Agency Strategy 3: Advance EPA's Organizational Excellence and Workforce Equity
<b>Completion Date</b>	September 2023

**Purpose and brief description:** EPA's mission to protect human health and the environment requires a highly skilled and dedicated workforce. Almost forty percent of EPA's workforce is or will be eligible for retirement within five years. This, along with changing workforce demographics, will impact every region and program. EPA has a unique opportunity to transform its human capital processes, including workforce planning, knowledge transfer, and succession management to prepare itself for the future of work. EPA is carrying out evidence-building activities to address priority questions related to workforce planning, one of EPA's Learning Agenda priority areas. The Agency will use the results to inform and develop policies and approaches to equip employees with the needed competencies, knowledge and most up-to-date tools to advance EPA's mission. Loss of institutional knowledge due to retirement or turnover reduces expertise and impacts efficiency, innovative problem solving and Agency ability to deliver on commitments.

**Question(s) addressed:** OMS assessed: 1) baseline familiarity with succession management and workforce analysis; 2) consistent use of the tools (such as Talent Enterprise Diagnostic tool, data visualization dashboards and succession management templates); 3) alignment of Succession Management templates and dashboards with stakeholder needs; and 4) effectiveness of EPA communications and training for these tools.

**Conclusions and/or (interim) findings:** Twenty-one organizations completed four major milestones in EPA's Succession Management process (Strategic Direction Template and the Workforce Profile Template; Demand Analysis, Leadership and Critical Position Matrix; Competency/Skill Gap Analysis; and Draft Succession Management Plans). The strategic direction and workforce profile milestone identified the long-term vision and direction of the suborganizations, initiated analysis of future requirements for products and services and collected data describing the current workforce. The demand analysis and critical position identification milestone addressed forecasting organizational functions, staff and skill needs to meet short- and long-term goals and objectives. The competency/skill gap analysis milestone addressed the importance of identifying and analyzing competencies related to each suborganization's critical positions. The draft succession management plans built on the previous milestones to identify long-term strategies to align skill sets with mission needs and provide opportunities for employees to gain relevant technical and managerial experience.

Through training and organizational consultations, several observations and recommendations emerged regarding the overall familiarity and experience of EPA suborganizations in Succession Management. These include strengthening individual office workforce data analysis capabilities; streamlining the workforce planning/succession management process, with a focus on automation; and embedding annual workforce planning and succession management as an organizational strategy. Additional training and consultations are planned for FY 2024 to further bridge gaps in workforce data analysis and encourage continued use of workforce planning and succession management as organizational strategies.

**Use of the conclusions and/or (interim) findings:** Data from the FY 2023 succession management process will be used to inform a consolidated agency-wide succession management plan in FY 2024. During FY 2024, regional and program offices will begin to implement gap closure strategies, monitor workforce data trends and refine succession management plans. Progress report updates are planned for Q2 and Q3, with a final plan by the end of the fiscal year. Information obtained from these updates will also be incorporated into the FY 2024 agency-wide succession management plan.

**Link to findings:** The identified workforce activities are considered key components of management’s strategic decision-making process; findings will be shared consistent with disclosure requirements related to potentially privileged or prohibited information. It is anticipated relevant results will be shared with internal stakeholders, including senior leaders and EPA’s Human Resource Officer/Program Management Officer community. Aggregate information on findings might be shared with other federal agencies and/or publicly.

<b>Title</b>	EPA Learning Agenda: Drinking Water Systems out of Compliance
<b>Lead Office</b>	Office of Enforcement and Compliance Assurance
<b>Link to EPA Strategic Plan</b>	Goal 3: Enforce Environmental Laws and Ensure Compliance Objective 3.1: Hold Environmental Violators and Responsible Parties Accountable Objective 3.2: Detect Violations and Promote Compliance
<b>Estimated Completion Date</b>	September 2026

**Purpose and brief description:** Drinking water noncompliance is greatest in small, disadvantaged communities, and may be higher than EPA data suggests due to monitor and reporting failures. The *Drinking Water Systems Out of Compliance* learning priority area in EPA’s Learning Agenda consists of 5 different research questions, identified through stakeholder engagement. Collectively, the evaluation of the questions assesses drinking water data reported to EPA to determine whether it accurately measures national compliance and substantiates EPA policy decisions; considering noncompliance root causes and corresponding technical/managerial/financial (TMF) factors; and testing efficacy of technical assistance, enforcement, and state oversight.

EPA is using several methods to address this priority area: literature reviews, statistical analysis of existing data, case studies, and gleaning and aggregating information from EPA and states’ reports are all methods we have employed. Our evaluations have the potential to increase drinking water compliance rates by identifying PWS characteristics correlated with noncompliance and evaluating policy instruments and their ability to impact those characteristics and a PWSs compliance status. Our analyses will assist in determining the most effective way to apply compliance assurance tools for increasing compliance in the drinking water program.

The Office of Enforcement and Compliance Assurance (OECA), Office of Water (OW), and the *Drinking Water Systems Out of Compliance* learning priority workgroup are assessing drinking water data reported to EPA to determine whether it accurately measures national compliance and substantiates EPA policy decisions. To that end, OECA has evaluated SDWIS data quality. EPA has a laboratory certification program design to certify credibility of sample analysis and reporting, so OECA is looking at options to evaluate the

existence and scope of potential credibility issues with samples submitted by drinking water systems to laboratories for analysis.

OECA anticipates FY 2025 funds will be used to identify causes of noncompliance based on correlative characteristic findings from Question 2 – root cause of noncompliance analyses. In FY2023, OECA used logistic regression to identify which of the water system characteristics are the most predictive of noncompliance. OECA will do additional work to identify spatial patterns of noncompliance and good compliance to determine if any other common characteristics or trends exist. FY 2025 funds will also support prospective studies for Question 3 – efficacy of inspection and enforcement on compliance. Efforts will be focused on retrospective analysis using EPA’s inspection and enforcement data. OECA will work on Question 4 –analyses for defining technical, managerial, and financial metrics, which is closely related to Question 2 – Root Cause Analysis. Building off of information gained from Question 2, OECA will review existing efforts and literature to determine what evaluation aspects are most valuable and concentrate on that work in FY2025.

OCEA anticipates evaluating Question 5 – Effective Oversight in future years.

**DWLA Questions:**

1. Does EPA have ready access to data to measure drinking water compliance reliably and accurately?
2. What factors determine system noncompliance and optimal performance?
3. Does increased use of compliance assurance tools (inspections and enforcement) improve system compliance, and if so under what circumstances?
4. How can EPA determine if a system has the technical, managerial, and financial capacity to provide safe water on a continuous basis to its customers?
5. What EPA oversight activities are effective at assessing and improving state programs’ ability to drive compliance?

**Conclusions and/or (interim) findings:** Provide a brief summary of the conclusions and findings (if the activity is complete) OR the interim findings (if the activity is not yet complete).

For Question 1, we attempted to evaluate four aspects of SDWIS Fed data quality: data transfer errors, compliance determinations, PWS sample results, and effects of monitoring and reporting (M&R) violations. While there appears to be no indication of widespread data flow concerns regarding SDWIS Fed, findings are still under review and not ready for publication.

For Question 2, we used linear regression of SDWIS Fed data elements to determine which system characteristics were the most correlative with noncompliance. We also conducted an analysis of small systems to identify better and lower performing systems than expected and are currently expanding our analyses to look more closely at any common characteristics among those in each category. Better and lower performing systems were determined based on the frequency and ability to resolve a health-based violation (HBV). Following this, EPA was able to link Census data to PWSs in order to form an analytical dataset. This allowed EPA to perform a multivariate statistical analysis to determine how a set of factors relate to the compliance bins. Through this binning approach, OECA was able to determine which factors are associated with better compliance records and which are associated with worse compliance records.

For Question 3, we developed a prospective study approach for a randomized control trial (RTC) for testing the benefits of EPA inspections at PWSs, but we were not able to implement the approach because a number of organizations would need to be involved, and coordinating priorities and schedules was not possible at the time.

We evaluated, in aggregate, states' reporting of determinations of system compliance with drinking water regulations. These determinations entail states identifying which systems have incurred a violation of drinking water regulations. OECA calculated violations expected based on sample data provided to states by drinking water systems and then compared the calculated number to the number of violations reported to EPA's drinking water database of record, SDWIS-Fed. OECA is still evaluating preliminary findings to consider circumstances that could result in discrepancies, such as potential differences in EPA and state return-to-compliance policies or lag-time in reporting.

**Use of the conclusions and/or (interim) findings:** Provide a brief summary of how EPA used (or will use) the results to make program improvements, support planning and policy decision making, assess progress toward mission/objectives, and/or make changes to strategies or measures.

For question 1, regarding data reliability and availability, OECA will use the results of these analyses to understand limitations, if any, in using SDWIS-Fed data in our evaluations of the other four Questions in the learning agenda priority area. EPA may more broadly use the information in continuous improvement efforts for data quality and for regulatory compliance. For question 2, regarding factors of system noncompliance, EPA will use the results of these analyses to identify key factors of system noncompliance and optimal performance and relate those factors to adjusting existing or creating new policy instruments. For question 3, regarding compliance assurance tools, OECA will use the results of these analyses to examine most effective use of compliance assurance tools. For question 4, regarding TMF capacity, EPA hopes to use the results of this evaluation to determine TMF metrics for early warning of challenged drinking water systems ahead of major noncompliance or failure.