United States
Environmental Protection Agency

FISCAL YEAR 2022

Justification of Appropriation Estimates for the Committee on Appropriations

Tab 03: Science and Technology

EPA-190-R-21-002

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Environmental Protection Agency
FY 2022 Annual Performance Plan and Congressional Justification

Table of Contents – Science and Technology

Environmental Protection Agency
FY 2022 Annual Performance Plan and Congressional Justification

APPROPRIATION: Science & Technology
Resource Summary Table

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology				
Budget Authority	$750,441.8	$729,329.0	$829,972.0	$100,643.0
Total Workyears	1,962.9	1,987.7	2,136.9	149.2

*For ease of comparison, Superfund transfer resources for the audit and research functions are shown in the Superfund account.

Bill Language: Science & Technology

For science and technology, including research and development activities, which shall include research and development activities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980; necessary expenses for personnel and related costs and travel expenses; procurement of laboratory equipment and supplies; hire, maintenance, and operation of aircraft; and other operating expenses in support of research and development, $829,972,000, to remain available until September 30, 2023.

Program Projects in S&T

(Dollars in Thousands)

Program Project	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Clean Air and Climate				
Clean Air Allowance Trading Programs	$7,537.7	$6,793.0	$8,800.0	$2,007.0
Climate Protection	$7,326.8	$7,895.0	$9,997.0	$2,102.0
Federal Support for Air Quality Management	$8,974.6	$7,154.0	$10,222.0	$3,068.0
Federal Vehicle and Fuels Standards and Certification	$98,543.9	$96,783.0	$110,169.0	$13,386.0
Subtotal, Clean Air and Climate	$122,383.0	$118,625.0	$139,188.0	$20,563.0
Indoor Air and Radiation				
Indoor Air: Radon Program	$39.9	$157.0	$157.0	$0.0
Radiation: Protection	$1,795.6	$1,735.0	$2,340.0	$605.0
Radiation: Response Preparedness	$3,402.1	$3,096.0	$4,039.0	$943.0
Reduce Risks from Indoor Air	$235.5	$161.0	$168.0	$7.0
Subtotal, Indoor Air and Radiation	$5,473.1	$5,149.0	$6,704.0	$1,555.0

Program Project	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Enforcement				
Forensics Support	$13,726.2	$14,000.0	$14,114.0	$114.0
Homeland Security				
Homeland Security: Critical Infrastructure Protection	$12,926.2	$10,380.0	$14,342.0	$3,962.0
Homeland Security: Preparedness, Response, and Recovery	$27,021.6	$24,852.0	$25,545.0	$693.0
Homeland Security: Protection of EPA Personnel and Infrastructure	$443.0	$501.0	$501.0	$0.0
Subtotal, Homeland Security	$40,390.8	$35,733.0	$40,388.0	$4,655.0
IT / Data Management / Security				
IT / Data Management	$3,473.7	$3,072.0	$3,121.0	$49.0
Operations and Administration				
Facilities Infrastructure and Operations	$68,812.7	$67,500.0	$68,533.0	$1,033.0
Pesticides Licensing				
Pesticides: Protect Human Health from Pesticide Risk	$3,109.5	$2,803.0	$2,840.0	$37.0
Pesticides: Protect the Environment from Pesticide Risk	$1,757.7	$2,207.0	$2,230.0	$23.0
Pesticides: Realize the Value of Pesticide Availability	$379.9	$876.0	$970.0	$94.0
Subtotal, Pesticides Licensing	$5,247.1	$5,886.0	$6,040.0	$154.0
Research: Air, Climate and Energy				
Research: Air, Climate and Energy	$95,350.8	$95,250.0	$156,210.0	$60,960.0
Research: Safe and Sustainable Water Resources				
Research: Safe and Sustainable Water Resources	$108,506.9	$112,250.0	$116,588.0	$4,338.0
Research: Sustainable Communities				
Research: Sustainable and Healthy Communities	$143,191.3	$133,000.0	$137,412.0	$4,412.0
Research: Chemical Safety for Sustainability				

Program Project	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Health and Environmental Risk Assessment	$38,921.5	$37,482.0	$41,412.0	$3,930.0
Research: Chemical Safety for Sustainability				
Endocrine Disruptors	$19,833.8	$16,304.0	$16,851.0	$547.0
Computational Toxicology	$23,616.2	$21,487.0	$22,229.0	$742.0
Research: Chemical Safety for Sustainability (other activities)	$52,257.7	$51,727.0	$54,738.0	$3,011.0
Subtotal, Research: Chemical Safety for Sustainability	$95,707.7	$89,518.0	$93,818.0	$4,300.0
Subtotal, Research: Chemical Safety for Sustainability	$134,629.2	$127,000.0	$135,230.0	$8,230.0
Water: Human Health Protection				
Drinking Water Programs	$4,265.0	$4,364.0	$6,444.0	$2,080.0
Congressional Priorities				
Water Quality Research and Support Grants	$4,992.0	$7,500.0	$0.0	-$7,500.0
TOTAL S&T	**$750,441.8**	**$729,329.0**	**$829,972.0**	**$100,643.0**

*For ease of comparison, Superfund transfer resources for the audit and research functions are shown in the Superfund account.

Clean Air

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$15,503.2	$13,153.0	$18,138.0	$4,985.0
Science & Technology	***$7,537.7***	***$6,793.0***	***$8,800.0***	***$2,007.0***
Total Budget Authority	$23,040.9	$19,946.0	$26,938.0	$6,992.0
Total Workyears	63.9	63.7	78.7	15.0

Program Project Description:

This program is responsible for managing the Clean Air Status and Trends Network (CASTNET), an ambient monitoring network that has been continuously collecting data for more than 30 years. CASTNET serves as the Nation's primary source for assessing long-term trends in atmospheric sulfur and nitrogen deposition, regional ground-level ozone, and other forms of particulate and gaseous air pollution. CASTNET sites are uniquely situated in remote and high elevation areas within 39 states and seven tribal boundaries. The network provides valuable data to support the ozone National Ambient Air Quality Standards (NAAQS) in many areas not monitored by state, local, and tribal monitoring agencies. Under this program, independent audits and performance evaluations are performed to meet the NAAQS requirements and provide high-quality data. Additionally, CASTNET ozone data are used for exceptional event assessments of international transport, background concentrations, wildfire events, and stratospheric ozone intrusions often leading to ozone exceedances. States are required to provide exceptional event demonstrations in order to exclude monitoring data from the NAAQS design values. Used in conjunction with the National Atmospheric Deposition Program's wet deposition networks and other ambient air quality networks, CASTNET's data products also are used to determine the effectiveness of national and regional emission control programs, validate satellite measurements, and provide near-real time data to support AirNow and Air Quality Index (AQI) reporting tools.

The CASTNET Program provides spatial and temporal trends in ambient air quality and is the largest network in the world reporting atmospheric deposition used to assess ecological impacts in sensitive ecosystems (e.g., national parks, freshwater bodies, and subalpine regions). The sites also fill in critical data gaps from urban networks that lack information on air quality issues affecting downwind population centers, such as oil and gas, wildfire smoke, and wood smoke in mountain valleys. Rural CASTNET sites are intentionally located away from stationary emission sources but are often located in or near areas with low income or minority communities. Maintaining the CASTNET monitoring network continues to be critical for assessing the environmental benefits realized from regional emission reduction programs (thereby reducing secondary pollutant formation of ozone and fine particles), as well as aiding states in exceptional events determinations. In 2020, impacts of the COVID-19 pandemic were greater in areas with poor air quality. EPA used CASTNET data to report local AQI values and assess changes in regional air quality as a result of stay-at-home orders.

EPA works closely with tribal governments to build tribal air monitoring capacity through partnerships with the CASTNET Program. Since 2002, CASTNET has added seven sites on tribal lands, including two new sites in the northwest U.S. By expanding tribal partnerships, CASTNET can fill important spatial gaps in ambient and deposition monitoring while simultaneously integrating sites operated by tribes into a national program. Tribes will benefit from dedicated tribal monitoring sites that build tribal technical skills, provide near-real time air quality data to the community, and provide environmental data that help tribes assess the impacts of air pollution on cultural or natural resources on tribal lands.

To support modernization efforts, CASTNET will use the existing network infrastructure to fill in gaps in continuous measurements necessary to evaluate changes in atmospheric chemistry and global climate impacts on air quality and deposition. The Program is well-situated to measure background or regional levels of air toxics (e.g., ethylene oxide) and persistent chemicals of concern (e.g., PFAS compounds). Measuring speciated reactive nitrogen will provide valuable data that states can use to determine which species are driving PM formation and make more informed decisions on emission control strategies. Furthermore, continuing to expand capacity while modernizing the CASTNET infrastructure ensures data can be made available in near-real time to address short-term changes in air quality resulting from meteorological conditions such as temperature inversions or natural disasters such as wildfires.

This program also is responsible for managing EPA's Long-Term Monitoring (LTM) Program, which was created to assess the health of lakes and streams in response to changes in deposition of atmospheric pollutants. Today, it ensures that the Clean Air Act continues to be effective in reducing the impact of atmospheric pollutants (e.g., strong acid anions) on surface waters in New England, the Adirondack Mountains, the Northern Appalachian Plateau (including the Catskill mountains), and the Blue Ridge region. This program is operated cooperatively with partners in state agencies, academic institutions, and other federal agencies. The LTM surface water chemistry monitoring program provides field measurements for understanding biogeochemical changes in sulfur, nitrogen, acid neutralizing capacity, aluminum, and carbon in streams and lakes in relation to reductions in pollutant emissions and a changing climate. The LTM Program is one of the longest running programs at EPA, providing a longitudinal dataset based on sampling and measurements since 1983.

The Clean Air Allowance Trading Programs are nationwide and multi-state programs that address air pollutants that are transported across state, regional, and international boundaries. The programs designed to control SO_2 and NO_X include Title IV (the Acid Rain Program) of the Clean Air Act, the Cross-State Air Pollution Rule (CSAPR), and the CSAPR Update. The infrastructure for the Clean Air Allowance Trading Programs also supports implementation of other state and federal programs to control SO_2, hazardous air pollutants, and greenhouse gases.

Both the CSAPR and the CSAPR Update Rule require 27 states in the eastern U.S. to limit their statewide emissions of SO_2 and/or NO_x in order to reduce or eliminate the states' contributions to fine particulate matter and/or ground-level ozone pollution in other states. They set emissions limitations that are defined in terms of maximum statewide "budgets" for emissions of annual SO_2, annual NO_x, and/or ozone-season NOx from each state's large electric generating units. EPA is supporting state efforts with respect to best available retrofit technology, reasonable progress, and

interstate visibility transport, as those obligations relate to SO_2 emissions from electricity generating units.[1]

FY 2022 Activities and Performance Plan:

Work in this program directly supports the President's priorities to tackle the climate crisis, advance environmental justice, and expand the capacity of the EPA.

In FY 2022, EPA will:

- Continue to support 64 CASTNET, 31 NADP National Trends Network (NTN), 71 NADP Ammonia Monitoring Network (AMoN), and LTM monitoring sites that provide long-term atmospheric concentrations, deposition, and surface water quality data. Data are used to analyze and assess air quality, trends in sulfur and nitrogen deposition, critical loads, and other indicators of ecosystem health.

- Provide support for independent audits and required performance evaluations to assure high-quality data to support the NAAQS and environmental assessments.

- Continue progress toward increasing monitoring capacity by working to identify new tribal partners that would benefit from joining a national air monitoring program.

- Invest in technology and small businesses by replacing aging equipment, repairing monitoring shelters more than 30 years old that have deteriorated due to extreme weather and deploying new equipment and sites in rural, often low-income/minority areas. The CASTNET contractor allocates 55 percent of their subcontract dollars to small businesses responsible for performing calibrations, managing site operators, and data analyses.

- Upgrade aging CASTNET equipment. To improve overall data quality EPA will replace continuous ozone analyzers, and procure new gas analyzers (e.g., CO, VOCs, speciated nitrogen) that will support NAAQS assessments, emission control strategies, and regulatory actions in the future. Analyzers will be integrated into the existing automated calibration systems to improve network resiliency.

- Utilize existing infrastructure to expand network capacity by adding measurement systems for background and regional concentrations of air toxics and emerging pollutants of concern. Data will complement urban measurements and provide valuable information on atmospheric pathways and chemical transformations that will impact health risks.

- Modernize the data reporting tools and visualizations to improve user experiences and data access, particularly during emergencies (e.g., COVID-19 pandemic). Strengthening back- and front-end data management platforms will improve system reliability and allows state and local agencies to quickly make critical decisions. Providing real-time air quality data during such events is valuable for informing vulnerable populations about health risks.

[1] Clean Air Act § 110 and § 169A; refer to 40 CFR 52.2312.

- Assure the continuation of ongoing SO_2 and NO_X emission reductions from power plants in the eastern half of the U.S. by implementing CSAPR and the CSAPR update, and across the contiguous U.S. by implementing the Acid Rain Program.[2]

- Ensure accurate and consistent results for the Clean Air Allowance Trading Programs. Continue work on performance specifications and investigating monitoring alternatives and methods to improve the efficiency of monitor certification and emissions data reporting.

- Work with states to implement emission reduction programs to comply with CAA Section 110(a)(2)(D)(i)(I) requirements, including conducting environmental justice analyses to consider the distributional impacts of emissions on overburdened communities.[3]

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$2,007.0) This program change invests in technology updates such as replacing aging equipment, repairing monitoring shelters that have deteriorated over the past 30 years due to extreme weather, deploying new equipment and sites in rural, often low-income/minority areas, and modernizing data reporting tools critical during emergencies and emerging needs (e.g., COVID-19 pandemic, PFAS).

Statutory Authority:

Clean Air Act.

[2] Clean Air Act §§ 110(a)(2)(D) and 401.
[3] For more information on program performance, please see: https://www.epa.gov/airmarkets/progress.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$103,054.5	$97,000.0	$103,689.0	$6,689.0
Science & Technology	***$7,326.8***	***$7,895.0***	***$9,997.0***	***$2,102.0***
Total Budget Authority	$110,381.3	$104,895.0	$113,686.0	$8,791.0
Total Workyears	205.1	214.1	227.9	13.8

Program Project Description:

The Climate Protection Program supports implementation and compliance with greenhouse gas (GHG) emission standards for light-duty and heavy-duty vehicles developed under EPA's Federal Vehicle and Fuels Standards and Certification Program. Resources under this program also support compliance activities for implementing the National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy (CAFE) standards. Under authorities contained in the Clean Air Act and the Energy Policy Act, EPA is responsible for issuing certificates and ensuring compliance with both the GHG and CAFE standards.

FY 2022 Activities and Performance Plan:

Work in this program directly supports: Executive Order 14008: *Tackling the Climate Crisis at Home and Abroad*; and Executive Order 13990: *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*. Resources under this program will support implementation and compliance activities associated with EPA's GHG and NHTSA's fuel economy standards for light-duty and heavy-duty vehicles and engines. Resources will support the following activities:

Certification and Compliance

Implementation of the GHG emission standards for light-duty and heavy-duty vehicles and engines has significantly increased EPA's certification and compliance responsibilities to ensure the programs achieve their climate goals. These GHG emission standards are not only resulting in a changing fleet of vehicles but also have introduced numerous innovative features into the vehicle certification process that provide greater flexibility for manufacturers in how they comply with the standards. These features include new and more comprehensive trading programs, credits for off-cycle emission reductions, and new federal test procedures. In FY 2022, EPA will be implementing a substantially expanded "Phase 2" of the heavy-duty vehicle and engine GHG program. This implementation requires significant expansions of EPA's information technology systems, which provide an efficient means for manufacturers to apply for and receive certificates of conformity, to reflect the revised compliance and certification requirements of the new heavy-duty GHG standards.

Vehicle and Engine Testing Services

Since FY 2012, EPA's National Vehicle & Fuel Emissions Laboratory (NVFEL) has invested significant resources to maintain critical vehicle and engine testing equipment and capabilities that were upgraded in the 2000's to implement new standards for fuel, vehicle, and engine emissions. This includes updates to its four-wheel drive dynamometers and analytical systems needed to perform regulation development and certification testing of light-duty, medium-duty, and heavy-duty vehicles, including battery electric and hybrid electric technologies. NVFEL also has led the development and implementation of new test methods for accurately measuring the efficiency and range of electrified vehicles and is developing new methods for gathering in-use fuel efficiency data from vehicles tested on the road.

NVFEL is investing in expanded electric vehicle charging infrastructure in the laboratory to support anticipated future test requirements for light-duty and heavy-duty vehicles and is preparing for testing of hydrogen fuel cell technologies. NVFEL's ongoing facility modernization has been essential to the implementation of requirements for EPA's Phase 2 GHG regulations for heavy-duty and medium-duty vehicles. Importantly, it also has enabled greater production of scientific data on new and emerging vehicle and engine technologies, leading to the development of more advanced computer models to support EPA's rulemaking activities. Future equipment modernization is needed to sustain a level playing field between foreign and domestic manufacturers, revealing instances of non-compliance attributable to design or defect, and can lead to equal opportunities for manufacturers to benefit from developing innovative solutions to emissions challenges.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$68.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$2,034.0 / +2.3 FTE) This program change increases support for the National Vehicle and Fuel Emissions Laboratory compliance/certification work and mobile source vehicle emissions analysis. Additional resources at the lab support restoring capacity to test and certify engines, fuels, and vehicles to ensure compliance with regulatory standards, and to generate emissions data to support regulatory development work essential to tackling the climate change crisis. This investment includes $380.0 thousand in payroll costs.

Statutory Authority:

Clean Air Act; Pollution Prevention Act (PPA), §§ 6602-6605; National Environmental Policy Act (NEPA), § 102; Clean Water Act, § 104; Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), § 8001; Energy Policy Act of 2005, § 756.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$131,855.1	$138,020.0	$257,808.0	$119,788.0
Science & Technology	***$8,974.6***	***$7,154.0***	***$10,222.0***	***$3,068.0***
Total Budget Authority	$140,829.7	$145,174.0	$268,030.0	$122,856.0
Total Workyears	824.6	843.0	923.0	80.0

Program Project Description:

Federal support for the criteria pollutant and air toxics programs includes a variety of tools to characterize ambient air quality and the level of risk to the public from air pollutants and to measure national progress toward improving air quality and reducing associated risks. The Federal Support for Air Quality Management Program supports development of State Implementation Plans (SIPs) through modeling and other tools and assists states in implementing, attaining, maintaining, and enforcing the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The Program also supports development and provision of information, training, and tools to assist state, tribal, and local agencies, as well as communities, to reduce air toxics emissions and risks specific to their local areas. In addition, the Program supports activities related to the Clean Air Act (CAA) stationary source residual risk and technology review program. EPA is required to assess the level of risk remaining after promulgation of National Emission Standards for Hazardous Air Pollutants (NESHAP) that are based on Maximum Available Control Technology (MACT) within eight years of that promulgation. In addition, the Agency is required to review all NESHAP at least every eight years to determine if revisions are needed to reflect developments in practices, processes, and control technologies.

FY 2022 Activities and Performance Plan:

During FY 2022, as part of implementing key activities in support of attainment of the NAAQS, EPA will provide states and local air agencies with scientifically and technically sound assistance in developing SIPs. This assistance includes providing models, modeling inputs and tools, and technical data and guidance and identifying emission control options. EPA ensures national consistency in how air quality modeling is conducted as part of regulatory decision-making, including federal and state permitting programs, SIP-related actions, as well as how conformity determinations are conducted across the U.S. The Agency will work with states and local air agencies to ensure that particulate matter (PM) hot-spot analyses are conducted in a manner consistent with the transportation conformity regulation and guidance.

One of EPA's priorities is to fulfill its statutory and court-ordered obligations. In FY 2022, EPA will continue to conduct the periodically required "technology reviews" of NESHAP and conduct required risk assessments for MACT-based NESHAP. EPA will enhance risk assessment capabilities to better identify and determine impacts on communities. The Program will prioritize

work with an emphasis on meeting court-ordered deadlines, and also incorporate environmental justice considerations as part of the decision-making process. EPA will continue to provide information and assistance to states and communities through documents, websites, webinars, and training sessions on tools to help them provide input to environmental justice assessments that can inform risk reduction strategies for air toxics. EPA will continue to communicate effectively to, and collaborate with, environmental justice communities to address air toxics concerns. EPA will continue its multi-pollutant air quality management work with state and local areas, factoring environmental justice into prioritization efforts, including providing tools to support state, tribal and local governments in strategy development. EPA will continue to look at all pollutants in an industrial sector and identify ways to take advantage of the co-benefits of pollution control. The focus of these efforts is to address an individual sector's emissions comprehensively and to prioritize regulatory efforts to address the sources and pollutants of greatest concern to overburdened communities. In developing sector and multi-pollutant approaches, EPA is building innovative solutions that address the differing and cumulative nature of the multiple pollutants and associated industrial sectors.

EPA works with other internal and external stakeholders on improving ambient air monitoring networks and measurement techniques to fill data gaps and to better estimate population exposure to criteria and toxic air pollutants. To ensure data quality, EPA will continue to implement and manage independent quality assurance programs for national monitoring networks as well as for federal and commercial laboratories that produce ambient air monitoring data.

In FY 2022, EPA will work with partners to continue improving emissions factors and inventories, including the National Emissions Inventory. This effort includes gathering improved activity data from emissions monitoring and using geographic information systems and satellite remote sensing systems, where possible, for key point, area, mobile, and fugitive sources, and global emission events.

Performance Measure Targets:

Work under this program supports performance results in the Federal Support for Air Quality Management program under the EPM appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$463.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$2,605.0 / +11.0 FTE) This program change increases support for the development of science, technology, and methodologies to better implement the Clean Air Act, including enhancing risk assessment capabilities to better identify and determine impacts on communities, communicating and collaborating with environmental justice communities to address air toxics concerns, and improving ambient air monitoring networks and measurement techniques to fill data gaps to better estimate population exposure to criteria and toxic air pollutants. This investment includes $2,161.0 thousand in payroll costs.

Statutory Authority:

Clean Air Act.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$98,543.9***	***$96,783.0***	***$110,169.0***	***$13,386.0***
Total Budget Authority	$98,543.9	$96,783.0	$110,169.0	$13,386.0
Total Workyears	311.1	308.5	313.5	5.0

Program Project Description:

Under the Federal Vehicle and Fuels Standards and Certification Program, EPA develops, implements, and ensures compliance with national emission standards to reduce mobile source related air pollution from: light-duty cars and trucks; heavy-duty trucks and buses; nonroad engines and vehicles; and from the fuels that power these engines. The Program also evaluates new emission control technology and provides state, tribal, and local air quality managers and transportation planners with access to information on transportation programs and incentive-based programs.

As part of ensuring compliance with national emission standards, the Program tests vehicles, engines, and fuels, and establishes test procedures for federal emissions and fuel economy standards. The Program operates test cells that simultaneously measure criteria pollutants and greenhouse gas (GHG) emissions, reviews certification applications for light-duty vehicles and heavy-duty engines to approve applications for criteria pollutant and GHG emission standards and examines potential violations.

National Vehicle and Fuel Emissions Laboratory (NVFEL)
The NVFEL ensures air quality benefits and fair competition in the marketplace by conducting testing operations on motor vehicles, heavy-duty engines, nonroad engines, and fuels to certify that all vehicles, engines, and fuels that enter the U.S. market comply with all federal clean air, GHG, and fuel economy standards. The NVFEL conducts vehicle and engine emission tests as part of pre-production tests, certification audits, in-use assessments, and recall programs to ensure compliance with mobile source programs. The NVFEL also produces critical test data on new and emerging vehicle and engine technologies to support the development of future greenhouse gas and criteria pollutant regulations. Through cooperative partnerships and committee involvement, the lab leads the development and implementation of test methods and procedures for vehicles, engines, and fuels to ensure consistent data quality among manufacturers' labs, measure fuel efficiency, and verify compliance of electrified and conventional vehicles with EPA standards.

Renewable Fuel Standard (RFS)
The RFS Program was created under the Energy Policy Act of 2005 (EPAct), which amended the Clean Air Act, and was expanded under the Energy Independence and Security Act of 2007 (EISA). The RFS Program requires a certain volume of renewable fuel to replace or reduce the quantity of petroleum-based transportation fuel, heating oil, or jet fuel.

Supporting State and Local Governments

EPA works with state and local governments to ensure the technical integrity of the mobile source control emission benefits included in State Implementation Plans (SIPs) and transportation conformity determinations. EPA develops and provides information and tools to assist state, local, and tribal agencies, as well as communities, to reduce criteria pollutant and air toxics emissions and risks specific to their local areas. Reductions in emissions of mobile source air pollution, such as components of diesel exhaust, are achieved through: technical assistance of Clean Air Act mobile source programs in nonattainment and maintenance areas for EPA's national ambient air quality standards (NAAQS); establishing national emissions standards for vehicles, equipment, and fuels, research of mobile source health impacts and mitigation options; and partnership approaches working with state, local, and tribal governments, as well as a variety of non-governmental stakeholder groups.

Prioritizing Environmental Justice

In response to the Administration's priorities and goals, EPA's mobile source programs are developed and implemented to ensure environmental justice and equity. This includes: 1) outreach and inclusion throughout the regulatory development process; 2) analysis of current conditions to understand economic inequities potentially related to our regulatory policies – as well as disparities in exposure to mobile source air pollution experienced by minorities, low-income populations, and tribal communities; 3) analysis of the equity and air quality improvements from our regulatory actions and voluntary programs; 4) technical assistance to state and local governments to reduce criteria pollutant and other emissions through regulatory and non-regulatory strategies; and 5) exploration of non-regulatory mitigation measures to further target improvements in air quality for those disproportionately exposed to mobile sources of air pollution.

FY 2022 Activities and Performance Plan:

Work in this program directly supports the implementation of Executive Order 13990: *Protecting Public Health and the Environment* and *Restoring Science to Tackle the Climate Crisis*; and Executive Order 14008: *Tackling the Climate Crisis at Home and Abroad*.

Federal Vehicle and Fuels Standards and Certification Program

In FY 2022, the Federal Vehicle and Fuels Standards and Certification Program will continue to focus its efforts on certification decisions. The Agency will continue to perform its compliance oversight functions on priority matters, conducting compliance oversight tests where evidence suggests noncompliance. EPA will continue to conduct pre-certification confirmatory testing activities for emissions and fuel economy for passenger cars and expects to increase onroad measurements of in-use vehicle emissions. EPA anticipates reviewing and approving about 4,700 vehicle and engine emissions certification requests, including light-duty vehicles, heavy-duty diesel engines, nonroad engines, marine engines, locomotives, and others. Demand for EPA's certification services has increased significantly, due in part to the addition of exhaust and fuel evaporative emissions certification requirements for marine, other nonroad, and small spark-ignited engines. Accordingly, NVFEL has expanded its compliance testing capabilities in each of these areas.

EPA utilizes in-use emissions data provided by light-duty vehicle manufacturers to measure compliance and determine if any follow-up evaluation or testing is necessary. Since CY 2000, light-duty vehicle manufacturers have been required to test a number of newer and older in-use vehicles and provide the data to EPA, which receives over 2,000 test results from more than 6,000 vehicles annually. EPA reviews the data and determines if there are any specific vehicles, models, or manufacturers that are failing emissions standards in-use. The Agency will use this information submitted by light-duty manufacturers, together with emissions data collected at NVFEL, to determine if there are vehicle models which should be recalled and repaired to address excess in-use emissions and that should be identified for testing for the upcoming model year prior to granting the manufacturer a certificate of conformity, which allows the manufacturer to sell vehicles in the U.S.

Emission Standards for New Motor Vehicles

In FY 2022, EPA will take action to tackle climate change per the Presidential executive orders, by focusing on the transportation sector's largest contributors to GHG emissions: light-duty vehicles (LDVs) and heavy-duty vehicles (HDVs).

EPA is revising the light-duty vehicle GHG standards established under the previous Administration in April 2020 (the Safer Affordable Fuel Efficient Vehicles Rule), and plans to issue a proposed rule setting revised standards through model year (MY) 2026 by July 2021 and a final rule by the end of December 2021. Separately, EPA is undertaking a review of the prior Administration's withdrawal of the 2013 waiver of federal preemption given to California for its GHG standards and Zero Emission Vehicle mandate for light-duty vehicles. This review could lead to rescinding this withdrawal and a reinstatement of California's regulatory program.

The near-term rule will serve as a stepping-off point for longer-term standards. Under Executive Order 14008: *Tackling the Climate Crisis at Home and Abroad*, the President described the urgency of the global climate crisis and encouraged a whole of government approach to tackling it. One of EPA's actions under this EO will be to initiate a rulemaking to set strong standards for LDVs post-2026 that provide an incentive for transportation electrification. Many automakers have recently announced ambitious plans for electrifying their new LDV fleets in the 2030 to 2040 timeframe. EPA's standards will take into consideration these industry commitments.

In FY 2022, EPA also will take action to reduce GHG emissions from highway HDVs, the second-largest source of transportation GHG emissions. EPA will develop the next round of criteria and GHG emission standards for highway HDVs. The GHG elements of this multipollutant effort will build upon the final step of the "Phase 2" HD GHG standards that go into effect in CY 2027, and will recognize the impact that electrification of vehicles in this sector will have on future GHG standards for CY 2030 and beyond. One key focus for the GHG elements of this effort will be the shift from HDVs powered by internal combustion engines to those powered by zero emission battery or fuel-cell technologies. Several major truck manufacturers have announced their intention of electrify most of their HDVs in the 2035 to 2040 timeframe. EPA's future GHG standards for HDVs will build upon these industry commitments.

EPA will need to invest significant resources to address a myriad of new technical challenges to support these two sets of long-term rulemakings, which will include added LDV and HDV testing

and modeling capabilities at NVFEL. Key to this technical work is to understand the cost, feasibility, and infrastructure impacts of electrifying the broad range of products in the LDV and HDV sectors.

Fuel Economy Labeling Requirements

In FY 2022, EPA also will oversee compliance with vehicle fuel economy labeling requirements. In past years, EPA conducted in-use audits of manufacturer "coast-down" data, revealing issues in manufacturer data submitted to EPA and, as a result, found inaccurate fuel economy labels on more than a million vehicles from several well-known manufacturers. While EPA temporarily suspended its coast-down testing due to the COVID-19 pandemic, the Agency expects to resume this testing when public health guidance allows it.

Tier 3 Standards

In FY 2022, EPA will continue implementing the Tier 3 standards for light-duty vehicles and certifying manufacturers' fleets for vehicle MY 2022 and MY 2023. EPA is responsible for establishing the test procedures needed to measure tailpipe emissions and for verifying manufacturers' vehicle fuel economy data. As a result, the Agency will continue to maintain its critical laboratory equipment and testing resources to ensure that new cars and trucks are in compliance with the Tier 3 emissions standards.

Marine and Aircraft Emission Reduction Measures

EPA will continue working with the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) on programs to control pollutant emissions from marine and aircraft engines, respectively. EPA is supporting the State Department and Coast Guard on technical issues related to establishing measures to achieve GHG targets established at IMO. In FY 2022, EPA expects to transition from short-term to more ambitious medium-term measures. At ICAO, EPA has the opportunity to influence the emissions work to be performed over the next 3-year cycle, which will be decided in early FY 2022. Additionally, EPA is developing a domestic rule for aircraft engine PM standards, expected to be finalized in FY 2022.

In addition to the international efforts for aviation, EPA is continuing its work to address lead in aviation gasoline. In coordination with the Federal Aviation Administration (FAA) and working with airports, local air agencies, and communities, EPA is evaluating potential exposures to lead from the use of leaded aviation gasoline in piston-engine aircraft as well as potential mitigation measures.

Emissions Modeling

The Motor Vehicle Emission Simulator (MOVES) is the Agency's emission modeling system that estimates emissions for onroad and nonroad sources at the national, county, and project levels for criteria air pollutants, GHGs, and air toxics. In FY 2022, MOVES3, the most recently released version of EPA's model, will support the Agency's emission control programs, as well as provide critical support to states in their determination of program needs, including the development of SIPs, to meet the NAAQS. The Agency also will support users on any release of a new model version based on the best available data and science.

National Vehicle and Fuel Emissions Laboratory

EPA is pursuing an infrastructure upgrade project for the NVFEL. The Agency is evaluating an Energy Savings Performance Contract (ESPC), a private/public partnership contract vehicle run through the Department of Energy. ESPCs use the facilities' energy and operational savings to pay for most of the contract costs. EPA anticipates signing the proposed ESPC in FY 2022 with potential implementation costs in excess of $30 million.

In FY 2022, the mechanical, electrical, control, and building management systems at NVFEL will be at or beyond the end of useful life with the completion of the current, 25-year, ESPC. NVFEL provides all laboratory testing and support functions necessary for the Agency to certify that all vehicles, engines, and fuels sold in the United States are in compliance with all U.S. emission standards, representing close to 5,000 certificates issued on an annual basis. Additional resources are critical to support the ability of NVFEL to carry-out its mission-critical work of certifying vehicle compliance. Ensuring industry's compliance is a priority goal for EPA and an essential safeguard that a level playing field exists for manufacturers of vehicles and engines introduced into commerce in the United States.

Renewable Fuel Standards

A large portion of EPA's efforts on fuels will be centered on the implementation of the RFS program. In the statute, Congress established renewable fuel volume targets through FY 2022, leaving it to the Agency to establish the volumes for FY 2023 and beyond. By the end of FY 2022, EPA will issue a rulemaking to establish these volumes. In addition, EPA will continue the efforts associated with the ongoing implementation of the program. These include: 1) revising and improving the RFS regulations to improve its operation; 2) reviewing and approving the use of new biofuels and/or their feedstocks; 3) registering new facilities to enable them to generate RINs (the credits under the Program); 4) operating and upgrading the electronic moderated transaction system (EMTS) to provide oversight and verify compliance with the RFS Program; 5) ensuring the integrity of the RFS Program through enforcement actions against those using the program for fraudulent gain; and 6) supporting the Department of Justice in defending the Agency's implementation of the RFS Program in the numerous challenges in court.

In addition to the RFS Program, EPA will continue to implement its existing gasoline and diesel fuel quality standards and obligations under the Clean Air Act. This includes many of the same compliance and enforcement oversight activities mentioned above for the RFS. In addition, in late 2020 EPA finalized a fuel regulation streamlining rule that it will continue to implement in 2022. Finally, in 2022 EPA will continue its ongoing research into new opportunities to improve and/or protect fuel quality in ways that can reduce air pollution and improve public health and welfare.

EPA will continue to operate and maintain the credit trading systems under the RFS. EISA expanded the renewable fuels provisions of EPAct and requires additional studies in various areas of renewable fuel use. EISA also requires EPA to develop a comprehensive lifecycle GHG methodology to implement the Act's GHG threshold requirements for the RFS. Producers of new and advanced biofuels regularly seek to qualify their fuels under RFS, and EPA will continue to apply its lifecycle analysis to such fuels to evaluate and determine eligibility for the Program.

In FY 2022, EPA will maintain oversight of the RFS Program and continue to evaluate compliance with RFS provisions through its system, which is used to track the creation, trades, and use of billions of Renewable Identification Numbers (RINs) for compliance. The tracking system handles 4,000 to 6,000 submissions per day, typically averaging more than 20,000 transactions per day, and the generation of more than 1.4 billion RINs per month. RINs are generated with the production of qualifying renewable fuel and are used to achieve national RFS programmatic goals of reducing or replacing the quantity of petroleum-based transportation fuel, heating oil, or jet fuel produced.

In FY 2022, EPA will continue to implement its Fuel and Fuel Additive Registration program. The Agency will prioritize its review and decisions for Part 79 registrations.

In FY 2022, EPA will implement a rulemaking that streamlines and updates EPA's existing gasoline, diesel, and other fuels regulations to improve overall compliance assurance and maintain environmental performance, while reducing compliance burdens for industry, as well as EPA. This rule streamlines the existing fuels regulations by deleting expired provisions, eliminating redundant compliance provisions, removing unnecessary and out-of-date requirements, and replacing them with a single set of provisions that will apply across all gasoline, diesel, and other fuels programs under the current regulations. While the rule substantially reduced the overall volume of regulations, as with any regulatory change, implementing the new provisions will require substantial outreach and oversight by EPA to ensure regulated parties meet the new requirements, and will further necessitate investment in NVFEL's role as the fuels program reference standard for all regulated parties.

Supporting State and Local Governments

In FY 2022, EPA will continue to provide state and local governments with assistance in developing SIPs and transportation conformity determinations. EPA will continue to work with states and local governments to ensure the technical integrity of the mobile source emission estimates in their SIPs. EPA will assist in identifying control options available and provide guidance, as needed. In addition, in partnership with the Department of Transportation, EPA will ensure national consistency in how transportation conformity determinations are conducted across the U.S. and in the development of motor vehicle emissions budgets in SIPs, for use in conformity determinations.

EPA will continue to provide assistance to state and local transportation and air quality agencies working on $PM_{2.5}$ and PM_{10} hotspot analyses. This will help ensure the latest available information is used, is nationally consistent, and protects public health in local communities - including minority and low-income communities - near new or expanded highway and freight terminal projects with significant increases in diesel truck traffic. In addition, EPA will continue to support states with respect to Clean Air Act-required inspection and maintenance (I/M) programs that focus on in-use vehicles and engines. Basic and/or enhanced I/M testing is currently being conducted in almost 30 states with EPA technical and programmatic guidance. EPA also will continue to provide technical assistance to certain states considering changes or removal of low Reid Vapor Pressure (RVP) fuel programs.

Prioritizing Environmental Justice

In FY 2022, EPA will continue to work with a broad range of stakeholders - including communities with environmental justice concerns - to develop targeted, sector-based, and place-based incentives for diesel fleets (including school buses, ports, and other goods movement facilities) to limit emissions from older, pre-2007 diesel engines not subject to stringent emissions standards. Millions of people in the U.S. currently live and work near ports and can be exposed to air pollution associated with emissions from diesel engines at ports, including particulate matter, nitrogen oxides, ozone, and air toxics.[4] The near-port communities that bear the brunt of air pollution from these diesel engines are often comprised of low-income populations and people of color. EPA will focus its efforts on reducing mobile source emissions in and around ports through EPA's Ports Initiative.[5] EPA also is working with industry to bring about field testing and emissions testing protocols for a variety of innovative energy-efficient, emissions reducing technologies for the legacy fleet.

Performance Measure Targets:

(PM CRT) Number of certificates of conformity issued that demonstrate that the respective engine, vehicle, equipment, component, or system conforms to all of the applicable emission requirements and may be entered into commerce.	**FY 2021 Target**	**FY 2022 Target**
	4,700	4,700

EPA is currently evaluating its suite of measures and indicators related to environmental justice and climate change, including available data and programs where improved data sets are needed to develop useful performance measures for Environmental Justice and Climate Change Programs. Measures are under development in this program to address environmental justice and climate change.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$2,918.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$152.0) This change to fixed and other costs is an increase due to the recalculation of lab utilities.

- (+$10,316.0 / +5.0 FTE) This program change increases support program activities to address the climate crisis, including the development of analytical methods and analyses to support climate protection, specifically regulations to control greenhouse gas emissions from cars and trucks. This investment includes $930.0 thousand in payroll costs.

[4] For more information, please see the DERA Fourth Report to Congress, July 2019, which may be found at: https://www.epa.gov/cleandiesel/clean-diesel-reports-congress.

[5] For more information, please visit https://www.epa.gov/ports-initiative.

Statutory Authority:

Title II of the Clean Air Act; Motor Vehicle Information Cost Savings Act; Alternative Motor Fuels Act of 1988; National Highway System Designation Act; Energy Policy Act of 1992; Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU); Energy Policy Act of 2005; Energy Independence and Security Act of 2007.

Indoor Air and Radiation

Indoor Air: Radon Program
Program Area: Indoor Air and Radiation

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$2,680.4	$3,136.0	$3,167.0	$31.0
Science & Technology	***$39.9***	***$157.0***	***$157.0***	***$0.0***
Total Budget Authority	$2,720.3	$3,293.0	$3,324.0	$31.0
Total Workyears	8.5	9.0	9.0	0.0

Program Project Description:

Title III of the Toxic Substances Control Act (TSCA) authorizes EPA to take a variety of actions to address the public health risks posed by exposures to indoor radon. Under the statute, EPA studies the health effects of radon, assesses exposure levels, sets an action level, provides technical assistance to States, industry and the public, advises the public of steps they can take to reduce exposure and promotes the availability of reliable radon services and service providers to the public.

Radon is the second leading cause of lung cancer in the United States – and the leading cause of lung cancer mortality among non-smokers – accounting for about 21,000 deaths per year.[6] EPA's non-regulatory Indoor Air: Radon Program promotes actions to reduce the public's health risk from indoor radon. EPA and the Surgeon General recommend that people conduct a simple home radon test and, if levels above the EPA's guidelines are confirmed, reduce elevated levels by home mitigation using inexpensive and proven techniques. EPA also recommends that new homes be built using radon-resistant features in areas where there is elevated radon. Nationally, risks from radon have been reduced in many homes over the years, but many are still in need of mitigation. This voluntary program promotes partnerships between national organizations, the private sector, and more than 50 state, local, and tribal governmental programs to reduce radon risk.

This program, combined with the Indoor Air: Radon EPM Program, supports the EPA Radon Reference and Intercomparison Program (ERRIP) of the National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama. The ERRIP is the only federal National Institute of Standards and Technology (NIST) traceable primary radon reference and calibration program accessible to the U.S. radon industry and is a critical element of the framework for promoting the availability of reliable, quality radon services for the public.

[6] For additional information, please see: https://www.epa.gov/radon.

FY 2022 Activities and Performance Plan:

EPA will provide radon reference intercomparison samples to secondary radon chambers operating in North America. EPA will update and modernize program equipment and perform required QA/QC on program analytical process and procedures.

Performance Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- There is no change in program funding.

Statutory Authority:

Title III of the Toxic Substances Control Act (TSCA).

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$8,912.4	$7,661.0	$10,342.0	$2,681.0
Science & Technology	***$1,795.6***	***$1,735.0***	***$2,340.0***	***$605.0***
Hazardous Substance Superfund	$2,323.3	$1,985.0	$2,612.0	$627.0
Total Budget Authority	$13,031.3	$11,381.0	$15,294.0	$3,913.0
Total Workyears	56.4	53.8	66.7	12.9

Program Project Description:

EPA supports waste site characterization and cleanup by providing field and fixed laboratory environmental radiological and radioanalytical data and technical support, providing radioanalytical training to state and federal partners, and developing new and improved radioanalytical methods and field measurement technologies. The National Analytical Radiation Environmental Laboratory in Montgomery, Alabama, and the National Center for Radiation Field Operations in Las Vegas, Nevada, provide analytical and field operation support for radioanalytical testing, quality assurance, analysis of environmental samples, and field measurement systems and equipment to support site assessment, cleanup, and response activities in the event of a radiological accident or incident. Together, these organizations provide technical support for conducting site-specific radiological characterizations and cleanups.

FY 2022 Activities and Performance Plan:

In FY 2022, EPA, in cooperation with states, tribes, and other federal agencies, will provide ongoing site characterization and analytical support for site assessment activities, remediation technologies, and measurement and information systems. EPA also will provide essential training and direct site assistance, including field surveys and monitoring, laboratory analyses, health and safety, and risk assessment support at sites with actual or suspected radioactive contamination.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$33.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.
- (+$572.0 / +2.2 FTE) This program change will address critical gaps in EPA's radiological protection capacity including the ability to provide ongoing site characterization and analytical support for site assessment activities, remediation technologies, and measurement and information systems. This investment includes $372.0 thousand in payroll costs.

Statutory Authority:

Atomic Energy Act of 1954; Clean Air Act; Energy Policy Act of 1992; Nuclear Waste Policy Act of 1982; Public Health Service Act; Safe Drinking Water Act; Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978; Waste Isolation Pilot Plant Land Withdrawal Act of 1992; Marine Protection, Research, and Sanctuaries Act; Clean Water Act.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$2,616.2	$2,404.0	$2,908.0	$504.0
Science & Technology	***$3,402.1***	***$3,096.0***	***$4,039.0***	***$943.0***
Total Budget Authority	$6,018.3	$5,500.0	$6,947.0	$1,447.0
Total Workyears	34.9	33.3	41.4	8.1

Program Project Description:

The National Analytical Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and the National Center for Radiation Field Operations (NCRFO) in Las Vegas, Nevada, provide laboratory analyses and field sampling and analyses to respond to radiological and nuclear incidents. This work includes measuring and monitoring radioactive materials and assessing radioactive contamination in the environment. This program comprises direct scientific field and laboratory activities to support preparedness, planning, training, and procedure development. In addition, program personnel are members of EPA's Radiological Emergency Response Team (RERT), a component of the Agency's emergency response program, and are trained to provide direct expert scientific and technical assistance. EPA's RERT is part of the Nuclear Incident Response Team under the Department of Homeland Security.

FY 2022 Activities and Performance Plan:

In FY 2022, EPA's RERT will provide critical support for federal radiological emergency response and recovery operations under the National Response Framework and the National Oil and Hazardous Substances Pollution Contingency Plan. When necessary, EPA's RERT will complement routine operations (e.g., on-site technical support/consultation, fixed laboratory, and mobile laboratory analyses) and provide for the rapid collection of field measurements/samples and accurate radionuclide analyses of environmental samples.[7]

In FY 2022, NAREL and NCRFO will build capacity in core levels of readiness for radiological emergency responses; participate in critical emergency exercises; and respond, as required, to radiological incidents. NAREL and NCRFO will prioritize rapid deployment capabilities to ensure that field teams and laboratory personnel are ready to provide scientific data, field measurement capabilities, analyses, and updated analytical techniques for radiation emergency response programs across the Agency.

Performance Measure Targets:

[7] For additional information, please visit: https://www.epa.gov/radiation/radiological-emergency-response.

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$69.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$100.0) This change to fixed and other costs is an increase due to the recalculation of lab utilities.

- (+$774.0 / +5.0 FTE) This program change is an increase in support activities for preparedness work, including basic laboratory analytic functions. This investment includes $744.0 thousand in payroll costs.

Statutory Authority:

Homeland Security Act of 2002; Atomic Energy Act of 1954; Clean Air Act; Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA); Public Health Service Act (PHSA); Robert T. Stafford Disaster Relief and Emergency Assistance Act; Safe Drinking Water Act (SDWA).

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$10,934.8	$11,750.0	$13,837.0	$2,087.0
Science & Technology	***$235.5***	***$161.0***	***$168.0***	***$7.0***
Total Budget Authority	$11,170.3	$11,911.0	$14,005.0	$2,094.0
Total Workyears	35.2	37.2	47.2	10.0

Program Project Description:

Title IV of the Superfund Amendments and Reauthorization Act of 1986 (SARA) authorizes EPA to conduct and coordinate research on indoor air quality, develop and disseminate information, and coordinate risk reduction efforts at the federal, state, and local levels. Poor indoor air quality represents one of the largest risks in EPA's portfolio.[8] EPA uses a range of strategies, including partnerships with non-governmental, professional, federal, state and local organizations, to provide information, guidance and technical assistance to equip industry, the health care community, the residential, school and commercial building sectors, and the general public to take action to reduce health risks from poor indoor air quality in homes, schools, and other buildings. As technical experts working at the intersection of the built environment and health, EPA is focused on policy and guidance to improve building conditions, including for disproportionately impacted communities, to reduce indoor air risk and achieve improvements in environmental and health outcomes.

Tribes have identified indoor air quality as a high priority and often bear disproportionately high impacts from poor indoor air quality. For example, Native Americans and Alaska Natives are disproportionately exposed to increased indoor pollutant concentration and suffer from asthma-related health outcomes due to housing conditions.

FY 2022 Activities and Performance Plan:

Under this program, EPA will maintain indoor air monitoring and assessment equipment, conduct field measurements and assessments, and provide technical support and guidance for indoor air quality remediations, with a primary focus on assistance to tribal communities. In addition, EPA will conduct training and capacity building for tribal air quality professionals on indoor air assessments and field measurement technology and practices, including radon.

Performance Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

[8] For additional information, please see: https://www.epa.gov/iaq.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$7.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

Statutory Authority:

Title IV SARA; Title III Toxic Substances Control Act; Clean Air Act.

Enforcement

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$13,726.2***	***$14,000.0***	***$14,114.0***	***$114.0***
Hazardous Substance Superfund	$1,257.6	$1,145.0	$1,164.0	$19.0
Total Budget Authority	$14,983.8	$15,145.0	$15,278.0	$133.0
Total Workyears	57.3	68.9	68.9	0.0

Program Project Description:

The Forensics Support Program provides expert scientific and technical support for criminal and civil environmental enforcement cases, as well as technical support for the Agency's compliance efforts. EPA's National Enforcement Investigations Center (NEIC) is an environmental forensic center accredited for both laboratory analysis and field sampling operations that generate environmental data for law enforcement purposes. It is fully accredited under International Standards Organization (ISO) 17025, the main standard used by testing and calibration laboratories, as recommended by the National Academy of Sciences.[9] The NEIC maintains a sophisticated chemistry and physical science laboratory and a corps of highly trained inspectors and scientists with expertise across environmental media. The NEIC works closely with EPA's Criminal Enforcement Program to provide technical support (e.g., sampling, analysis, consultation, and testimony) to criminal investigations. The NEIC also works closely with other EPA programs to provide technical support, consultation, on-site inspection, investigation, and case resolution services in support of the Agency's Civil Enforcement Program.

The Forensics Support Program will continue to provide expert scientific and technical support for EPA's criminal and civil enforcement efforts, focus its work on collecting and analyzing materials to characterize contamination, and attribute it to individual sources and/or facilities. The work NEIC performs typically represents the most complex cases nationwide, requiring a level of expertise and equipment not found elsewhere in EPA, as well as support to evaluate and leverage emerging technologies.

FY 2022 Activities and Performance Plan:

Work in this program directly supports the Administration's priorities. The Forensics Support Program provides expert scientific and technical support for EPA's criminal and civil enforcement efforts. EPA's FY 2022 budget proposal provides analytical and scientific support for environmental forensics to ensure compliance with environmental laws, especially in underserved communities.

[9] Strengthening Forensic Science in the United States: A Path Forward, National Academy of Sciences, 2009, available at: http://www.nap.edu/catalog.php?record_id=12589.

Effective enforcement relies on the best available science. In FY 2022, NEIC will support the President's directive to "listen to science - and act. We must strengthen our clean air and water protections. We must hold polluters accountable for their actions. We must deliver environmental justice in communities all across America" (EO 14008, sec. 201).[10] To achieve these goals, the Agency will employ NEIC's environmental forensics expertise to investigate violations of environmental statutes and prosecute environmental crimes in communities that are disproportionally affected by pollution and environmental crime, and to target those areas more effectively.

In FY 2022, NEIC also will continue to streamline its forensics work, and identify enhancements to the Agency's sampling and analytical methods, using existing and emerging technology. The NEIC also will build on its previous progress to maximize the efficiency and effectiveness of its operations, reduce the time for completion of civil inspection reports, improve procurement processes, and continue to identify and implement further efficiencies in laboratory operations. The results of these efforts will inform EPA's work in FY 2022 and beyond.

The NEIC will seek to grow its support of EPA enforcement and compliance assurance programs. During FY 2019 and FY 2020, the NEIC accepted over 220 requests from all 10 EPA regions for technical enforcement support while declining over 149 requests due to a lack of capacity and staffing. During that same period, the NEIC provided testimony and expert reports in support of over 28 cases covering a variety of highly technical areas.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$123.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (-$9.0) This program change realizes progress made in maximizing the efficiency and effectiveness of operations, including reducing the time for completion of civil inspection reports, improving procurement processes, and continuing to identify and implement further efficiencies in laboratory operations in providing analytical and scientific support for environmental forensics to ensure compliance with environmental laws.

Statutory Authority:

Reorganization Plan No. 3 of 1970, 84 Stat. 2086, as amended by Pub. L. 98–80, 97 Stat. 485 (codified at Title 5, App.) (EPA's organic statute); Act to Prevent Pollution from Ships (MARPOL

[10] For additional information on the Executive Order on *Tackling the Climate Crisis at Home and Abroad*, please see: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/.

Annex VI); Asbestos Hazard Emergency Response Act; Clean Air Act; Clean Water Act; Emergency Planning and Community Right-to-Know Act; Federal Insecticide, Fungicide, and Rodenticide Act; Marine Protection, Research, and Sanctuaries Act; Mercury-Containing and Rechargeable Battery Management Act; Noise Control Act; Oil Pollution Act; Resource Conservation and Recovery Act; Rivers and Harbors Act; Safe Drinking Water Act; Small Business Regulatory Enforcement Fairness Act; Toxic Substances Control Act.

Homeland Security

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$990.3	$909.0	$1,008.0	$99.0
Science & Technology	***$12,926.2***	***$10,380.0***	***$14,342.0***	***$3,962.0***
Total Budget Authority	$13,916.5	$11,289.0	$15,350.0	$4,061.0
Total Workyears	22.2	26.6	32.6	6.0

Program Project Description:

Under the federal homeland security system, EPA is the Sector-Specific Agency responsible for implementing statutory and Presidential directives relating to homeland security for the water sector. EPA's Water Security Program is implemented through close partnerships with the water sector, state emergency response and water program officials, and other federal agencies—most notably the Department of Homeland Security (DHS), the U.S. Army Corps of Engineers, and the Intelligence Community. The Water Security Program engages federal, state, and local entities in defining annual objectives and identifying high priorities for immediate action.

FY 2022 Activities and Performance Plan:

This program provides critical resources to coordinate and support protection of the Nation's critical water infrastructure from terrorist threats and all-hazard events. In FY 2022, under this homeland security program, EPA will provide exercises and technical support to about 1,500 water utilities, state officials, and federal emergency responders to become more resilient to any natural or manmade incident that could endanger water and wastewater services. EPA will provide tools, exercises, and technical assistance which will address the highest risks confronting the water sector.

Natural Disasters and General Preparedness

Drought, floods, hurricanes, earthquakes, and other natural disasters represent a high risk to the water sector owing to their historical frequency of occurrence and their enormous potential for destruction. As evident from several recent natural disasters, the level of preparedness within the water sector varies significantly—with many utilities lacking adequate preparedness capabilities. In FY 2022, EPA will improve the preparedness of the water sector by providing nationwide exercises and technical support to address natural disasters and general preparedness with the objective to train water and wastewater systems, state officials, and emergency response partners. Specifically, EPA will:

- Provide in-person exercises and workshops which will include: Incident Command System / National Incident Management System exercises; drought response; flood response; state functional exercises (e.g., scenarios of hurricanes, floods, and earthquakes); resource

typing and site access workshops; a regional interstate emergency response exercise (e.g., hurricane), etc.;

- Conduct tabletop and functional exercises to improve the operation of intra-state and inter-state mutual aid agreements among water utilities;

- Implement lessons learned of relevance to the water sector from the most recent hurricane seasons, as identified by reports from the Federal Emergency Management Agency, the Water Agency Response Network, and EPA's Inspector General;

- Continue to address high priority security areas, as identified in the stakeholder generated *2017 Roadmap to a Secure and Resilient Water and Wastewater Sector,*[11] with an emphasis on projects addressing the following four priorities: 1) establishing the critical lifeline status of the water and wastewater sector and translating that definition into strong support for the sector's needs and capabilities; 2) improving detection, response, and recovery to contamination incidents; 3) advancing preparedness and improving capabilities of the water and wastewater sector for area-wide loss of water and power; and 4) advancing recognition of vulnerabilities and needed responses related to cyber risk management;

- Conduct nationwide exercises with three critical, inter-dependent sectors: healthcare, emergency services, and energy. Most incidents, particularly natural disasters, have underscored the mutual reliance on the water sector with other lifeline sectors. Through exercises and technical support with officials at the local, state, and federal levels from these other sectors, EPA will seek to improve coordination among critical lifeline sectors;

- Sustain operation of the Water Desk in the Agency's Emergency Operations Center in the event of an emergency by updating roles and responsibilities, training staff in the incident command structure, ensuring adequate staffing during activation of the desk, and coordinating with EPA's regional field personnel and response partners; and

- Develop annual assessments, as required under the National Infrastructure Protection Plan, to describe existing water security efforts and progress in achieving the sector's key metrics.

Water Security Initiative and Water Lab Alliance

Water Security Initiative. The Water Security Initiative (WSI) designs and demonstrates an effective system for timely detection and appropriate response to drinking water contamination threats and incidents through a pilot program that has broad application to the Nation's drinking water utilities in high-threat cities. The FY 2022 request includes $4.7 million for necessary WSI Surveillance and Response System (SRS) activities to: 1) continue refining technical assistance products based on the five full-scale SRS pilots; 2) implement a monitoring and response program for water utilities focused on source water chemical spills; and 3) provide direct technical

[11]For more information, please see:
https://www.waterisac.org/sites/default/files/public/2017_CIPAC_Water_Sector_Roadmap_FINAL_051217.pdf.

assistance to the dozens of water utilities that seek to leverage EPA's expertise in deploying their own warning system.

In FY 2022, EPA will train approximately 50 drinking water utilities in the design, operation, and response components of early contaminant warning systems.

In particular, EPA will:

- Continue efforts to promote the water sector's adoption of Water Quality Surveillance and Response Systems. This will help to rapidly detect and respond to water quality problems, such as contamination in the distribution system, in order to reduce public health and economic consequences through the development of several online exercise modules and webinars, as well as the provision of in-person direct technical assistance;

- Build upon the Drinking Water Mapping Application to Protect Source Waters (DWMAPS)[12] and the new chemical spill and storage notification requirements in the America's Water Infrastructure Act of 2018. EPA will collaborate with water sector stakeholders, water utilities, and state environmental agencies, to identify specific information (e.g., what chemicals are stored upstream from a surface water intake), including Emergency Planning and Community Right-to-Know Act (EPCRA) Tier 2 data, that are valuable to developing a comprehensive source water contamination threat inventory. EPA will initiate work in three states to develop a comprehensive inventory and characterization of source water contamination threats with the objective of developing a defined process that other states could emulate. This effort will help to ensure that drinking water utilities have access to the basic information (e.g., what chemicals are stored upstream from a surface water intake) necessary for implementing effective source water contamination detection and response systems;

- Conduct nationwide exercises for the SRS Capabilities Assessment Tool,[13] a web-based, easy to use, decision support tool that presents the user with a series of questions by which to assess existing detection and response capabilities, compare these existing capabilities to a target capability, and identify potential enhancements to address gaps between the existing and target capabilities; and

- Continue the successful SRS implementation pilot program[14] within the water sector - the purpose of which is to: demonstrate the application of SRS tools in designing and operating an early warning system for contamination events; illustrate additional applications of SRS tools, such as extending the SRS approach to source water monitoring; and identify champions, within the industry, for implementing surveillance and response systems.

Water Laboratory Alliance. In a contamination event, the sheer volume or unconventional type of samples could quickly overwhelm the capacity or capability of a single laboratory. To address this

[12] For more information, please see: https://www.epa.gov/sourcewaterprotection/drinking-water-mapping-application-protect-source-waters-dwmaps.
[13] For more information, please see: https://www.epa.gov/sites/production/files/2015-06/documents/srs_fact_sheet.pdf.
[14] For more information, please see: https://www.epa.gov/waterqualitysurveillance.

potential deficiency, EPA has established a national Water Laboratory Alliance (WLA) comprised of laboratories harnessed from the range of existing lab resources from the local (e.g., water utility) to the federal level (e.g., the Centers for Disease Control and Prevention's (CDC) Laboratory Response Network). In FY 2022, EPA will continue to promote, through exercises, expert workshops, and association partnerships, the Water Laboratory Alliance Plan,[15] which provides a protocol for coordinated laboratory response to a surge of analytical needs. Approximately 15 exercises or workshops were completed in FY 2020. In FY 2022, under WLA, EPA will train approximately 50 laboratories in improving their ability to handle potential problems associated with surge capacity and analytical method capabilities during an emergency.

In particular, EPA will:

- Continue to work with regional and state environmental laboratories to conduct exercises and continue efforts to automate the exercises, enabling laboratories and other members of the water sector to participate in exercises simultaneously and continue the innovative practice of pursuing validation of methods through exercises;

- Continue to expand the membership of the WLA with the intention of achieving nationwide coverage. The WLA has 160 member laboratories that are geographically diverse and can provide a wide range of chemical, biological, and radiological analyses.[16] For the WLA to become a robust infrastructure that can cover major population centers and address a diverse array of high priority contaminants, membership must continue to increase;

- Continue to target laboratories located in areas where the WLA has both inadequate membership levels and gaps in laboratory analytical capabilities;

- Coordinate with other federal agencies, primarily DHS, CDC, Food and Drug Administration, and Department of Defense, on biological, chemical, and radiological contaminants of high concern and how to detect and respond to their presence in drinking water and wastewater systems; and

- Continue to implement specific recommendations of the Water Decontamination Strategy as developed by EPA and water sector stakeholders (e.g., defining roles and responsibilities of local, state, and federal agencies during an event).

Cybersecurity

Cybersecurity represents a substantial concern for the water sector, given the ubiquitous access to critical water treatment systems from the internet. Recent attacks perpetrated by state and other actors and their clear potential to disrupt essential lifeline services, such as drinking water supplies, are prompting a growing recognition that the federal government should adopt a more aggressive posture towards cybersecurity. EPA will work with each state, territory, and tribe to develop and train a cadre of technical assistance providers who can work directly with individual water systems

[15] For more information, please see: https://www.epa.gov/waterlabnetwork.
[16] For more information, please see: https://www.epa.gov/dwlabcert/contact-information-certification-programs-and-certified-laboratories-drinking-water.

to assess and enhance their cybersecurity practices. This multi-year effort requires EPA to work with the Nation's 52,000 community water systems, many of which have limited or no technical capacity to address cyber issues. EPA also would seek to train individuals on how to integrate cyber training into their sanitary survey assessments.

In addition to expanding direct technical assistance, and in discussions with the National Security Council, EPA is pursuing regulatory options in the near-term for addressing cybersecurity in the water sector. Under this effort, EPA also is requesting resources to develop policies and/or regulations and associated activities. EPA will publish guidance for public water systems on what cybersecurity practices are recommended for safe operation and EPA will develop a nationwide training effort for all states, sanitary survey inspectors, and all public water systems on compliance and cybersecurity in general.

In FY 2022, EPA will continue to fulfill its obligations under Executive Order 13636[17]which designated EPA as the lead federal agency responsible for cybersecurity in the water sector. EPA will partner with the water sector to promote cybersecurity practices and gauge progress in the sector's implementation of these practices as directed by the Cybersecurity Enhancement Act of 2014. EPA will be conducting nationwide exercises and providing technical support on cybersecurity threats and countermeasures for about 200 water and wastewater utilities. The EPM Homeland Security: Critical Infrastructure Protection Program also can support cybersecurity related work.

Specifically, EPA will:

- Conduct one-day classroom exercises, at locations distributed nationally, on water sector cybersecurity. The exercises will address cybersecurity threats (including ransomware), vulnerabilities, consequences, best practices, and incident response planning;

- Update and/or develop new course materials owing to the evolving nature of cyber threats, such as the recently documented role of Russian state actors in infiltrating water system industrial control processes and business enterprise functions;

- Develop brief, targeted guidance documents for underserved segments of the water sector, such as small systems and technical assistance providers; and

- Continue to implement a new training program for technical assistance providers that will create a nationwide, state-level network capable of providing direct assistance to water utilities in adopting and tracking cybersecurity practices in adopting and tracking cyber security practices as recommended in the sanitary survey guidance.

America's Water Infrastructure Act (AWIA)

In FY 2022, EPA will continue its efforts to fulfill the mandates of the Community Water System Risk and Resilience section of AWIA requiring community water systems, serving a population

[17] For more information, please see: https://www.dhs.gov/publication/executive-order-13636-improving-critical-infrastructure-cybersecurity.

greater than 3,300, to prepare risk assessments and emergency response plans. EPA will provide technical assistance to these systems on how to conduct resilience assessments, prepare Emergency Response Plans (ERPs), and certify completion of these assessments and plans. In FY 2020, 22 trainings were completed on how to appropriately prepare Risk and Resilience Assessments (RRA) and ERPs. Additionally, 526 large systems certified the completion of their RRAs. In FY 2022, EPA, as required by the law, also will provide guidance to community water systems serving fewer than 3,300 people on how to develop a risk assessment and ERPs. EPA will provide technical assistance to water systems to address drinking water vulnerabilities where EPA determines an urgent and immediate need. The EPM Homeland Security: Critical Infrastructure Protection Program also can support AWIA homeland security related work.

Performance Measure Targets:

Work under this program supports Safe Drinking Water Act implementation and compliance and performance results in the Drinking Water Programs, under the EPM appropriation, to support safe drinking water for the nation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$89.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$3,873.0 / +6.0 FTE) This increase of resources and FTE supports the Water Sector Cybersecurity Program to enhance cyber incident preparation, response, recovery, information sharing, and intelligence for water utilities to protect infrastructure. This increase also includes $1,037.0 thousand in payroll costs and essential workforce support costs.

Statutory Authority:

Safe Drinking Water Act, §§ 1431-1435; Clean Water Act; Public Health Security and Bioterrorism Emergency and Response Act of 2002; Emergency Planning and Community Right-to-Know Act, §§ 301-305.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$27,021.6***	***$24,852.0***	***$25,545.0***	***$693.0***
Hazardous Substance Superfund	$32,992.9	$33,020.0	$33,264.0	$244.0
Total Budget Authority	$60,014.5	$57,872.0	$58,809.0	$937.0
Total Workyears	119.3	124.1	125.8	1.7

Program Project Description:

Exposure to hazardous chemicals, microbial pathogens, and radiological materials released into the environment could pose catastrophic consequences to the health of first responders and American citizens. EPA has responsibility, under legislation and Presidential Directives, to remediate contaminated environments created by incidents such as terrorist attacks, industrial accidents, or natural disasters.

The Homeland Security Research Program (HSRP) is one of six integrated and transdisciplinary research programs in EPA's Office of Research and Development. Each of the six integrated and transdisciplinary research programs is guided by a Strategic Research Action Plan (StRAP) that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *HSRP FY 2019-2022 StRAP* continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

These StRAPs continue to reflect the research needs of the Agency's program and regional offices, states, and tribes. The StRAPs received active collaboration and involvement from EPA and its stakeholders, which ensures that EPA's scientific efforts are responsive to today's environmental concerns.

EPA's disaster-related responsibilities are described by the following three objectives in the *HSRP's 2019-2022 StRAP*: 1) contaminant characterization and consequence assessment; 2) environmental cleanup and infrastructure remediation; and 3) systems approaches to preparedness and response.

Funding supports EPA in carrying out the primary mission essential function, including EPA's efforts to help communities prepare for, endure, and recover from disasters – safeguarding their economic, environmental, and social well-being. HSRP collaborates with state, local, and private sector organizations and key federal agencies[18] to prioritize research needs and prevent the duplication of scientific and technical work. HSRP delivers effective tools, methods, information,

[18] Partners include: Department of Homeland Security (DHS), Department of Defense (DOD), Centers for Disease Control and Prevention (CDC), Federal Bureau of Investigation (FBI), National Institute of Health (NIH), National Science Foundation (NSF), Department of Energy (DOE), and Department of Agriculture (USDA).

and guidance to local, state, and federal decision-makers that address both critical terrorism-related issues and natural or manmade disasters.

EPA also is responsible for operating and maintaining the network of near real-time radiation monitors, known as *RadNet,* under the Nuclear/Radiological Incident Annex to the National Response Framework. This network is critical in responding to large-scale incidents such as the accident at the Fukushima nuclear facility and is an EPA Critical Infrastructure/Key Resource asset. This monitoring network is supported by the IT system known as ARaDS, the Analytical Radiation Data System.

Recent accomplishments include:

- *Supporting EPA's Role in COVID-19 Response:* HSRP was instrumental in EPA's role in supporting reducing transmission of COVID-19 from the environment. HSRP worked with its EPA Program Office partners and with other federal, state, and local stakeholders (including DHS, CDC, and local transit authorities) to provide timely and reliable information from real-time research to address agency and stakeholder pressing needs.

  The HSRP provided the following information:
  - effective cleaning and disinfection approaches for specific scenarios,
  - understanding of the potential effectiveness and utility of antimicrobial coating products claiming to provide residual disinfection of surfaces,
  - determination of the effectiveness of disinfection devices such as UV lights,
  - methods for disinfection of personal protective equipment, and
  - assessment of technologies designed for reducing airborne transmission of viruses, including development of test methodologies useful at relevant scale consistent with the actual technology field use.

  Research findings were regularly updated and communicated with a wide audience via webinars[19] (with attendance in the thousands), regular meetings with stakeholders and associations, and posted on the EPA COVID-19 research website[20]. Stakeholders (including the New York City Metro Transit Authority, the Los Angeles Metro, and many others) used the HSRP research to make informed decisions on their cleaning and disinfection approaches.

- *Supporting Preparedness for Bio-incident Response:* According to the National Biodefense Strategy (NBS)[21], biological threats are among the most serious threats facing the United States and the international community. HSRP's biological response (consequence management) research is part of the coordinated effort under the NBS to combat the real and serious biothreats our country faces, whether they arise from natural outbreaks of disease, accidents involving high consequence pathogens, or the actions of terrorists or state actors. HSRP is focused on developing capabilities to protect human

[19] For more information, please see: https://www.epa.gov/emergency-response-research/webinar-series
[20] For more information, please see: https://www.epa.gov/healthresearch/research-covid-19-environment
[21] For more information, please see:
https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/09/National-Biodefense-Strategy.pdf

health and minimize the consequences of a biological incident, including public health emergencies arising from natural outbreaks. One important aspect of consequence management is rapidly and effectively determining areas of concern for public health due to exposure to pathogens in our everyday environments. Environmental sampling is critical for effective response to bio-incidents, specifically for addressing persistent biological agents like *Bacillus anthracis* spores or other pathogens that can survive or propagate in the environment (e.g., in biofilm or other host vectors). Various sampling methods have been developed and evaluated for characterizing and clearing potentially contaminated indoor sites; the performance of these sampling methods is not yet assessed for use in outdoor environments. To address this gap, HSRP conducted research to evaluate the detection and recovery of spores using various sampling methods on common urban outdoor surfaces.[22] This information will help responders determine which methods to consider for their specific situation. In addition, HSRP developed a virtual reality (VR) platform[23] for training personnel on biological surface sampling techniques. The training platform addresses the difficulty in training responders in realistic bio-incident situations by creating an immersive experience that allows the user to explore and interact with their environment through the use of VR. The sampling method evaluation and VR training platform provide essential resources to effectively respond to environmental contamination from bio-incidents.

- *Environmental Resilience Tools Wizard:* The Environmental Resilience Tools Wizard[24] addresses environmental problems associated with disasters and homeland security incidents that can have significant impact on human health. The wizard contains a database of curated EPA resilience tools and resources, including characteristics about each resource (e.g. resilience application, format, audience, scale, specialized requirements). The wizard helps to ensure communities have ready access to resources that can be directly used to build community resilience to disasters. The development of the wizard involved searching for, identifying, and categorizing the resources as well as designing and developing the tool interface. The wizard is intended to be used by emergency managers who need to address environmental aspects of resilience and environmental managers who need to address disaster resilience, including EPA Regional offices, state and local agencies, and utilities. One additional significant aspect of this tool is its usefulness in translating technical information about individual tools into resilience applications for audiences who have diverse expertise and resilience interests.

- *Improving Drinking Water Resilience:* Drinking water systems face multiple challenges, including natural disasters, aging infrastructure, water quality concerns, uncertainty in supply and demand, environmental emergencies, and terrorist attacks. All of these have the potential to disrupt a large portion of a water system causing damage to infrastructure and outages to customers. Increasing resilience to these types of challenges is essential to

[22] For more information, please see: Comparison of surface sampling methods for an extended duration outdoor biological contamination study, https://link.springer.com/article/10.1007/s10661-020-08434-8.
[23] For more information, please see: Biological Sampling Training Simulator https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CESER&dirEntryId=349129.
[24] For more information, please see: Environmental Resilience Tools Wizard, https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=349765&Lab=CESER.

improve overall water security. The Water Network Tool for Resilience (WNTR)[25] is a software package allowing for end-to-end evaluation of drinking water infrastructure's resilience to disasters. The software improves upon the existing EPA software (EPANET) capabilities by fully integrating hydraulic and water quality simulation, damage estimates and response actions, and resilience metrics into a single platform. This tool is important for drinking water systems around the world who want to better understand how their water systems can withstand natural disasters like earthquakes, floods, and power outages.

FY 2022 Activities and Performance Plan:

Work in this program is subject to evaluation by the Agency's Board of Scientific Counselors (BOSC), which is an independent expert body that performs evaluations and lends advice on the strategic research planning for EPA's Research and Development Program.

The following work is reflected in the *HSRP FY 2019-2022 StRAP*. Research is planned and prioritized based on the needs of end-users of this science, including regional On-Scene Coordinators, water utility companies, states, and EPA program and regional offices.

Characterizing Contamination and Assessing Consequence. Research on contaminant characterization, coupled with an understanding of exposure potential, can be used to inform the public health consequences of contaminant exposure. HSRP addresses how contaminants behave in water systems and the built and natural environment, including the development of capabilities to support decision makers in their assessment of contamination threats to public health. HSRP will develop contaminant detection, environmental sampling, and analytical capabilities. These research areas provide essential information to support environmental response and remediation decision making to protect public health and the environment. In FY 2022, HSRP will:

- Conduct studies on biological, chemical, and radiological contaminant fate, transport, and inactivation and removal in water and wastewater systems to inform mitigation decisions.

- Develop rapid and widely-available biological sample collection and analysis methods for outdoor environmental matrices and protocols for target biological agent analysis.

- Develop sampling strategy and data management tools for wide-area biological incidents for urban wide-area environments.

- Develop indoor contaminant mapping capabilities for supporting radiological remediation decision making.

Environmental Cleanup and Infrastructure Remediation. EPA has extensive expertise in cleaning up contamination associated with accidental spills and industrial accidents. However, experience in remediating chemical, biological, radiological or nuclear (CBRN) contamination, released over wide areas such as outdoor urban centers or impacted water systems, is lacking. Such a release can pose a continual challenge for remediation with long-standing environmental and health

[25] For more information, please see: Water Network Tool for Resilience (WNTR) https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=349798&Lab=CESER.

consequences. As the lead agency overseeing the water sector, EPA addresses water sector research needs identified by the Water Sector Coordinating Council and the Water Government Coordinating Council's Critical Infrastructure Partnership Advisory Council.[26]

EPA research under HSRP aims to fill the most critical capability gaps so that EPA can make the most informed mitigation and remediation decisions. HSRP research will focus on: 1) wide-area decontamination research to develop capabilities for addressing hazardous contaminants in the environment, including indoor and outdoor areas, 2) water treatment and decontamination of water systems, and 3) waste management as part of the response and remediation efforts. In FY 2022, HSRP will:

- Develop decontamination methods for biological agents that can effectively minimize the risk of transmission from environmental matrices, including research useful to support reducing environmental transmission in pandemic or other naturally occurring outbreaks.

- Develop decontamination methods for chemical agent contaminated areas, including methods for Non-Traditional Agents, opioids, and biotoxins.

- Conduct cybersecurity research to assess the impact to drinking water infrastructure from cyberattack.

- Develop decontamination approaches at the bench, pilot, and the full-scale Water Security Test Bed for contaminated drinking water infrastructure.

- Develop decision making tools to support waste management of chemical, biological, and radiological contaminated waste by assessing aerial photography, remote sensing, options for waste recyling/reusing, and best practices to minimize social, economic and environmental impacts.

- Improve on-site and off-site management of contaminated water and associated waste streams.

System Approaches to Preparedness and Response. Transitioning the research into field ready capabilities involves ensuring that decision makers and responders have knowledge of and access to the latest information. Decision makers need access to tools and information built from a systems approach where each of the research areas are brought together through their interdependencies and relative impacts. Priorities for HSRP address the development of systems-based tools by pulling together the connected elements of the research products to provide technical support and decision-support tools and this ensures that information is readily and easily accessible during an emergency. In FY 2022, HSRP will:

- Assess community resilience and better understand social aspects of remediation through the development of tools and training materials. This development will help local agencies

[26] The Water Sector Coordinating Council is a "self-organized, self-run, and self-governed council" composed of water utilities. The Water Government Coordinating Council is responsible for interagency coordination of efforts related to the water sector.

plan for resilience to disasters, incidents, and climate changes by identifying risks and vulnerabilities using indicators from locality-based knowledge and data.

- Develop integrated decision-support tools to enhance resiliency, response, and recovery from natural and man-made disasters. This development will improve decision making, data collection and management, and communication for responders during CBRN incident response as well as response to other large-scale, complex disasters.

Radiation Monitoring. The *RadNet* fixed monitoring network provides near real-time radiation monitoring coverage near each of the 100 most populous U.S. cities, as well as expanded geographic coverage for a total of 140 monitoring sites. The *RadNet* air monitoring network provides the Agency, first responders, and the public with greater access to data, and, should there be a radiological emergency, improves officials' ability to make decisions about protecting public health and the environment during and after the incident. Additionally, the data is used by scientists to better characterize the effect of a radiological incident.

In FY 2022, the Agency will continue to operate the *RadNet* air monitoring network, continue to add exposure rate meter capability to the network, and provide essential maintenance to the network. To best maximize resources, exposure rate meter capability will be added to monitors when needed repairs are called for. This expansion will enhance the federal government's ability to effectively communicate radiation measurement information to the public and to non-technical decision makers after a radiological release. In addition to aiding in explaining data to the public and decision makers, the addition of exposure rate meters aligns EPA's monitoring system with that of the international community.

Research Planning:

The BOSC provides advice and recommendations to EPA's Research and Development Program on technical and management issues of its research programs. HSRP and the HSRP Subcommittee of the BOSC will continue to meet regularly over the next several years to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability, and timeliness of particular research products. This provides evidence for how research products are being used and by whom. Through the evaluation process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. The Agency is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement[27] is designed to inform states about EPA's research programs and its role within EPA, and to better understand the science needs of state environmental and health agencies. Key partners at the state level include the Environmental Council of the States—with its Environmental Research Institute of the States and Interstate Technology and Regulatory Council—and the Association of State and Territorial Health Officials, as well as state media

[27] For more information, please see: https://www.epa.gov/research/epa-research-solutions-states.

associations such as the Association of Clean Water Administrators and the Association of State Drinking Water Administrators.

Performance Measure Targets:

Work under this program supports performance results in the Research: Chemical Safety and Sustainability Program under the S&T appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$632.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (-$228.0) This change to fixed and other costs is a decrease due to the recalculation of lab fixed costs.

- (+$521.0 / +1.7 FTE) This net program change reflects an increase to support research efforts to identify and address emerging threats to the water sector. This includes $293.0 thousand in payroll costs and essential workforce support costs.

- (-$232.0) This program change decreases resources for radiological emergency preparedness and reflects balancing of coordination efforts with partner agencies and other program efforts to maximize resources, including adding exposure rate meter capability to RadNet monitors when repairs are needed to those monitors.

Statutory Authority:

Atomic Energy Act of 1954; Clean Air Act, §§ 102, 103; Safe Drinking Water Act, §§ 1431-1435, 1442; Robert T. Stafford Disaster Relief and Emergency Assistance Act; National Defense Authorization Act for Fiscal Year 1997, §§ 1411-1412; Public Health Security and Bioterrorism Preparedness Response Act of 2002; Toxic Substances Control Act, § 10; Oil Pollution Act; Pollution Prevention Act; Resource Conservation and Recovery Act; Emergency Planning and Community Right-to-Know Act; Clean Water Act; Federal Insecticide, Fungicide, and Rodenticide Act; Federal Food, Drug, and Cosmetic Act; Food Quality Protection Act; Food Safety Modernization Act, §§ 203, 208.

Homeland Security: Protection of EPA Personnel and Infrastructure

Program Area: Homeland Security

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$4,175.9	$4,959.0	$5,139.0	$180.0
Science & Technology	***$443.0***	***$501.0***	***$501.0***	***$0.0***
Building and Facilities	$14,325.7	$6,676.0	$6,676.0	$0.0
Hazardous Substance Superfund	$994.6	$1,030.0	$1,030.0	$0.0
Total Budget Authority	$19,939.2	$13,166.0	$13,346.0	$180.0
Total Workyears	7.7	9.2	9.2	0.0

Total workyears in FY 2022 include 9.2 FTE to support Homeland Security Working Capital Fund (WCF) services.

Program Project Description:

This program supports activities to ensure that EPA's physical structures and assets are secure and operational and that physical security measures are in place to help safeguard staff in the event of an emergency. These efforts also protect the capability of EPA's vital laboratory infrastructure assets. Specifically, funds within this appropriation support security needs for the National Vehicle and Fuel Emissions Laboratory (NVFEL).

FY 2022 Activities and Performance Plan:

In FY 2022, the Agency will continue to provide enhanced physical security for the NVFEL and its employees. This funding supports the cost of security enhancements required as part of an agency security assessment review.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- There is no change in program funding.

Statutory Authority:

Intelligence Reform and Terrorism Prevention Act of 2004; Homeland Security Act of 2002; Reorganization Plan No. 3 of 1970, 84 Stat. 2086, as amended by Pub. L. 98–80, 97 Stat. 485 (codified at Title 5, App.) (EPA's organic statute).

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$86,699.8	$82,715.0	$86,744.0	$4,029.0
Science & Technology	***$3,473.7***	***$3,072.0***	***$3,121.0***	***$49.0***
Hazardous Substance Superfund	$15,168.6	$13,826.0	$15,202.0	$1,376.0
Total Budget Authority	$105,342.1	$99,613.0	$105,067.0	$5,454.0
Total Workyears	442.3	482.4	486.4	4.0

Total workyears in FY 2022 include 172.0 FTE to IT/Data Management working capital fund (WCF) services.

Program Project Description:

The work performed under the Information Technology/Data Management (IT/DM) Program supports human health and the environment by providing critical IT infrastructure and data management. Science and Technology (S&T) resources for EPA's IT/DM Program fund the following activities: Quality Program,[28] EPA National Library Network, and One EPA Web.

The Quality Program provides quality policies and practices intended to ensure all environmentally related data activities performed by or for the Agency will result in the production of data that are of adequate quality to support their intended uses. The Quality Program provides Quality Assurance (QA) policies, training, oversight, and technical support to assist EPA's programs in implementing quality management systems for all environmental data operations. It also oversees the implementation of EPA's Information Quality Guidelines. EPA's National Library Network provides information resources and services to EPA staff and to the public to support the mission of EPA. One EPA Web provides accessible, relevant, timely, accurate, and complete environmental information to the public through EPA's internet pages, primarily www.epa.gov.

FY 2022 Activities and Performance Plan:

EPA's Quality Program provides technical support to all EPA offices and laboratories in implementing EPA quality policies, procedures, and standards. In FY 2022, the Quality Program will continue to manage and provide oversight for the Information Quality Guidelines to ensure that information disseminated by or for EPA conforms with the *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency*[29] criteria.

In FY 2022, the Quality Program will facilitate the development of the Agency's responses to public requests for correction of information disseminated by EPA and report this information to the Office of Management and Budget (OMB). The Quality Program also will continue to focus

[28] For more information about EPA's Quality Program, please see: http://www.epa.gov/quality.
[29] For more information, please see: https://www.epa.gov/quality/guidelines-ensuring-and-maximizing-quality-objectivity-utility-and-integrity-information.

on implementing recommendations from the OIG Audit Report, *EPA Needs to Address Internal Control Deficiencies in the Agencywide Quality System*,[30] including review and action on all outdated quality policies, procedures, and guidance documents, and implementation of agencywide training modules. The Program will give priority to implementation of a revised Environmental Information Quality Policy and Environmental Information Quality Procedure, as well as development of an agencywide Quality Program Strategic Plan. The Quality Program will work to fully implement EPA's State and Tribal Quality Assurance Project Plans (QAPPs) directive,[31] and develop mechanisms to ensure that all work conducted at EPA, including work by contractors and grantees, adheres effectively to the agencywide quality system.

The Agency's S&T resources for IT/DM also will help provide library services through the EPA National Library Network to all EPA employees and access to environmental information to the public, as well as support the hosting of EPA's websites and web pages. One EPA Web will continue to manage content and support internal and external users with information on EPA business, support employees with internal information, and provide a clearinghouse for the Agency to communicate initiatives and successes.

In FY 2022, EPA will work to transform the Agency's libraries to meet the needs of the 21st Century. This involves operating in an increasingly online and mobile environment; providing services and resources at the customer's point of need; prioritizing the thorough assessment of print materials to support strategic space usage; utilizing detailed data to ensure print collections are highly relevant to the Agency's needs and centralizing core services; and relying on technology and a team of professional librarians to disseminate information and connect people to resources they need to support their work.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from (Dollars in Thousands):

- (+$27.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$22.0) This program change increases support for IT infrastructure.

[30] For more information, please see: https://www.epa.gov/office-inspector-general/report-epa-needs-address-internal-control-deficiencies-agencywide-quality.
[31] For more information, please see: https://www.epa.gov/sites/production/files/2016-06/documents/r5-final_0.pdf.

Statutory Authority:

Reorganization Plan No. 3 of 1970, 84 Stat. 2086, as amended by Pub. L. 98–80, 97 Stat. 485 (codified at Title 5, App.) (EPA's organic statute); Federal Information Technology Acquisition Reform Act; Federal Information Security Modernization Act (FISMA); Government Performance and Results Act (GPRA); Government Management Reform Act (GMRA); Clinger-Cohen Act (CCA); Rehabilitation Act of 1973 § 508.

Operations and Administration

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$285,437.3	$285,441.0	$297,748.0	$12,307.0
Science & Technology	***$68,812.7***	***$67,500.0***	***$68,533.0***	***$1,033.0***
Building and Facilities	$32,216.3	$27,076.0	$56,076.0	$29,000.0
Leaking Underground Storage Tanks	$1,066.0	$836.0	$837.0	$1.0
Inland Oil Spill Programs	$640.2	$682.0	$683.0	$1.0
Hazardous Substance Superfund	$82,734.0	$68,727.0	$72,801.0	$4,074.0
Total Budget Authority	$470,906.5	$450,262.0	$496,678.0	$46,416.0
Total Workyears	305.2	315.4	315.4	0.0

Total workyears in FY 2022 include 5.4 FTE to support Facilities Infrastructure and Operations working capital fund (WCF) services.

Program Project Description:

Science and Technology (S&T) resources in the Facilities Infrastructure and Operations Program fund the Agency's rent, utilities, and security. The Program also supports centralized administrative activities and support services, including health and safety, environmental compliance and management, facilities maintenance and operations, space planning, sustainable facilities and energy conservation planning and support, property management, mail, and transportation services. Funding for such services is allocated among the major appropriations for the Agency.

In response to the COVID-19 pandemic, EPA will continue ensuring the safety of EPA facilities and personnel by following the EPA Workplace Safety Plan in accordance with CDC guidelines. This includes adherence to requirements for mask-wearing, occupancy limits, procuring disinfecting and cleaning supplies, hand sanitizer for use by facility personnel and EPA staff, promoting physical distancing through signage, and procuring safety shields for personnel with increased contact with other people (e.g., security guards, badging office personnel, and administrative staff).

FY 2022 Activities and Performance Plan:

In FY 2022, EPA will continue to invest in the reconfiguration of EPA's workspaces, enabling the Agency to release office space and avoid long-term rent costs, consistent with HR 4465,[32] the *Federal Assets Sale and Transfer Act of 2016*. EPA is implementing a long-term space consolidation plan that will aim to reduce the number of occupied facilities, consolidate and optimize space within remaining facilities, and reduce square footage wherever practical. EPA also

[32] For additional information, please refer to: https://www.congress.gov/bill/114th-congress/house-bill/4465, *Federal Assets Sale and Transfer Act of 2016*.

will continue to work to enhance its federal infrastructure and operations in a manner that increases efficiency.

EPA's long-term consolidation plan for FY 2018 – FY 2022 has the potential to provide a cumulative annual rent avoidance of approximately $28 million across all appropriations by releasing 850,641 square feet. This will help offset EPA's escalating rent and security costs. In FY 2020, EPA released 116,425 square feet of unused office and warehouse space and is planning to release an additional 26,017 square feet in FY 2021. Planned consolidations and space releases in FY 2022 will allow EPA to release an expected 467,345 square feet of space. For FY 2022, the Agency is requesting $29.9 million for rent, $17.7 million for utilities, and $13.7 million for security in the S&T appropriation. EPA uses a standard methodology to ensure that rent charging appropriately reflects planned and enacted resources at the appropriation level.

In support of Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*,[33] EPA will work to secure physical and operational resiliency for agency facilities. The Agency will continue to take aggressive action to reconfigure EPA's workplaces with the goal of reducing long-term rent costs while increasing EPA facility resiliency and sustainability to combat the effects of climate change and ensuring a space footprint that accommodates a growing workforce. Space consolidation and reconfiguration enables EPA to reduce its footprint to create a more efficient, collaborative, and technologically sophisticated workplace. However, even if modifications are kept to a minimum, each move requires initial funding to achieve long-term cost avoidance and sustainability goals.

EPA will continue to manage lease agreements with the General Services Administration (GSA) and private landlords, and maintain EPA facilities, fleet, equipment, and fund costs associated with utilities and building security needs. In line with Executive Orders 14008[34] and 13990,[35] EPA will pursue aggressive energy, water, and building infrastructure requirements with emphasis on environmental programs (e.g., Environmental Management Systems, Environmental Compliance Programs, Leadership in Energy and Environmental Design (LEED) Certification, alternative fuel use, fleet reductions, telematics, sustainability assessments). This investment will support EPA facilities infrastructure (e.g., architectural and design) and mechanical systems (e.g., electrical, water/steam, HVAC), which is necessary to meet federal sustainability goals. Additionally, EPA will direct all future fleet procurements, where economically feasible, to the purchase of electric vehicles, or lease through GSA electric vehicles. This allows EPA to prioritize energy efficiency and climate resilience in the rehabilitation of United States Government fleet vehicles and combat the climate crisis.

EPA also will meet regulatory Occupational Safety and Health Administration (OSHA) obligations and provide health and safety training to field staff (e.g., inspections, monitoring, On-Scene Coordinators), and track capital equipment of $25 thousand or more. In FY 2022, the

[33] For additional information, please refer to: https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad.
[34] For additional information, please refer to: https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad.
[35] For additional information, please refer to: https://www.federalregister.gov/documents/2021/01/25/2021-01765/protecting-public-health-and-the-environment-and-restoring-science-to-tackle-the-climate-crisis.

Agency will continue to partner with GSA to utilize shared services solutions, *USAccess* and Enterprise Physical Access Control System (ePACS) programs. *USAccess* provides standardized HSPD-12 approved Personal Identity Verification (PIV) card enrollment and issuance and ePACS provides centralized access control of EPA space, including restricted and secure areas.

Performance Measure Targets:

Work under this program supports performance results in the Facilities Infrastructure and Operations Program and the Central Planning, Budgeting, and Finance Program under the EPM appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (-$1,034.0) This change to fixed and other costs is a decrease due to the recalculation of rent, utilities, security, and transit subsidy.

- (+$2,067.0) This program change is an increase to support ensuring a space footprint that accommodates a growing workforce and increasing EPA facility resiliency and sustainability to combat the effects of climate change.

Statutory Authority:

Federal Property and Administration Services Act; Reorganization Plan No. 3 of 1970, 84 Stat. 2086, as amended by Pub. L. 98-80, 97 Stat. 485 (codified at Title 5, App.) (EPA's organic statute).

Pesticides Licensing

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$60,580.8	$60,181.0	$60,929.0	$748.0
Science & Technology	***$3,109.5***	***$2,803.0***	***$2,840.0***	***$37.0***
Total Budget Authority	$63,690.3	$62,984.0	$63,769.0	$785.0
Total Workyears	393.7	385.6	385.6	0.0

Total program work years in FY 2022 include 82.1 FTE funded by the Reregistration and Expedited Processing Revolving Fund.

Program Project Description:

EPA's Pesticide Program screens new pesticides before they reach the market and ensures that pesticides already in commerce are safe. As directed by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Federal Food, Drug, and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act of 1996 (FQPA), and the Pesticide Registration Improvement Extension Act of 2018 (PRIA),[36] EPA is responsible for registering and re-evaluating pesticides to protect consumers, pesticide users, workers who may be exposed to pesticides, children, and other sensitive populations. To make regulatory decisions and establish tolerances (e.g., maximum allowable pesticide residues on food and feed) for food use pesticides and for residential or non-occupational use, EPA must find the pesticide safe. This involves considering cumulative and aggregate risks and ensuring extra protection for children. The Agency must balance the risks and benefits of other uses. For antimicrobial pesticides with public health claims, EPA requires that manufacturers perform tests to ensure the efficacy (*i.e.*, performance) of products per the labelling. In response to the ongoing COVID-19 pandemic and in anticipation of future public health emergencies, the Pesticide Program evaluates public health claims for antimicrobial products, including the accelerated availability of disinfectants determined to be effective against SARS-CoV-2 and development of study designs to support the generation of innovative products, including those that can reduce airborne transmission of the virus.

Under the Science and Technology appropriation, this program operates two laboratories, the Microbiology Laboratory[37] and the Analytical Laboratory,[38] that support the goal of protecting human health and the environment through diverse analytical testing and analytical method development, and validation efforts. These laboratories provide a variety of technical services to EPA, other federal and state agencies, tribal nations, and other organizations to protect human health from pesticide risk.

FY 2022 Activities and Performance Plan:

[36] On Friday, March 8, 2019, the Pesticide Registration Improvement Extension Act of 2018 (PRIA 4), which reauthorizes PRIA for 5 years through fiscal year 2023 and updates the fee collection provisions of the FIFRA was signed into law.
[37] For additional information, please visit: https://www.epa.gov/aboutepa/about-microbiology-laboratory.
[38] For additional information, please visit: https://www.epa.gov/aboutepa/about-analytical-chemistry-laboratory-acl.

The Microbiology Laboratory will continue to protect human health by ensuring the availability of scientific sound efficacy test methods for antimicrobial pesticides (e.g., hospital disinfectants used to treat surfaces). By developing new methods for new uses and emerging pathogens, the regulated community can register new products and new claims for existing products. These efforts will have an impact on the public because of the critical support the laboratory provides to inform regulatory actions for public health pesticides, identify pathways for approval of pathogen-specific claims, and allow for marketplace penetration of these products. Specifically, in FY 2022, EPA will:

- Complete the data collection, analysis, and development of regulatory guidance materials on a quantitative method that follows the Organization for Economic Cooperation and Development (OECD) quantitative method for bactericidal claims to support adoption of the method for regulatory purposes, including an analysis of data from the FY 2021 multi-laboratory studies.

- Complete analysis of FY 2021 multi-laboratory data and develop guidance materials and final method (through American Society for Testing and Materials [ASTM] review) for *Legionella* in recirculating water for cooling tower remediation.

- Issue prototype method and guidance for evaluating porous materials found in clinical and agricultural environments (room separation curtains, vinyl surfaces, wood, etc.)

- Provide efficacy testing and technical support for the first workplan on the Antimicrobial Product Evaluation Program (APEP) pursuant to EPA's response to the Office of the Inspector General (Report No. 16-P-0316).

- Develop residual self-sanitizing disinfectant protocol (SARS-CoV-2) and collect multi-laboratory data to support regulatory use.

- Complete data analysis and development of final ASTM method and regulatory guidance document for evaluating the efficacy of antimicrobial towelettes.

- Continue to develop laboratory capacity for conducting efficacy testing with Biosafety Level 3 (BSL-3) microorganisms at the Environmental Science Center, Ft. Meade, MD. SARS-CoV-2 is a BSL-3 microorganism; EPA's Office of Pesticide Programs has the only EPA laboratory with physical containment laboratories to manage BSL-3 microbes.

In FY 2022, the Analytical Chemistry Laboratory will continue to protect human health by ensuring the availability of appropriate analytical methods for analyzing pesticide residues in food and feed and ensuring their suitability for monitoring pesticide residues and enforcing tolerances. In addition, the Analytical Chemistry Laboratory will:

- Develop improved analytical methods using state of the art instruments to replace outdated methods, thus increasing laboratory efficiency and accuracy of the data.

- Provide analytical support to fill in data gaps for the Pesticide Programs' risk assessments and for Section 18 emergency exemptions, and to perform studies for use in risk mitigation.

- Develop protocols and generate data to improve the Pesticide programs' dietary risk assessment considering potential exposure to residues of household antimicrobial disinfectant products that require potable water rinses of food contact surfaces after application.

- Provide analytical assistance and technical advice to all regional offices in support of their enforcement cases, including cases against imported disinfectant products with false claims against SARS-CoV-2. This could disproportionately impact members of EJ communities who might not speak English, who may be being targeted by illegal foreign imports, and who may not know to look for approved products (*i.e.*, List N products).

- Verify that pesticides are properly formulated (as requested).

- Operate EPA's National Pesticide Standard Repository.

Preventing Disease through Public Health Pesticides: Antimicrobial Testing

Antimicrobial pesticides play an important role in public health and safety by killing germs, bacteria, viruses, fungi, protozoa, algae, and slime. Some of these products are used to sterilize hard surfaces in hospitals. Chemical disinfection of hard, non-porous surfaces such as floors, bed rails, and tables is one component of the infection control systems in hospitals, food processing operations, and other places where disease-causing microorganisms, such as bacteria and viruses, may be present. In reviewing registrations for antimicrobials, EPA is required to ensure that antimicrobials maintain their effectiveness.[39]

EPA's Antimicrobial Testing Program (ATP) has been testing hospital sterilants, disinfectants, and tuberculocides since 1991 to help ensure that products in the marketplace meet stringent efficacy standards. EPA is in the process of developing a new risk-based testing strategy in response to OIG recommendations made in FY 2016.[40] Consistent with the OIG recommendations, EPA suspended the ATP in November 2017 and released a draft risk-based strategy, renamed the Antimicrobial Performance Evaluation Program (APEP), in October 2019 for public comment and will continue to seek public input prior to implementation in FY 2022 and beyond. Implementation of the of APEP will have a positive impact on public health, by ensuring antimicrobials approved for use meet contemporary efficacy standards.

Evidence and Evaluation

The Microbiology Laboratory will continue efficacy method development activities to support EPA's antimicrobial pesticide regulatory programs. In support of these efforts, the Microbiology Laboratory submitted several methods for emerging pathogens (*Clostridioides difficile* and biofilms) and selected formulation types (towelette) to ASTM workgroups for technical review in

[39] *See*, FIFRA section 3(h)(3), 7 U.S.C. 136a(h)(3).
[40] For additional information, please visit: https://www.epa.gov/pesticide-registration/antimicrobial-testing-program.

FY 2019. These methods were approved by ASTM. The peer-review process provided during the ASTM workgroup meetings helped optimize and improve the clarity of the methods, as well as making the methods more robust and relevant to real-world scenarios. The results of these efforts will help ensure products are available for control of *Clostridioides difficile* and biofilms and inform EPA's method development activities in FY 2022 and beyond.

The Analytical Chemistry Laboratory completed the development of protocols to measure the residues of quaternary ammonium compounds and phenols left on a kitchen counter that was sprayed with an antimicrobial product and followed with a potable water rinse (PWR). These protocols are under review by EPA and, if approved, will be used by the manufacturers to collect residues data for active ingredients in antimicrobial products with indirect food uses. These data will help the Agency refine its dietary risk assessments, which historically, were based on no residue left after a PWR.

The Analytical Chemistry Laboratory program completed the study of the performance of all commercially available Sulfuryl Fluoride (SF) detection devices for their reliably and effectiveness in measuring the required SF clearance level for a safe re-entry into buildings/structures after fumigation. The program will provide webinar sessions on the results of this study for the registrants and device manufacturers in 2021. In FY 2022, the Program will continue to provide analytical support to the pesticide re-evaluation for SF detection devices, including developing performance criteria and continuing to monitor performance of devices in the marketplace.

Performance Measure Targets:

Work under this program supports performance results in the Pesticides: Protect the Environment from Pesticide Risk Program under the EPM appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$23.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (-$55.0) This change to fixed and other costs is a decrease due to the recalculation of laboratory fixed costs.

- (+$69.0) This program change is an increase in resources to support the development of laboratory efficacy testing capacity in the Microbiology Laboratory and increasing laboratory efficiency at the Analytical Chemistry Laboratory.

Statutory Authority:

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); Federal Food, Drug, and Cosmetic Act (FFDCA), §408.

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$37,650.6	$39,543.0	$39,952.0	$409.0
Science & Technology	***$1,757.7***	***$2,207.0***	***$2,230.0***	***$23.0***
Total Budget Authority	$39,408.3	$41,750.0	$42,182.0	$432.0
Total Workyears	297.8	249.6	249.6	0.0

Total program work years in FY 2022 include 53.2 FTE funded by the Reregistration and Expedited Processing Revolving Fund.

Program Project Description:

In compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA),[41] EPA conducts risk assessments using the latest scientific methods to determine the risks that pesticides pose to human health and the ecological effects on plants, animals, and ecosystems that are not the targets of the pesticide. The Agency's significant regulatory decisions are posted for review and comment to ensure that these actions are transparent, and to allow stakeholders, including at-risk populations, to be engaged in decisions that affect their environment.

Under the Science and Technology appropriation, EPA's Pesticide Program operates two laboratories, the Microbiology Laboratory[42] and the Analytical Laboratory,[43] that support the goal of protecting human health and the environment through diverse analytical testing, and analytical method development and validation efforts. These laboratories will continue to provide a variety of technical services to EPA, other federal and state agencies, tribal nations, and other organizations to ensure the protection of the environment from pesticide risk.

EPA must determine that food and residential uses of pesticides are safe. For other risk concerns, EPA must balance the risks of the pesticides with benefits provided from the use of the product. To avoid unreasonable risks, EPA may impose risk mitigation measures such as modifying use rates or application methods, restricting uses, or denying some or all uses. In some regulatory decisions, EPA may determine that uncertainties in the risk determination need to be reduced and may require monitoring of environmental conditions, such as effects on water sources, development of new, standardized methodologies, or the development and submission of additional laboratory or field study data by the pesticide registrant.

[41] *See*, FIFRA, Sections 2 and 3, Definitions, Registration of Pesticides (7 U.S.C. §§ 136, 136a). Available online at: https://www.epa.gov/laws-regulations/summary-federal-insecticide-fungicide-and-rodenticide-act. Section 3(c)(5) of FIFRA states that the Administrator shall register a pesticide if it is determined that, when used in accordance with labeling and common practices, the product "will also not generally cause unreasonable adverse effects on the environment." FIFRA defines "unreasonable adverse effects on the environment", as "any unreasonable risk to man or the environment, considering the economic, social, and environmental costs and benefits of the use of any pesticide."
[42] For additional information, please visit: https://www.epa.gov/aboutepa/about-microbiology-laboratory.
[43] For additional information, please visit: https://www.epa.gov/aboutepa/about-analytical-chemistry-laboratory-acl.

In addition to FIFRA responsibilities, the Agency has responsibilities under the Endangered Species Act (ESA).[44] Under ESA, EPA must ensure that pesticide regulatory decisions will not destroy or adversely modify designated critical habitat or result in jeopardy to the continued existence of species listed by the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). Where risks are identified, EPA must work with FWS and NMFS in a consultation process to ensure these pesticide registrations also will meet ESA standard.

EPA's Pesticide Program laboratories provide a diverse range of environmental data that the Agency uses to make informed regulatory decisions. The Analytical Chemistry Laboratory and the Microbiology Laboratory each provide critical laboratory testing and support activities to assist the decision-making processes of the Agency. The laboratories develop standard methods to evaluate the performance of antimicrobial products such as disinfectants used in hospital settings, and validate analytical chemistry methods to ensure that EPA, the Food and Drug Administration (FDA), the United States Department of Agriculture (USDA), and the states have reliable methods to measure and monitor pesticide residues in food and in the environment.

FY 2022 Activities and Performance Plan:

In FY 2022, the Microbiology Laboratory will continue to work with the U.S. Department of Homeland Security and USDA to evaluate various environmentally-relevant materials such as porous materials (e.g., wood, concrete, fabric, tile, etc.) which simulate use sites in livestock, poultry, and other food animal rearing operations. Outbreaks of avian influenza, African swine fever, Newcastle Disease virus, etc., can be devastating to American agriculture and the persistence of these viruses on surfaces is not well understood. Currently, due to the unavailability of standardized quantitative test methods to simulate real-world conditions in the field, the response to an animal pathogen outbreak and submission of requests under FIFRA Section 18 to address these outbreaks relies on published, and often antiquated, data. Thus, the use of commonly available chemicals for remediation (e.g., citric acid, sodium hypochlorite, chlorine dioxide, etc.) of contaminated sites without extensive knowledge of their environmental impact from such widespread use is deemed problematic. The goal of the Laboratory is to develop a quantitative approach for assessing the effectiveness of antimicrobial products against high consequence animal viruses and other pathogens to provide a tool for the development of high-quality efficacy data on relevant surface materials. The availability of the method to the regulated community will support more effective, targeted chemistries and refined antimicrobial application techniques for porous materials, and the development of new antimicrobial products following contemporary regulatory requirements.

In FY 2022, the Analytical Chemistry Laboratory will continue to focus on analytical method development and validations as well as special studies to address specific, short-term, rapid-turnaround priority issues. The Laboratory also will continue to provide technical and analytical assistance to EPA's Enforcement and Compliance Assurance Program and regional offices in support of their enforcement/complaint cases, including analysis of dicamba and its metabolites in soil and vegetation samples and analysis of products sold in online commerce. The Laboratory also will continue to support pesticide registration review by evaluating the accuracy and precision

[44] *See*, ESA sections 7(a)(1) and 7(a)(2); Federal Agency Actions and Consultations (16 U.S.C. § 1536(a)). Available at the U.S. Fish and Wildlife Service ESA internet site: http://www.fws.gov/endangered/laws-policies/section-7.html.

of sulfuryl fluoride detection devices used to detect the presence of a fumigant prior to re-entry. In addition, the Laboratory will continue to review the effectiveness of a potable water rinse at removing residues of antimicrobial active ingredients from different surface types to refine the exposure estimates used in risk assessments for these active ingredients. Finally, in FY 2022, the Analytical Chemistry Laboratory also will continue to provide national technical analytical support for the development of data needed for the Pesticides Program's risk assessments and for Section 18 emergency exemptions, and to perform studies for use in risk mitigation.

Performance Measure Targets:

Work under this program supports performance results in the Pesticides: Protect the Environment from Pesticide Risk Program under the EPM appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$15.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (-$12.0) This change to fixed and other costs is a decrease due to the recalculation of laboratory fixed costs.

- (+$20.0) This program change is an increase in resources to support the development of laboratory capacity in the Microbiology Laboratory for more effective, targeted chemistries and refined antimicrobial application techniques for porous materials.

Statutory Authority:

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); Endangered Species Act (ESA).

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$6,173.0	$7,730.0	$7,792.0	$62.0
Science & Technology	***$379.9***	***$876.0***	***$970.0***	***$94.0***
Total Budget Authority	$6,552.9	$8,606.0	$8,762.0	$156.0
Total Workyears	30.7	35.8	35.8	0.0

Program Project Description:

EPA's Pesticide Program laboratories provide significant contributions to help the Agency realize the value of pesticides. They consist of the Microbiology Laboratory[45] and the Analytical Chemistry Laboratory,[46] that support the goal of protecting human health and the environment through diverse analytical testing and analytical method development, and validation efforts.

The primary focus of the Microbiology Laboratory is standardization of existing test methods and the development and validation of methods for new uses and emerging pathogens for antimicrobial products with public health claims – products used to kill or suppress the growth of pathogenic microorganisms on inanimate objects and surfaces. The Laboratory is instrumental in advancing the science of antimicrobial product testing and provides technical expertise to standard-setting organizations and various agency stakeholder groups.

The Analytical Chemistry Laboratory provides scientific, laboratory, and technical support through chemical analyses of pesticides and related chemicals to protect human health and the environment. The Analytical Chemistry Laboratory responsibilities include: providing technical support and chemical analyses of pesticides and related chemicals; developing new multi-residue analytical methods; and operating EPA's *National Pesticide Standard Repository*, which collects and maintains pesticide standards (i.e., samples of pure active ingredients or technical grade active ingredients, regulated metabolites, degradates, and related compounds).

These laboratories provide a variety of technical services to EPA, other federal and state agencies, tribal nations, and other organizations to ensure the value of pesticide availability is realized.

FY 2022 Activities and Performance Plan:

In FY 2022, EPA will realize the benefits of pesticides by ensuring the continued operation of the National Pesticide Standard Repository. The laboratories will continue to conduct chemistry and efficacy evaluations for antimicrobials. As the recognized source for expertise in pesticide analytical method development, EPA's Pesticide Program laboratories will continue to provide

[45] For additional information, please visit: https://www.epa.gov/aboutepa/about-microbiology-laboratory.
[46] For additional information, please visit: https://www.epa.gov/aboutepa/about-analytical-chemistry-laboratory-acl.

quality assurance review, technical support, and training to EPA's regional offices, state laboratories, and other federal agencies that implement the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

In FY 2022, the Microbiology Laboratory will continue to evaluate FIFRA Section 18 emergency exemptions and novel protocol requests for new uses and novel pathogens. The Laboratory will continue the development of data and methods to support Section 18 for high consequence animal pathogens (e.g., African swine fever, Newcastle disease virus, etc.). In addition, the continued work to develop new methods for emerging pathogens (e.g., *Legionella*, *Candida auris,* etc.) and clinical porous materials provides a pathway for registrants to add new claims to existing antimicrobial pesticides. In some cases, the methods will lead to the development of new products when currently registered formulations are not effective against emerging pathogens. The Laboratory anticipates supporting up to 25 requests for these activities during FY 2022.

The Analytical Chemistry Laboratory will continue its work in developing and validating multiresidue methods using state-of-the-art methodology and instrumentation; in providing chemical analysis for assessing risk to human health and to the environment from agricultural use of pesticides; and in providing technical support to all EPA regions to ensure that pesticide products are formulated according to approved labels.

The Microbiology Laboratory will continue to refine and develop methods to support EPA's Section 3 and Section 18 regulatory programs. In FY 2021, in support of these efforts, the Laboratory initiated work to confirm the efficacy of disinfectant products against SARS-CoV-2. In addition, the Laboratory collaborated with the Office of Research and Development's Homeland Security Research Program to develop guidance for registrants seeking to make long-term efficacy claims for disinfectants. In addition, the laboratories worked in tandem on a testing platform to address both durability of the surface materials and efficacy. Because label claims for most disinfectants are limited to hard surfaces, the Laboratory also began efforts to develop a quantitative efficacy test method which may provide a pathway for evaluating disinfectant claims for porous material (vinyl, room divider curtains, etc.).

The Analytical Chemistry Laboratory maintains EPA's *National Pesticide Standard Repository* pursuant to 40 CFR part 158. The Laboratory collects and maintains an inventory of analytical standards of registered pesticides in the United States, as well as some that are not currently registered. EPA provides the pesticide standards (approximately 4,000 to 5,000 annually) to qualified federal, state, territorial, and tribal laboratories for food and product testing and environmental monitoring. In FY 2018, efficiency reviews showed that the typical turnaround time for a standard request was approximately 15 working days. Using the results of the efficiency review, the Analytical Chemistry Laboratory is implementing procedural changes such as requiring requests be grouped for pesticide standards, instituting an inventory control system focusing on high demand standards, and installing a chemist as the lead staff person in the Repository to reduce the turnaround time to 12 days (for those pesticide standard requests that are not complicated and/or standards that are not expiring). These changes help federal agencies, states, and tribal laboratories expedite enforcement efforts. This process will continue to be improved in FY 2022 and beyond.

Performance Measure Targets:

Work under this program supports performance results in the Pesticides: Protect the Environment from Pesticide Risk Program under the EPM appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$31.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (-$73.0) This change to fixed and other costs reflects a decrease in Operations and Maintenance of the Pesticides Program Laboratories due to reduced rent, utilities, and security.

- (+$136.0) This program change is an increase in resources to support method development and refinement in the Microbiology Laboratory and increasing efficiencies at the Analytical Chemistry Laboratory.

Statutory Authority:

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); Federal Food, Drug, and Cosmetic Act (FFDCA) § 408.

Research: Air and Energy

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$95,350.8***	***$95,250.0***	***$156,210.0***	***$60,960.0***
Total Budget Authority	$95,350.8	$95,250.0	$156,210.0	$60,960.0
Total Workyears	254.3	258.0	288.0	30.0

Program Project Description:

Air pollution adversely affects human health, the environment, and the economy, yet millions of people still live in areas that do not meet national standards for air pollutants. While all Americans are at risk, some people and communities are especially vulnerable to poor air quality and the impacts of climate change, and communities with environmental justice and equity concerns bear a disproportionate share of the risks and impacts. Climate change is a public health and environmental justice crisis, and is already impacting air and water quality, as well as posing increasing risks for the future. For example, climate change has increased the extent and severity of wildfires[47], which has substantially worsened air quality, especially in the Western U.S.[48] To address these issues, the Air, Climate, and Energy (ACE) Research Program provides scientific information to EPA program and regional offices, states, tribes, and other stakeholders. ACE strives to advance the science needed to achieve clean air, attain the National Ambient Air Quality Standards[49] (NAAQS), reduce emissions of hazardous air pollutants (HAPs), address the causes and consequences of climate change, and develop more resilient communities which will protect human health and ecosystems throughout the Nation. In addition, ACE will help contribute to the understanding of interventions to protect public health, strategies to prepare, adapt, and build resilience, and responses to the transformation of our energy system and its environmental benefits and impacts.

The ACE Research Program is one of six integrated and transdisciplinary research programs in EPA's Office of Research and Development. Each of the six programs is guided by a Strategic Research Action Plan (StRAP) that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *ACE FY 2019-2022 StRAP* builds upon prior ACE StRAPs and continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

[47] Fourth National Climate Assessment (NCA4) - Figure 25.4, adapted from Abatzoglou and Williams 2016 (https://nca2018.globalchange.gov/)
[48] For more information, please see: https://pubmed.ncbi.nlm.nih.gov/30012611/.
[49] Section 109 of the Clean Air Act identifies two types of national ambient air quality standards – primary standards provide public health protection, including protecting the health of "sensitive" populations such as children, older adults, and persons with pre-existing disease such as asthma or cardiovascular disease and secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, wildlife, soils, water, crops, vegetation, and buildings. Unless otherwise stated, in this document the term NAAQS will refer to both primary and secondary standards.

The ACE Research Program is centered around three inter-related research topic areas: 1) Science for Air Quality Decisions; 2) Extreme Events and Emerging Risks; and 3) Next-generation Methods to Improve Public Health and the Environment. The ACE Research Program relies on successful partnerships with others, including academic and industry researchers, states, local and private sector organizations, as well as key federal agencies.

Recent Accomplishments of the ACE Research Program include:

- **Smoke from Wildland Fires:** EPA conducts research on emissions, air quality, health, and ecological impacts from wildland fires. In FY 2021, EPA researchers tested air pollution measurement methods to determine which are most accurate during periods of wildland fire smoke.[50] In FY 2020 and FY 2021, EPA published several major articles on health studies of smoke from wildland fires and developed a framework to analyze impacts from fires under different settings to inform options for fire management and meeting resiliency objectives.[51] Collaborations of EPA with the Missoula City-County Health Department in Montana and the Hoopa Valley Tribe in California continue to evaluate how air-handling systems can reduce indoor exposure to smoke and the efficacy of various portable air cleaners during wildfire smoke episodes.[52] In FY 2020, research on the efficiency of masks during periods of wildfire smoke informed recommendations for behaviors to reduce exposure to airborne viruses.[53]

- **Climate Change Impacts and Adaptation Planning Tools**: EPA researchers published several articles on the results of modeling studies evaluating how warming temperatures and increases in heavy preciptation[54] can lead to increased flooding and affect managment practices used to reduce the risk of water quality and aquatic ecosystem impairment[55] in watersheds impacted by urban, agricultural, and forestry land uses. In FY 2020 and FY 2021, EPA researchers examined temporal patterns of greenhouse gas emissions from surfaces of water reservoirs thereby providing information to improve U.S. and global annual inventories.[56] EPA scientists authored a guide on coral reef restoration planning and design[57] as part of an international collaboration and assisted practitioner teams in American Samoa, Commonwealth of the Northern Mariana Islands, Guam and Hawaii to use this guide, resulting in all four jurisdictions successfully completing restoration action plans.

- **Toxic Air Pollutants Measurement and Transport Modeling:** Many states continue to work to address air toxics, such as ethyl oxide (EtO), a known hazardous substance used to sterilize medical equipment, and Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) emissions and waste. In FY 2020 and FY 2021, EPA improved and evaluated methods to

[50] For more information, please see: https://doi.org/10.5194/amt-14-1783-2021.
[51] For more information, please see: https://www.epa.gov/air-research/wildland-fire-research-health-effects-research, https://www.ahajournals.org/doi/full/10.1161/JAHA.119.014125, and https://ehp.niehs.nih.gov/doi/full/10.1289/EHP3860.
[52] For more information please see: https://www.epa.gov/air-research/science-matters-special-edition-wildland-fire-science-october-2019.
[53] For more information, please see: https://doi.org/10.1001/jamainternmed.2020.4221.
[54] For more information, please see: https://doi.org/10.1007/s10584-021-02963-y.
[55] For more information, please see: https://doi.org/10.13031/trans.13630 and https://doi.org/10.2166/wcc.2020.031.
[56] For more information, please see: https://bg.copernicus.org/preprints/bg-2021-36/.
[57] For more information, please see: https://www.coris.noaa.gov/activities/restoration_guide/welcome.html.

measure ambient levels EtO.[58] EPA also is conducting field and laboratory research to develop methods to measure source emissions of PFAS, as well as products of incomplete combustion of PFAS resulting from incineration.[59] Research includes study of the fate and transport through ambient air and the resulting potential deposition to soil and water of PFAS from manufacturing facilities and incineration as a means of destroying PFAS waste. In FY 2021, EPA published the first modeling study of PFAS air emissions, transport, and deposition from a manufacturing facility.[60]

FY 2022 Activities and Performance Plan:

In FY 2022, the ACE Research Program will continue research in areas that support EPA's mission to protect human health and the environment, fulfill the Agency's legislative mandates, advance cross-agency priorities, and provide research and scientific analyses, including the impacts of climate change and consideration of communities with environmental justice and equity concerns, to inform policymaking.

The ACE Research Program prioritizes key activities to support attainment of the NAAQS and implementation of stationary and mobile source regulations, as well as national and multi-state programs. The ACE Research Program continues to develop, evaluate, and apply methods and models to support air quality management programs and provides foundational science to inform decision making with consideration of increasing climate change impacts.

In FY 2022, the ACE Research Program will:

- Revitalize EPA's climate change program. EPA is requesting an increase of $30 million to:

    1. Assess human and ecosystem exposures and effects associated with air pollutants on individual, community, regional, national, and global scales, both today and in the future under a changing climate.[61]

    2. Assess the consequences of climate change and the vulnerability of communities and ecosystems to climate change impacts, including wildfires and other extreme events, and identify and evaluate strategies to adapt to and build resilience to these impacts.

    3. Characterize disproportionate impacts of climate change and air pollution on communities with environmental justice and equity concerns, identify and evaluate strategies to reduce impacts in those communities, and develop and evaluate innovative multi-pollutant and sector-based approaches to preventing pollution.

[58]For more information, please see: https://www.epa.gov/air-research/ambient-air-methods-and-measurement-development-research#VOCs.
[59] For more information, please see: https://www.epa.gov/sites/production/files/2019-09/documents/technical_brief_pfas_incineration_ioaa_approved_final_july_2019.pdf and https://www.epa.gov/newsreleases/epa-aggressively-working-increase-research-and-understand-pfas.
[60] For more information, please see: https://pubs.acs.org/doi/abs/10.1021/acs.est.0c06580.
[61] Beyond effects associated with ambient air exposures, consideration of potential human and ecosystem exposures and effects associated with deposition of air pollutants to water and land also are evaluated.

4. Continue to fund research on energy efficiency and renewable energy in disadvantaged communities and evaluate strategies to bring the benefits of transformations in transportation and energy systems to these communities.

- Collaborate with Department of Energy's ARPA-C. EPA is requesting an additional $30 million increase to fund collaborative research in climate adaptation and resilience with the new Advanced Research Projects Agency for Climate (ARPA-C) that will be located within DOE. EPA will collaborate with users of climate adaptation and resilience science to develop technologies that will significantly expand the applicability, accessibility, and usability of EPA and other research for use by decision makers at regional, state, tribal, and local levels.

- Provide human exposure and environmental modeling, monitoring, metrics, and information needed to inform air quality and climate change decision making at the federal, state, tribal, and local level, deliver state-of-the-art tools that states and tribes can use to identify effective emission reduction strategies to meet the NAAQS, and enhance air quality measurement and modeling methods to ascertain current and future compliance with the NAAQS, including potential impacts from the changing climate.

- Ensure that agency program and regional information needs guide research that will advance EPA's capabilities and understanding of air pollution sources, fate and transport, and effects and how these are impacted by the changing energy infrastructure and climate while addressing emerging areas of concern to EPA and state policymakers, including climate change, environmental justice and equity, PFAS, ethylene oxide, and wildland fires.

- Develop and apply approaches to evaluate the positive and negative environmental impacts of the transition to a low-carbon energy system, including completion of a report to Congress on the environmental and resource conservation impacts of the Renewable Fuel Standard.[62]

Research Planning:

EPA's Board of Scientific Counselors (BOSC) is a federal advisory committee that provides advice and recommendations to EPA on technical and management issues of its research programs. The ACE Research Program met with the ACE Subcommittee of the BOSC in FY 2021 and is arranging for additional meetings in FY 2022 and over the next several years with the Subcommittee to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability, and timeliness of particular research products. This

[62] Required by the Energy Independence and Security Act of 2007, PL110-140. For more information, please see: https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act. More information about the report is available at: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=IO&dirEntryId=341491

provides evidence for how research products are being used and by whom. Through the evaluation process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. EPA is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement[63] is designed to inform states about their role within EPA and EPA's research programs, and to better understand the science needs of state environmental and health agencies. Key partners at the state level include: the Environmental Council of the States, with its Environmental Research Institute of the States and the Interstate Technology and Regulatory Council; the Association of State and Territorial Health Officials; as well as state media associations, such as the National Association of Clean Air Agencies.

EPA's commitment to advancing Tribal partnerships is demonstrated in the Research and Development Program, in which key partnerships are established through the Tribal Science Program which provides a forum for the interaction between Tribal and Agency representatives of mutual benefit and responsibility to work collaboratively on environmental science issues. The Tribal Science Program is committed to development of sound scientific and cultural approaches to meet the needs of tribes.

Performance Measure Targets:

Work under this program supports performance results in the Research: Sustainable and Healthy Communities Program under the S&T appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$774.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$17.0) This change to fixed and other costs is an increase due to the recalculation of laboratory fixed costs.

- (+$30,169.0 / +30.0 FTE) This program change increases funding and FTE for the Air, Climate, and Energy Research Program. This increase is targeted to EPA's commitment to enhance its efforts to combat the global issue of Climate Change. This increase will more than double its research to assess the impacts of climate change on human health and ecosystems. This investment includes $5,239.0 thousand for payroll costs.

- (+$30,000.0) This program change invests in the Air, Climate, and Energy Research Program for collaborative research in climate adaptation and resilience with the new Advanced Research Projects Agency for Climate (ARPA-C) that will be located within DOE. The ARPA model of high-risk, accelerated research is uniquely meant to conduct R&D that, if successful, results in transformational technology advancements.

[63] For more information, please see: https://www.epa.gov/research/epa-research-solutions-states.

Statutory Authority:

Clean Air Act; Title II of Energy Independence and Security Act of 2007; Environmental Research, Development, and Demonstration Authorization Act (ERDDAA); National Environmental Policy Act (NEPA) § 102; Pollution Prevention Act (PPA); Global Change Research Act of 1990.

Research: Safe and Sustainable Water Resources

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$108,506.9***	***$112,250.0***	***$116,588.0***	***$4,338.0***
Total Budget Authority	$108,506.9	$112,250.0	$116,588.0	$4,338.0
Total Workyears	352.0	358.1	378.1	20.0

Program Project Description:

The quality and availability of water, upon which human and ecosystem health and a robust economy depend, face myriad challenges. These challenges include aging water infrastructure, contaminants of emerging concern, waterborne pathogens, antimicrobial resistance, microplastics, excess nutrients and harmful algal blooms, stormwater runoff, and water shortages. Many of these concerns are more prevalent in disadvantaged communities and can be exacerbated by changing climate patterns, for example, higher temperatures and higher frequency, duration and intensity of precipitation events and extreme drought.

To address these current, emerging, and long-term water resource challenges, the Safe and Sustainable Water Resources (SSWR) Research Program produces robust research and scientific analyses for decision-making and inventive, practical solutions for the Agency and its stakeholders to protect and restore America's watersheds and water infrastructure.

The SSWR Research Program is one of six integrated and transdisciplinary research programs in EPA's Office of Research and Development (ORD). Each of the six programs is guided by a Strategic Research Action Plan (StRAP) that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *SSWR FY 2019-2022 StRAP* continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

Recent Accomplishments of the SSWR Research Program include:

- **Contaminants of Emerging Concern:**
    - **SARS-CoV2.** EPA is collaborating with the Center for Disease Control and the State of Ohio to establish a wastewater monitoring network to detect and quantify SARS-CoV2. EPA researchers are linking viral concentrations in wastewater to clinical cases at local levels to evaluate the application of wastewater surveillance for monitoring trends in SARS-CoV2 prevalence in communities. EPA also is developing standardized methods for molecular detection and culturable virus to evaluate potential risks from wastewater management processes.

- **Per- and Polyfluoroalkyl Substances (PFAS).**

  - **PFAS Treatment in Drinking Water**. EPA's Drinking Water Treatability Database was updated to include 26 PFAS chemicals. The database provides information on best practices and technologies for PFAS treatment in drinking water. Information on cost models for PFAS treatment in drinking water were also generated.

  - **PFAS Analytical Methods**.

    - EPA created the PFAS Analytical Website[64] which consolidates PFAS analytical and sampling methods for drinking water, groundwater, surface water, wastewater, air, and solids (soils, sediments, biota, and biosolids). The website includes analytical method resources from EPA and other federal agencies and non-governmental organizations, and sampling, data analysis, and laboratory certification resources.

    - ORD funded and provided technical support to develop and validate EPA drinking water Method 533. ORD also co-led the validation efforts for SW-846 Method 8327 for 24 PFAS in non-drinking water aqueous samples. A time and cost saving method was developed for PFAS analysis. ORD continues to provide technical support to validate an isotope dilution method in collaboration with EPA's Office of Water and the Department of Defense. ORD also is developing a total organic fluorine method for possible future validation.

- **Water Infrastructure:**

  - **Lead.** ORD developed sampling protocols and methodologies that can be used to identify lead service lines and continues to provide technical support to municipalities facing challenges with lead delivery lines.

  - **Wastewater.** ORD published the *Non-potable Environmental and Economic Water Reuse (NEWR) Calculator* – a practical tool to help stakeholders assess source water options for urban decentralized non-potable water reuse[65]. ORD also published results on the application and cost savings of alternative wastewater disinfection using combinations of peracetic acid, chlorine, and UV light.

[64] For more information, please see the following: https://www.epa.gov/water-research/pfas-analytical-methods-development-and-sampling-research

[65] For more information, please see the following: https://www.epa.gov/water-research/non-potable-environmental-and-economic-water-reuse-newr-calculator

- **Water Reuse[66].** ORD published several manuscripts[67] on risk models for fit-for-purpose water reuse. This much-needed information will help identify treatment targets for wastewater and other sources of water for multiple beneficial purposes, such as agriculture and irrigation, industrial processes, and groundwater replenishment.

- **Stormwater and Enhanced Aquifer Recharge (EAR).** ORD completed a report using case studies to understand the influence of stormwater management practices on groundwater quality,[68] a draft report summarizing the current state-of-the-science leading to best practices for EAR using stormwater[69] and several manuscripts on groundwater recharge and quality.[70] EPA also collaborated on a multi-agency study of chemicals in urban stormwater runoff to understand potential risks, which will help in future decisions on the implementation of EAR using stormwater. [71]

- **Harmful Algal Blooms (HABs):** ORD research contributed to improved understanding of adverse health outcomes from exposure to harmful algal toxins, the role of beach lagoons as reservoirs of cyanobacteria and their toxins, and the transport of freshwater biotoxins into coastal marine systems following extreme precipitation events. ORD also used the CyAN dataset for a new indicator that summarizes the national, regional, and state level presence of cyanobacteria in ~2,300 lakes across the continental United States.

- **Microplastics:** ORD advanced its sediment and surface water extraction and identification methods for characterizing the smaller micro- and nanoplastic particles. A citizen science project is assessing new methods to rapidly identify microplastics in sediment. Collaborations continue with the Southern California Coastal Water Research Project for its recommendations to the California State Water Board on a tiered drinking water method.

- **Recreational Waters and Public Health Protection:** To help reduce health risks associated with exposure to fecal contaminants in recreational waters, ORD focused on the development, performance evaluation, and implementation of methods to measure coliphage in recreational waters. Coliphage may more accurately indicate the probability of viral pathogen contamination. In addition, work is underway to develop certified DNA reference material that will support national implementation of multiple DNA-based methods designed to provide rapid (same day) beach water quality information and characterize sources of fecal contamination.

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[66] For more information, please see the following: https://www.epa.gov/water-research/onsite-non-potable-water-reuse-research.
[67] For more information, please see the following: https://doi.org/10.1016/j.watres.2020.116635, https://doi.org/10.2166/wh.2020.221, https://doi.org/10.2166/wst.2020.104, https://doi.org/10.1021/acs.estlett.0c00752, https://doi.org/10.3390/su12135459, https://doi.org/10.1016/j.watres.2019.115213 https://doi.org/10.1016/j.scitotenv.2019.134297.
[68] For more information, please see: https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=350152&Lab=CESER.
[69] Final report will be published in June 2021 (EPA/600/R-21/037).
[70] For more information, please see: https://doi.org/10.1016/j.jhydrol.2020.125720, https://doi.org/10.1016/j.jhydrol.2020.124569.
[71] For more information, please see: Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States.

While SSWR primarily supports clean and safe drinking water, it also supports efforts to: improve air quality through work on nitrogen, phosphorus, and wildland fires; revitalize land and prevent contamination through work on biosolids and groundwater; and ensure safety of chemicals through research on PFAS and other contaminants like lead.

In FY 2022, the SSWR Research Program will continue to focus on:

- **Water Infrastructure:**
    - Conduct research and provide technical support to deliver safe drinking water. Research will assess the distribution, composition, and potential health risks of known and emerging chemical and biological contaminants. Protocols for sampling lead and identification of lead service lines will support the availability of safe drinking water, especially in disadvantaged communities.
    - Assist states, communities, and utilities to address stormwater and wastewater infrastructure needs through applied models and technical assistance.
- **Climate Change Impacts/Resiliency**
    - Integrate the impacts of climate change on water bodies and water infrastructure, including wildland fire, extreme drought and precipitation events, harmful algal blooms, and other impacts on water quality and availability.
    - Develop risk assessments on stormwater capture for enhanced aquifer recharge.
    - Provide water reuse research support for safe, fit-for-purpose potable and non-potable use by states.
- **Harmful Algal Blooms/Nutrients:**
    - Investigate health impacts from exposure to harmful algal/cyanobacteria toxins, and develop innovative methods to monitor, characterize, and predict blooms for early action.
    - Support states' prioritization of watersheds for nutrient management and set water quality and aquatic life thresholds. These research and communication efforts will help states verify whether investments in implementing nutrient reduction management practices achieve their predicted benefits.
- **Microplastics:** Work with EPA program offices, regions, and states to refine methods for collection, extraction, characterization, quantification, and evaluation of microplastics in surface water and sediments. These standard methods will allow comparability across studies and aid in comprehensive exposure assessment and risk characterization of microplastics.

- **Recreational Waters and Public Health Protection:** Improve methods for rapid and cost-effective monitoring of waterborne pathogens in recreational waters. For example, improving rapid low-cost methods for real time notifications on the presence of pathogens will inform community decisions to close and reopen beaches more quickly to prevent human illness and unnecessary lost revenue.

In addition to the activities listed above, EPA also will conduct research across programs in the following areas:

- **PFAS Research:** PFAS are a class of chemicals of growing concern in the environment, and EPA has committed to taking action to support states, tribes, and local communities understand and manage risks associated with these chemicals. A significant challenge for risk managers at the state and local level is how to identify and remove or treat PFAS chemicals that are impacting drinking water supplies. Additional knowledge is needed regarding how to measure and quantify different PFAS chemicals in water, how to remove or treat PFAS chemicals when detected, and how to estimate the cost of different treatment alternatives so that utilities can make informed investment decisions. Within the SSWR Research Program, EPA is: (1) developing and validating standard methods for measuring different PFAS chemicals in water and water treatment residuals (e.g. biosolids); (2) reviewing available literature on effectiveness and cost data for different water treatment technologies applied to different PFAS chemicals; and (3) conducting pilot- and bench-scale testing of the most promising technologies to further evaluate effectiveness. This work is being done in collaboration with water utilities and water treatment technology suppliers. The results of this work will be posted to EPA's public Drinking Water Treatability Database so the information will be widely available to stakeholders.[72]

- **Lead:** EPA, the Centers for Disease Control and Prevention, and the American Academy of Pediatrics unanimously agree that there is no safe level of lead in a child's blood and that even low levels can result in behavior and learning problems, lower IQ, and other health effects.[73] In response to overwhelming scientific consensus and continued public health concern, reducing childhood lead exposure is one of the highest priorities for EPA.[74] SSWR research focuses on: (1) establishing reliable models for estimating lead exposure from drinking water; (2) developing improved sampling techniques and strategies for identifying and characterizing lead in plumbing materials, including lead service lines; (3) developing guidance on optimizing lead mitigation strategies; and (4) testing and evaluating treatment processes for removing lead from drinking water. The overall impact of this research will provide information and tools that EPA, states, tribes, utilities, and communities can use to minimize or eliminate lead exposure in drinking water.

Research Planning:

EPA's Board of Scientific Counselors (BOSC) is a federal advisory committee that provides advice and recommendations to EPA's Research and Development Program on technical and

[72] For more information, please see: https://iaspub.epa.gov/tdb/pages/general/home.do#content.
[73] For more information, please see: https://www.cdc.gov/nceh/lead/prevention/blood-lead-levels.htm.
[74] For more information, please see: https://www.epa.gov/lead.

management issues of its research programs. The SSWR Research Program and the SSWR Subcommittee of the BOSC will continue to meet regularly over the next several years to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability, and timeliness of particular research products. This provides evidence for how research products are being used and by whom. Through the evaluation process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. EPA is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement[75] is designed to inform states about their role within EPA and EPA's research programs, and to better understand the science needs of state environmental and health agencies. Key partners at the state level include: the Environmental Council of the States, with its Environmental Research Institute of the States and Interstate Technology and Regulatory Council; the Association of State and Territorial Health Officials; as well as state media associations, such as the Association of Clean Water Administrators and the Association of State Drinking Water Administrators.

EPA's commitment to advancing Tribal partnerships is demonstrated in the Research and Development Program, in which key partnerships are established through the Tribal Science Program which provides a forum for the interaction between Tribal and Agency representatives of mutual benefit and responsibility to work collaboratively on environmental science issues. The Tribal Science Program is committed to development of sound scientific and cultural approaches to meet the needs of tribes.

Performance Measure Targets:

(PM RD1) Percentage of Office of Research and Development (ORD) research products meeting stakeholder needs.	FY 2021 Target	FY 2022 Target
	81	82

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$930.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$57.0) This change to fixed and other costs is an increase due to the recalculation of laboratory fixed costs.

- (+$3,351.0 / +20.0 FTE) This net program change increases funding and FTE for the Safe and Sustainable Water Research Program. These FTE will help to address the challenges

[75] For more information, please see: https://www.epa.gov/research/epa-research-solutions-states.

of aging water infrastructure, contaminants of concern, harmful algal blooms, and diminished water availability.

Statutory Authority:

Safe Drinking Water Act (SDWA) § 1442(a)(1); Clean Water Act §§ 101(a)(6), 104, 105; Environmental Research, Development, and Demonstration Authorization Act (ERDDAA); Marine Protection, Research, and Sanctuaries Act (MPRSA) § 203; Title II of Ocean Dumping Ban Act of 1988 (ODBA); Water Resources Development Act (WRDA); Wet Weather Water Quality Act of 2000; Marine Plastic Pollution Research and Control Act of 1987 (MPPRCA); National Invasive Species Act; Coastal Zone Amendments Reauthorization Act (CZARA); Coastal Wetlands Planning, Protection and Restoration Act; Endangered Species Act (ESA); North American Wetlands Conservation Act; Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); Toxic Substances Control Act (TSCA).

Research: Sustainable Communities

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$143,191.3***	***$133,000.0***	***$137,412.0***	***$4,412.0***
Leaking Underground Storage Tanks	$520.6	$320.0	$327.0	$7.0
Inland Oil Spill Programs	$428.2	$664.0	$668.0	$4.0
Hazardous Substance Superfund	$15,501.1	$16,463.0	$16,634.0	$171.0
Total Budget Authority	$159,641.2	$150,447.0	$155,041.0	$4,594.0
Total Workyears	417.3	421.8	441.8	20.0

Program Project Description:

EPA's Sustainable and Healthy Communities (SHC) Research Program conducts research to support the following broad community-based goals: (1) accelerate the pace of contaminated site cleanups; (2) return contaminated sites to beneficial use in their communities; (3) protect vulnerable groups, such as communities with environmental justice concerns and children; (4) revitalize the most vulnerable communities; and (5) understand the connections between healthy ecosystems, healthy people, and healthy communities. SHC provides technical support at federal, tribal, or state-led contaminated site clean-ups and during environmental emergencies. SHC research products provide decision-makers with the latest scientific information on the interrelationships between socio-economic, human health, and environmental factors. SHC scientists conduct health, environmental engineering, and ecological research and use the results to generate tools for localities throughout the United States, to facilitate regulatory compliance and improve environmental and health outcomes. These tools aim to minimize negative, unintended consequences to human health and the environment and promote resilience to the impacts of climate change across communities.

SHC has made a commitment to explore all possibilities to minimize and mitigate disproportionate, negative impacts and to foster environmental, public health, and economic benefits for overburdened communities. Improved tools as well as Superfund remedial technologies will directly support communities with environmental justice concerns and accelerate the understanding of the negative impacts Superfund sites pose for underserved communities. SHC also is making the commitment to emphasize remediation technologies that improve climate adaptation and climate resilience.

The SHC Research Program is one of six integrated and transdisciplinary research programs in EPA's Office of Research and Development (ORD). Each of the six programs is guided by a Strategic Research Action Plan (StRAP) that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *SHC FY 2019-2022 StRAP* builds upon prior SHC StRAPs and continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

Recent Accomplishments of the SHC Research Program include:

- **Beneficial Use of Dredged Materials: Opportunities, Community Benefits, and Applied Guidance (Published in December 2020):**[76] Federal navigation channels throughout the US are maintained through operations and maintenance dredging of rivers and harbors. Much of this material is disposed through open water or contained disposal facility placement. While dredged materials may contain contaminants, there is a significant amount of material that is clean and may have beneficial uses in society. Thus, there is increased pressure to identify beneficial uses for dredged material, such as contaminated site remediation and aquatic habitat restoration. This project identified barriers and opportunities related to using clean dredged materials to remediate contaminated sites along with providing a tool for municipalities and other agencies to better understand the social and ecological benefits of utilizing dredged materials in cleanups or habitat restoration. The researchers started with a tool designed for EPA Region 5 and applied qualitative research and case study methodology to analyze specific decision contexts to refine the tool. The team also utilized and augmented the EPA ORD EcoService Models Library; developed a representative case study database; and produced a report to support decision-making for dredged materials. This project created a foundation of information, a use-refined tool, and a concept map to guide application for different stakeholders in future projects.

- **Supply Chain Emission Factors for US Commodities and Industries (Published in July 2020):**[77] Researchers have developed a comprehensive set of supply chain emission factors covering all categories of goods and services in the US economy to assist in quantifying emissions. Emissions from purchased goods and services and capital goods represent significant emissions sources for many organizations. The final factors are available in the Supply Chain Emission Factors for US Industries and Commodities dataset. This product includes a dataset and a report that describes the preparation of those factors, including background on the modeling associated with this preparation; and presents extensive analysis of the factors, including supporting equations and results in two appendices. These factors were prepared using U.S. Environmentally-Extended Input-Output (USEEIO) models which are life cycle models of goods and services in the US economy. Organizations can use these supply chain factors to calculate the life cycle greenhouse gas (GHG) emissions/carbon footprints of their purchases, or for reporting Scope 3 GHG emissions under the global Greenhouse Gas Protocol.

- **Community Health Estimates using Novel Approaches and Data Sources (articles Published October 2017-July 2020):**[78] This product outlines novel methods to quantify

[76] For more information, please see: https://intranet.ord.epa.gov/sites/default/files/2021-01/DMMT%20RESES%20Final%20Report_508.pdf.
[77] For more information, please see: https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=349324&Lab=CESER.
[78] For more information, please see: https://www.sciencedirect.com/science/article/pii/S0013935117304826, https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-018-3343-y, https://journals.lww.com/environepidem/Fulltext/2019/10001/Greater_residential_tree_cover_and_time_spent.327.aspx, https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CPHEA&dirEntryId=348017, and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7363776/.

the effects of environmental conditions on human health by analyzing geospatial data and bio-chemical responses to stressors in the body. For example, an increase in greenspace around a residence was found to result in measurably lower biological stress markers. This product and its methods could be used by EPA and municipalities across the country to better understand the public health benefits of community revitalization programs and land-use decisions.

FY 2022 Activities and Performance Plan:

The SHC Research Program provides science that supports work underway to accelerate the pace of Superfund and brownfields cleanups and return sites to beneficial use in their communities. These efforts support regulatory activities and protocol development for EPA's Land and Emergency Management Program, EPA's regional offices, and state-delegated programs. EPA research under SHC will provide technical support at federal-, tribal-, and state-managed cleanup sites and assistance during emergencies. It also will provide research and tools related to health disparities and social determinants of health, site restoration and revitalization benefits, and community resilience.

SHC's FY 2022 research will focus on three topic areas: (1) Contaminated Sites; (2) Waste and Sustainable Materials Management; and (3) Healthy and Resilient Communities. This research will integrate and translate public health, environmental engineering, and ecosystem science to provide:

- Remediation solutions through permanent remedies and innovative treatment technologies for returning contaminated sites to safe and productive use;

- Operational tools for waste sites and for sustainable materials management; and

- Approaches for revitalizing communities, particularly those that are underserved and overburdened, impacted by contamination and natural disasters.

The SHC Research Program provides state-of-the-science methods, models, tools, and technologies that the Land and Emergency Management Program uses in programmatic guidance and that EPA decision makers use in the site cleanup process. These tools will address contaminated sediments and groundwater, as well as health risks posed by vapor intrusion and chemicals of immediate concern, such as per- and polyfluoroalkyl substances (PFAS) and lead. These tools also will support communities affected by contaminated sites in their resilience and climate adaptation planning efforts.

Specifically, in FY 2022, SHC research will be in the following areas:

- **Contaminated Sites:** EPA research under SHC's Contaminated Sites will provide technical support, investigate remedial alternatives for soils, sediments and groundwater, investigate solvent vapor intrusion, and research contaminants of immediate concern (e.g. PFAS and lead). Primarily the research efforts focus on developing and testing remedial alternatives for treating contaminated soils, sediments, groundwater sites, vapor intrusion

sites, sites with PFAS and Pb contamination, and providing the technical support to the Office of Land and Emergency Management (OLEM), the Regions and States to translate the research into usable approaches.

- **Waste and Sustainable Materials Management:** EPA research under SHC's Waste and Sustainable Materials Management aims to strengthen the scientific basis for the Nation's materials management decisions and guidance. Primary research efforts will focus on developing lifecycle-based assessment tools for sustainable materials management, evaluating the design, application, and use of landfills as well as the degradation of liner material and improved monitoring strategies and their long-term impact on human health and the environment, and developing waste-management methodologies that can minimize adverse impacts to human health and the environment through proposed beneficial use and reuse. This work will include research that increases the effectiveness of food waste campaigns and examines food waste collection and pretreatment technologies from a lifecycle perspective. These efforts support an agency-wide goal to reduce domestic food loss and waste by half by the year 2030.[79]

- **Healthy and Resilient Communities - Remediation, Restoration, and Revitalization:** The SHC Research Program will evaluate and communicate the benefits from remediation, restoration, and revitalization of contaminated sites and provide community-driven solutions with measurable outcomes. These efforts will help communities meet their needs for building resilience to the impacts of climate change, including the health and well-being of those most vulnerable. Research under the Healthy and Resilient Communities topic will provide the scientific basis for guidance, best practices, and tools to support decisions by the Agency, its stakeholders, states, and tribes to optimize health and well-being outcomes while minimizing unintended consequences.

- **Contaminated Sites – Chemicals of Immediate Concern:**

    - **PFAS Research:** PFAS are a class of chemicals of growing concern in the environment, and EPA has committed to taking action to support states, tribes, and local communities in understanding and managing risks associated with these chemicals. A significant challenge for risk managers at the state and local level is how to remove or treat PFAS at contaminated sites. Within the SHC Research Program, EPA aims to understand: environmental PFAS contamination and pathways of exposure for the public; how PFAS can be removed from the environment through safe destruction or degradation; the significant sources, fate and transport pathways, and exposures to humans and ecosystems; and the costs and effectiveness of different methods for removing and remediating PFAS in the natural and built environment. SHC is specifically researching analytical methods development, human exposure measurement and estimates, contaminated sites source zone characterization, hard to treat streams such as landfill leachate, fate and transport of PFAS in groundwater, remediation performance (treatability and cost models), immobilization/stabilization of PFAS, and novel remedial technologies. This work is being done in collaboration with the Department of Defense through

[79] For more information, please visit: https://www.epa.gov/sustainable-management-food.

participation in their Strategic Environmental Research and Development Program.[80] EPA research under the SHC also is focusing on end-of-life management of PFAS-containing materials (e.g., industrial waste, household waste) to ensure that PFAS from these materials do not impact the environment. This work provides technical support and assistance to states, tribes, and local communities on issues pertaining to ecological and human health risk assessment and site engineering challenges related to PFAS.

- **Lead Research:** *The Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts* was produced by the President's Task Force on Environmental Health Risks and Safety Risks to Children, comprised of 17 federal agencies and co-led by EPA. It is a blueprint to reduce lead exposure and associated harms to children.[81] EPA's Research and Development Program has co-led Action Plan efforts to develop science and technology to support efforts to reduce lead exposures and related health risks. SHC is working to identify locations of high exposures and blood lead levels to target lead sources for mitigation, develop innovative methods for cleaning up Superfund and other contaminated sites, and strengthen the scientific basis of the Agency's lead-related regulatory and clean-up decisions. The SHC Research Program also will work to enhance models and methods that determine key drivers of blood lead levels to inform regulatory decisions, develop tools to identify and prioritize communities with higher incidence of increased blood lead levels in children, and provide the data needed to reduce uncertainty in lead exposure and risk analysis. EPA's research in this area is essential to support ongoing EPA regulatory and non-regulatory efforts, as well as filling in the data gaps for federal partners, states, tribes, and local communities.

Research Planning:

EPA's Board of Scientific Counselors (BOSC) is a federal advisory committee that provides advice and recommendations to EPA on technical and management issues of its research programs. The SHC Research Program will continue to meet regularly over the next several years with the SHC Subcommittee of the BOSC to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability and timeliness of particular research products. This provides evidence for how research products are being used and by whom. Through the evaluation process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. EPA is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement[82] is designed to inform states about their role within EPA and EPA's research programs, and to better understand the science needs of state environmental and health

[80] For more information about SERDP, please see: https://www.serdp-estcp.org/About-SERDP-and-ESTCP/About-SERDP.
[81] For more information, please see: https://www.epa.gov/lead/federal-action-plan-reduce-childhood-lead-exposure.
[82] For more information on EPA's work with states, please see: https://www.epa.gov/research/epa-research-solutions-states.

agencies. Key partners at the state level include: the Environmental Council of the States, with its Environmental Research Institute of the States and Interstate Technology and Regulatory Council; the Association of State and Territorial Health Officials; as well as state media associations, such as the Association of State and Territorial Solid Waste Management Officials.

EPA's commitment to advancing Tribal partnerships is demonstrated in the Research and Development Program, in which key partnerships are established through the Tribal Science Program which provides a forum for the interaction between Tribal and Agency representatives of mutual benefit and responsibility to work collaboratively on environmental science issues. The Tribal Science Program is committed to development of sound scientific and cultural approaches to meet the needs of tribes.

Performance Measure Targets:

(PM RD1) Percentage of Office of Research and Development (ORD) research products meeting stakeholder needs.	FY 2021 Target	FY 2022 Target
	81	82

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$951.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$53.0) This change to fixed and other costs is an increase due to the recalculation of laboratory fixed costs.

- (+$3,408.0 / +20.0 FTE) This net program change increases funding and FTE for the Sustainable and Healthy Communities Research Program. These FTE will help to address the acceleration of cleanup and return of contaminated sites to beneficial use, protection of vulnerable populations, and the revitalization of vulnerable communities.

Statutory Authority:

Reorganization Plan No. 3 of 1970, 84 Stat. 2086, as amended by Pub. L. 98-80, 97 Stat. 485 (codified as Title 5 App.) (EPA's organic statute).

Research: Chemical Safety and Sustainability

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$143.0	$0.0	$0.0	$0.0
Science & Technology	***$95,707.7***	***$89,518.0***	***$93,818.0***	***$4,300.0***
Hazardous Substance Superfund	$4,115.6	$0.0	$0.0	$0.0
Total Budget Authority	$99,966.3	$89,518.0	$93,818.0	$4,300.0
Total Workyears	270.6	273.9	295.9	22.0

Total Workyears include 3.2 FTE funded by TSCA fees in both FY 2021 and FY 2022.

Program Project Description:

The Chemical Safety for Sustainability (CSS) Research Program provides scientific and technical approaches, information, tools, and methods to make better-informed, more-timely decisions about chemicals and their potential risks to human health and the environment.[83] CSS products strengthen the Agency's ability to evaluate and predict human health and ecological impacts from the use, reuse, recycling, and disposal of manufactured and naturally occurring chemicals and their by-products.

The CSS Research Program is one of six integrated and transdisciplinary research programs in EPA's Office of Research and Development (ORD). CSS research addresses real-world problems, informs agency implementation of environmental regulations, and helps EPA and its stakeholders make timely decisions based on the best available science. Each of the six programs is guided by a Strategic Research Action Plan (StRAP)[84] that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *CSS FY 2019-2022 StRAP* builds upon the science foundation for chemical evaluations built by research in prior years and continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

CSS research informs agency decisions about chemicals, accelerates the pace of chemical assessment and decision-making, and helps to replace, reduce, and refine the use of mammalians used to evaluate chemical risk to ecological and human health. CSS products inform agency programs as they implement environmental regulations that govern agency actions, including the evaluation of existing and new chemicals (Toxic Substances Control Act [TSCA]), development and use of alternative testing protocols (TSCA, Federal Insecticide Fungicide and Rodenticide Act [FIFRA], Food Quality Protection Act [FQPA], Federal Food Drug Cosmetics Act [FFDCA]), chemical prioritization (TSCA, Safe Drinking Water Act [SDWA]), evaluation of pesticide registrations (FIFRA, Endangered Species Act), and mitigation activity at Superfund sites (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]). CSS

[83] For the CSS StRAP, please see: https://www.epa.gov/research/chemical-safety-sustainability-strategic-research-action-plan-2019-2022.
[84] For all ORD StRAPs, please see: https://www.epa.gov/research/strategic-research-action-plans-2019-2022.

research activities are coordinated with the activities of other national research programs to inform high priority research topics, such as research focused on per- and polyfluoroalkyl substances (PFAS). Coordination with the Human and Environmental Risk Assessment (HERA) Research Program ensures that the approaches, tools, and information produced by CSS can be used to improve chemical risk assessments, reduce uncertainties associated with those assessments, and increase the speed of delivering chemical information to the Agency.

Recent Accomplishments of the CSS Research Program include:

- **Protecting Children's Health Through Improved Developmental Neurotoxicity (DNT) Screening of Chemicals:** The potential effects of chemicals on the development of the human nervous system in children is a high priority concern of multiple agency programs. Currently available whole animal methods that evaluate developmental neurotoxicity (DNT) are costly, animal intensive, and encumbered with challenges and technical issues. Thus, they are infrequently used in decision-making. CSS scientists have developed alternative new approach methods (NAMs) for DNT endpoints that can be used to screen chemical libraries for potential DNT activity. These new assays include an *in vitro* method to evaluate neuronal network formation and function using specialized microelectrode arrays and a high content imaging approach to microscopically evaluate neuronal cell lines for effects of chemicals on key cellular processes of development. These methods, along with those developed by international collaborators, provide a battery of assays that represent many of the key events and processes necessary for normal nervous system development. These DNT NAMs were successfully reviewed by the FIFRA SAP in the Fall of 2020. Further development of the battery and additional testing of chemicals through the battery will provide essential data for evaluating the DNT potential of chemicals.

- **Development of innovative methods and tools for estimating exposure for thousands of chemicals:** As part of ORD's efforts to support implementation of the Toxic Substances Control Act (TSCA), CSS scientists have developed tools and methods to inform high-throughput exposure predictions for thousands of chemicals. It is critical to develop tools which allow for estimation of exposures needed for the evaluation of risk which can be applied even when data is limited. The Stochastic Human Exposure and Dose Simulation High-Throughput (SHEDS-HT)[85] model developed by CSS scientists models population level distributions of exposure to nearfield chemical sources. The model accounts for multiple routes, scenarios, and pathways of exposure so that we can understand total exposure to chemicals. CSS investigators have additionally developed critical data sets needed as input for the SHEDS-HT model, including the Chemical and Products Database (CPDat)[86]. CPDat includes nearly 4 million data points on chemicals relevant to estimation of exposure, including data types such as chemical use categorizations, general use and consumer product specific use, consumer product composition, and chemical functional use. The database maps these data points to more than 29,000 unique chemical structures and includes data on more than 500,000 products. Because an individual's exposure to

[85] For more information, please see: https://www.epa.gov/chemical-research/stochastic-human-exposure-and-dose-simulation-sheds-estimate-human-exposure.
[86] For more information, please see: https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat.

chemicals is correlated with their use of consumer products and associated behaviors, investigators are able to use both the CPDat database and the SHEDS-HT model to examine differences in chemical exposure for different subpopulations, including stratification of exposure by age (e.g. children vs. elderly), race and ethnicities, and household socioeconomic level.

- **Continued Release, Evolution, and Updating of Multiple Digital Information Products to Inform Decision Making:** The *Computational Toxicology Chemicals Dashboard*[87] is the Agency's 'first-stop-shop' for the delivery of information on chemical physico-chemical properties, structure, toxicity, exposure, and persistence. The *Dashboard* is used by the Agency and its external stakeholders, and allows for real-time quantitative structure-activity relationship (QSAR) predictions for chemical property and toxicity endpoints, and flexible searches including chemical and functional use, supporting mass spectrometry (mass and formula) and batch search functionality. As of the June 2021 release, the *Dashboard* houses curated data on 900,000 chemicals. The *ECOTOX Knowledgebase*[88] serves as the comprehensive, publicly available source of environmental toxicity data on aquatic life, terrestrial plants, and wildlife. The March 2021 release of the ECOTOX Knowledgebase contains over 1 million records and provides information on over 12,000 chemicals and over 13,000 species from over 50,000 references. The *Chemical Transformation Simulator* continues development as a web-based tool for predicting environmental and biological transformation pathways for organic chemicals. Recently, the *Simulator* was expanded to include environmental transformation information for PFAS chemicals. *SeqAPASS*[89] – Sequence Alignment to Predict Across Species Susceptibility – is a tool enabling extrapolation of toxicity information across species. Version 5.0, released in December 2020, features improved functionalities and visualization of results. Research and development for all these systems continues in order to meet the information needs of decision makers.

- **Development and Advancement of New Approach Methods (NAMs):** CSS objectives and research activities are strongly supporting the development of new approach methods (NAMs) that are improving understanding of chemical toxicity. NAMs are focused on providing better understanding of toxicity with faster, less expensive approaches that reduce the use of mammals and other vertebrate animals for toxicity testing. CSS continues to collaborate closely with the Chemical Safety and Pollution Prevention Program to implement the June 2018 TSCA Strategic Plan[90] to promote the development and implementation of alternative test methods. Additionally, CSS has a central role in the implementation of the June 2020 NAMs workplan.[91] Critical to this effort is implementation of a tiered hazard evaluation strategy. CSS investigators are currently advancing methods in high-throughput phenotypic profiling (HTTP) and high-throughput transcriptomics (HTTr), to be used for chemical prioritization and grouping of chemicals.

[87] For more information, please see: https://comptox.epa.gov/dashboard.
[88] For more information, please see: https://cfpub.epa.gov/ecotox/.
[89] For more information, please see: https://www.epa.gov/chemical-research/sequence-alignment-predict-across-species-susceptibility.
[90] For more information, please see: https://www.epa.gov/sites/production/files/2018-06/documents/epa_alt_strat_plan_6-20-18_clean_final.pdf.
[91] For more information, please see: https://www.epa.gov/chemical-research/new-approach-methods-work-plan.

Additionally, investigators are exploring approaches and models for species extrapolation in the ecotoxicology domain, and development of high-throughput exposure and toxicokinetic models in the exposure domain.

The CSS Research Program provides ongoing support to the Agency's Chemical Safety and Pollution Prevention Program for the successful implementation of TSCA activities related to alternative toxicity testing (Section 4), the evaluation of new chemicals (Section 5), and the evaluation of existing chemicals in the TSCA active inventory list (Section 6). CSS also provides ongoing support for the evaluation of pesticides under FIFRA.

FY 2022 Activities and Performance Plan:

In FY 2022, CSS research will continue to provide information needed to inform agency decisions about chemicals. Research efforts will focus on replacing, reducing, and refining the use of vertebrates in testing, while accelerating the pace of chemical assessment and decision-making. CSS research products will continue to use innovative *in vitro* and *in silico* (computer modeling) approaches to provide timelier, more comprehensive information about chemical hazard and exposure while still providing information of equal or greater biological predictivity than current *in vivo* animal models. The objective of CSS research activities is to provide chemical information informing risk-based decisions made by EPA programs, states, tribes, and others. Of particular relevance are 'chemicals of emerging concern,' such as PFAS, which heighten the need for rapid, scientifically-sound approaches to evaluate potential chemical safety.

The CSS Research Program is organized into eight, integrated research areas that include research on toxicity, exposure, human health, ecological health, chemical modeling and prediction, and chemical integration and informatics. Selected research areas are highlighted below for work in FY 2022.

- **High-Throughput Toxicity (HTT) Testing:** CSS research in the HTT research area is focused on developing, testing, and applying NAMs to evaluate chemical hazards. NAMs address EPA's need to evaluate large numbers of chemicals more efficiently for potential adverse human and ecological effects. Scientific and technological advances have paved the way for using additional NAMs in the HTT research area. These will enable EPA to make better, more timely decisions about chemicals by increasing toxicological information for more chemicals. Specifically, high-throughput methods research is focused on developmental neurotoxicology, inhalation toxicology assessment, and methodologically challenging chemicals, This research directly supports the Agency's efforts to fulfill requirements for: chemical evaluation under TSCA as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act; pesticide evaluation under FIFRA; chemical testing for endocrine system impacts under FQPA; and chemical evaluation as part of SDWA.

- **Rapid Exposure Modeling and Dosimetry:** In FY 2022, EPA research under the CSS Research Program will continue to provide data, models, and tools to characterize total human exposure to environmental chemicals. This will inform agency chemical prioritizations and evaluations (TSCA, SDWA); agency implementation of TSCA Section

5 (New Chemicals) and Section 6 (Existing Chemicals); and identify contaminants of emerging concern. Research in the Rapid Exposure Modeling and Dosimetry research area parallels work in the HTT research area to provide information to inform agency chemical risk assessment activities. Chemical exposure research also includes the continued development of advanced analytical and computational tools, such as non-targeted analysis, to detect and identify unknown chemicals in complex environmental media, biological media, and consumer products.

- **PFAS Research:**[92] PFAS are a class of substances of concern and EPA is committed to supporting states, tribes, and local communities in understanding and managing risks associated with these chemicals.[93] With research integrated across multiple CSS research areas, CSS has responded with research designed to: expand understanding of the toxicity of PFAS chemicals; evaluate PFAS fate, transport, occurrence, and persistence in the environment and in consumer products; and deliver chemical information to the Agency and its stakeholders in the government and private sector. The PFAS class of compounds include over 6,000 different chemicals, of which approximately 1,200 have been or are being used in commerce. For most PFAS chemicals, there are little or no published toxicity data available.[94] CSS is addressing this gap by conducting high-throughput toxicological screening assays on hundreds of PFAS chemicals. The chemicals were selected to represent a broad array of PFAS chemical and physical structural properties and to represent specific interests of EPA program and regional offices and the states. The results will be used to identify categories of PFAS chemicals having similar structural and toxicological properties that may inform the development and strength of predictive toxicological models. These *in vivo* and *in silico* methods are combined with targeted *in vivo* tests to reduce uncertainties and improve the reliability of toxicity predications. This work is being done in collaboration with the National Institute of Environmental Health Sciences: National Toxicology Program. Resources requested in FY 2022 will build upon the research foundation formed from completed work outlined in the *PFAS Action Plan*.

- **Improved Understanding of Biological Impacts:** The CSS Research Program will employ data generated from its chemical evaluation research to develop interpretive frameworks and models to place complex information into biological, chemical, and toxicological context. This information is captured in adverse outcome pathways (AOPs) which link molecular initiating events at the cellular level to apical outcomes expressed at the whole animal level. These pathways help decision-makers understand the significance of chemical impacts on biological systems as commonly determined by *in vitro* assays. Included in the development of these AOPs are data developed in the HTT and Virtual Tissue Modeling (VTM) research areas to capture information on chemical impacts to molecular pathways, cells, and complex tissues. This is especially important to understanding chemical impacts on developmental and reproductive biology. As part of the CSS Ecotoxicology and Modeling research area, CSS is applying AOP frameworks to model ecological outcomes across broad taxonomic and ecological scales.

[92] For more information, please see: https://www.epa.gov/sites/production/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf.
[93] For more information, please see: https://www.epa.gov/pfas/pfas-community-engagement.
[94] For more information, please see: https://www.epa.gov/pfas/epa-pfas-research.

- **Delivery of Chemical Information:** The CSS Research Program will deliver integrated chemical data and related information to the Agency in a scientifically robust, transparent manner. In FY 2022, CSS will continue to expand the tools highlighted previously under recent accomplishments. Additionally, the Chemical Safety Analytics research area of CSS provides computational, predictive tools to estimate physicochemical, toxicological, and exposure information for data poor chemicals. The Informatics, Synthesis, and Integration research area brings together chemical information developed by the CSS Research Program with information from other sources to inform agency decision makers. Building on this foundation, CSS is working with the Agency to build program-specific applications, such as RapidTox, an interactive series of customized workflows that facilitate access and use of relevant information to support different decision contexts. These applications will give risk assessors and decision-makers confidence that the new approaches, data, and tools developed in CSS are both scientifically sound and relevant to environmental decision making.

Research Planning:

EPA's Board of Scientific Counselors (BOSC) is a federal advisory committee that provides advice and recommendations to EPA on technical and management issues of its research programs.[95] The CSS Research Program and the Chemical Safety Subcommittee of the BOSC will continue to meet regularly over the next several years to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability and timeliness of particular research products. This provides evidence for how research products are being used and by whom. Through the evaluation process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. EPA is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement program[96] is designed to inform states about their role within EPA and EPA's research programs, and to better understand the science needs of state environmental and health agencies. Key partners at the state level include: the Environmental Council of the States, with its Environmental Research Institute of the States and the Interstate Technology and Regulatory Council; the Association of State and Territorial Health Officials; as well as state media associations, such as the Association of State and Territorial Solid Waste Management Officials.

EPA's commitment to advancing Tribal partnerships is demonstrated in the Research and Development Program, in which key partnerships are established through the Tribal Science Program which provides a forum for the interaction between Tribal and Agency representatives of mutual benefit and responsibility to work collaboratively on environmental science issues. The Tribal Science Program is committed to development of sound scientific and cultural approaches to meet the needs of tribes.

[95] For more information, please see: https://www.epa.gov/bosc.
[96] For more information, please see: https://www.epa.gov/research/epa-research-solutions-states.

Performance Measure Targets:

(PM RD1) Percentage of Office of Research and Development (ORD) research products meeting stakeholder needs.	FY 2021 Target	FY 2022 Target
	81	82

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$660.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$11.0) This change to fixed and other costs is an increase due to the recalculation of laboratory fixed costs.

- (+$3,629.0 / +22.0 FTE) This net program change increases funding and FTE for the Chemical Safety and Sustainability Research Program. These FTE will assist in providing scientific and technical approaches, information tools, and methods to better inform decision-making.

Statutory Authority:

Clean Air Act §§ 103, 104; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Children's Health Act; 21st Century Nanotechnology Research and Development Act; Clean Water Act; Federal Food, Drug, and Cosmetic Act (FFDCA); Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); Pollution Prevention Act (PPA); Resource Conservation and Recovery Act (RCRA); Safe Drinking Water Act (SDWA); Toxic Substances Control Act (TSCA).

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Science & Technology	***$38,921.5***	***$37,482.0***	***$41,412.0***	***$3,930.0***
Hazardous Substance Superfund	$3,882.1	$12,824.0	$12,876.0	$52.0
Total Budget Authority	$42,803.6	$50,306.0	$54,288.0	$3,982.0
Total Workyears	152.3	154.9	174.9	20.0

Program Project Description:

EPA's Health and Environmental Risk Assessment (HERA) Research Program is focused on the science of assessments that inform decisions made by EPA and others, including states and tribes. These assessments provide the scientific basis for decisions under an array of environmental laws, including: Clean Air Act, Clean Water Act; Safe Drinking Water Act; Toxic Substances Control Act (TSCA); and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The HERA Research Program is one of six integrated and transdisciplinary research programs in the Research and Development Program. Each of the six programs is guided by a Strategic Research Action Plan (StRAP) that reflects the research needs of agency program and regional offices, states, and tribes, and is implemented with their active collaboration and involvement. The *HERA FY 2019-2022 StRAP* builds upon prior Human Health Risk Assessment StRAPs and continues a practice of conducting innovative scientific research aimed at solving the problems encountered by the Agency and its stakeholders.

The current portfolio of HERA products encompasses these two topic areas:

- **Science Assessments and Translation:** The Science Assessments and Translation topic showcases EPA's focus on the science and practice of assessment development. A portfolio of assessment products will be produced that are responsive to agency priorities and timelines. The portfolio will include assessments from among the traditional product lines – Integrated Risk Information System (IRIS), Integrated Science Assessment (ISAs), and Provisional Peer-Reviewed Toxicity Values (PPRTVs) – in addition to a wide range of innovative 'fit-for-purpose' products. Additionally, significant emphasis will be placed on providing scientific and technical support throughout the lifecycle of decisions, from development to application of the assessment products.

- **Advancing the Science and Practice of Risk Assessment:** The HERA Research Program is multidisciplinary and aimed at incorporating scientific innovations to advance analytic approaches and applications for risk assessment. Research under this topic is targeted at enhancing hazard characterization, expanding the repertoire of dose-response methods and models, and characterizing the utility of emerging data and new computational tools as

applied to risk assessment. It also enhances and maintains critical assessment infrastructure, including databases, models, and software support, to ensure transparency and to facilitate understanding and translation to agency partners and external stakeholders. Refinements to current approaches will be anchored in assessment development and are expected to improve the accuracy, efficiency, flexibility, and utility of applications across a large landscape of assessment activities.

Recent Accomplishments of the HERA Research Program include:

The HERA Research Program has been developing assessment products to enhance timely responses, improve screening capabilities, and augment toxicity value derivations for use in risk assessments.

- **PFAS-related Toxicity Values:** Decision-making at the state and local level is hindered by a limited number of standard toxicity values (such as reference doses and cancer risk estimates) for many per- and polyfluoroalkyl substances (PFAS) of interest. The Agency continues to provide toxicity values with current values available for PFOA and PFOS,[97] as well as draft toxicity assessments for GenX[98] chemicals. In FY 2021, HERA released the final *Human Health Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)*[99], providing additional toxicity values for these substances.

- **Portfolio of Assessment Products:** In April 2021, HERA released the final *Human Health Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3)*[100], delivering on EPA's commitment to address PFAS in the environment. HERA anticipates posting final IRIS assessments for ethyl tertiary butyl ether and tert-butyl alcohol, as well as publicly releasing assessment materials for mercury salts, vanadium and compounds (oral exposure), and vanadium and compounds (inhalation exposure).[101] HERA anticipates delivering nine high-priority PPRTV assessments in FY 2021 to support Superfund priorities;[102] at least eight more assessments are expected in FY 2022. The *ISA for Oxides of Nitrogen, Oxides of Sulfur, and Particulate Matter - Ecological Criteria* was released in October 2020[103], after peer review by the Clean Air Scientific Advisory Committee.

- **Innovations in Risk Assessment:** HERA peer reviewed and anticipates finalizing the EPA version of the multi-path particle dosimetry (MPPD) model and software in the fall of 2021 for improved mechanistic modeling of inhalation dosimetry for particles. Continued advancements were made to HERA's dose-response analysis tool, Benchmark Dose

[1] Perfluorooctanoic Acid (PFOA), Perfluorooctanesulphonic Acid (PFOS).
[98] GenX chemicals assessment is owned by EPA's Water Program; the timeline for this assessment is different than PFBS. For more information on the timeline of this assessment, please contact EPA's Water Program.
[99] For more information, please see: https://www.epa.gov/pfas/learn-about-human-health-toxicity-assessment-pfbs.
[100] For more information, please see: https://www.epa.gov/pfas/learn-about-human-health-toxicity-assessment-pfbs.
[101] For more information, please see: https://www.epa.gov/iris/iris-recent-additions.
[102] For more information, please see: https://www.epa.gov/pprtv.
[103] For more information, please see: https://www.epa.gov/isa/integrated-science-assessment-isa-oxides-nitrogen-oxides-sulfur-and-particulate-matter.

Software (BMDS),[104] as well as critical information management databases including HERA's *Health and Environmental Research Online*[105] and the *Health Assessment and Workplace Collaborative*[106]. Having modernized its assessment infrastructure, EPA research under HERA is using evidence mapping to provide a better understanding of the extent and nature of data available to address agency chemical assessment priorities, including PFAS. It also serves to focus the assessments on support for specific decision contexts (*i.e.*, 'fit for purpose'). This approach is expected to improve assessment throughput and prioritize more timely assessments responsive to the priority needs of the Agency.

FY 2022 Activities and Performance Plan:

In FY 2022, the HERA Research Program's work will focus on efforts integral to achieving EPA priorities and informing the Agency's implementation of key environmental decisions. Specifically, in FY 2022, HERA will:

- Continue developing additional assessments through IRIS of perfluorinated compounds as described in *EPA's PFAS Action Plan*,[107] as well as other priority chemicals as identified by EPA's Water Program, Air and Radiation Program, and Land and Emergency Management Program. These HERA assessments include polychlorinated biphenyls, methylmercury, mercury salts, vanadium compounds, hexavalent chromium, inorganic arsenic, and formaldehyde. HERA also will provide support to the Air and Radiation Program with the development of the ISA for Lead to support review of the National Ambient Air Quality Standards (NAAQS). HERA will continue to provide scientific and technical support on assessments, such as to the Air and Radiation Program on decisions to retain or revise the NAAQS, and to the Chemical Safety and Pollution Prevention Program on TSCA implementation.

- Continue to develop and apply evidence mapping to provide a better understanding of the extent and nature of evidence available to address priority needs of the Agency and its partners, and focus the assessments on support for specific decision contexts (*i.e.*, 'fit for purpose') through a modernized assessment infrastructure.

- Provide the resources and workflow to two of the five Research and Development Program's Superfund technical support centers (TSCs)[108] to provide localized and tailored technical assistance and scientific expertise on human and ecological risk assessments to states, tribes, and EPA's program and regional offices. This includes direct support in cases of emergencies and other rapid response situations.

[104] For more information, please see: https://www.epa.gov/bmds.
[105] For more information, please see: https://hero.epa.gov/hero/.
[106] For more information, please see: https://hawcprd.epa.gov/.
[107] For more information, please see: https://www.epa.gov/pfas/epas-pfas-action-plan.
[108] HERA supports the Superfund Health Risk Technical Support Center (STSC) and the Ecological Risk Assessment Support Center (ERASC). For more information on EPA's five TSCs, please see: https://www.epa.gov/land-research/epas-technical-support-centers.

- Apply new and alternative approaches, methods, and data to risk assessment products, and technical support to better respond to the needs of the states, tribes, and EPA's program and regional offices, in cooperation with the Chemical Safety for Sustainability Research Program.

- Provide training to staff, partners, and stakeholders on risk assessment practice, assessment tool literacy, and standard operating procedures for assessment development via easy to access modules.

In addition to the activities listed above, EPA also conducts research across programs in the following areas:

- **PFAS Research:** PFAS are a class of chemicals of growing concern in the environment, and EPA has committed to taking action to support states, tribes, and local communities in understanding and managing risks associated with these chemicals. There are still large numbers of other PFAS of high interest to stakeholders which currently have no federal published, peer-reviewed toxicity values. Within the HERA Research Program, EPA is prioritizing additional PFAS for development of peer-reviewed toxicity values. This will result in an expanded set of high-quality peer-reviewed toxicity values for use by federal, state, and tribal decision makers in making risk assessment and management decisions. In addition, EPA is identifying, reviewing, organizing and presenting relevant health information on PFAS through systematic evidence mapping to identify data gaps, inform prioritization and hazard characterization, and facilitate human health assessments for PFAS.

- **Lead:** Childhood lead exposure continues to be one of the highest priorities for EPA. To advance lead exposure and biokinetic models used in EPA regulatory decisions and site assessments, research focuses on enhancing, evaluating, and applying lead exposure and biokinetic models used for estimating potential blood lead levels and related analyses for regulatory determinations. Additionally, the Exposure Factors Handbook[109] provides up-to-date data on various human factors, including soil and dust ingestion rates, used by risk assessors.

Research Planning:

EPA's Board of Scientific Counselors (BOSC) is a federal advisory committee that provides advice and recommendations to EPA on technical and management issues of its research programs. The HERA Research Program and the HERA Subcommittee of the BOSC will continue to meet regularly over the next several years to seek input on topics related to research program design, science quality, innovation, relevance, and impact.

The Agency assesses the impact of its research through a survey tool and discussion with key users. Metrics center around quality, usability, and timeliness of particular research products. This provides evidence for how research products are being used and by whom. Through the evaluation

[109] For more information, please see: https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252.

process, the Agency is able to identify targeted areas for improvement. The most recent survey results for FY 2020 research products indicated more than 80 percent met partner needs. EPA is working to improve partner engagement by developing a partner dashboard.

EPA's state engagement[110] is designed to inform states about their role within EPA and EPA's research programs, and to better understand the science needs of state environmental and health agencies. Key partners at the state level include: the Environmental Council of the States, with its Environmental Research Institute of the States and the Interstate Technology and Regulatory Council; the Association of State and Territorial Health Officials; as well as state media associations, such as the Association of State and Territorial Solid Waste Management Officials.

EPA's commitment to advancing Tribal partnerships is demonstrated in the Research and Development Program, in which key partnerships are established through the Tribal Science Program which provides a forum for the interaction between Tribal and Agency representatives of mutual benefit and responsibility to work collaboratively on environmental science issues. The Tribal Science Program is committed to development of sound scientific and cultural approaches to meet the needs of tribes.

Performance Measure Targets:

Work under this program supports performance results in the Research: Chemical Safety for Sustainability Program under the S&T appropriation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$406.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$3,524.0 / +20.0 FTE) This program change increases funding and FTE for the Health and Environmental Assessment program. These FTE will assist in advancing science assessments, such as IRIS, as well as analytical approaches for the applications of risk assessments. This investment includes $3,502.0 thousand in payroll costs.

Statutory Authority:

Clean Air Act §§ 103, 108, 109, and 112; Clean Water Act §§ 101(a)(6), 104, 105; Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) § 3(c)(2)(A); Safe Drinking Water Act (SDWA) § 1458; Toxic Substances Control Act (TSCA).

[110] For more information, please see: https://www.epa.gov/research/epa-research-solutions-states.

Water: Human Health Protection

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$101,007.3	$106,903.0	$118,265.0	$11,362.0
Science & Technology	***$4,265.0***	***$4,364.0***	***$6,444.0***	***$2,080.0***
Total Budget Authority	$105,272.3	$111,267.0	$124,709.0	$13,442.0
Total Workyears	472.2	475.2	531.0	55.8

Program Project Description:

The Drinking Water Technical Support Center leads the collection of national occurrence data for unregulated contaminants in drinking water; develops and evaluates analytical methods that are used to monitor drinking water contaminants accurately and reliably; leads the national program under which laboratories are certified to conduct the analyses of water contaminants with designated analytical methods; and works with states and public water systems collaboratively to implement tools that help systems achieve performance and optimization practices that achieve compliance and maximize technical capacity while reducing operational costs.

FY 2022 Activities and Performance Plan:

In FY 2022, EPA is requesting an increase of over $2.0 million and 4.0 FTE for the Drinking Water Technical Support Center to carry out the following activities:

- Lead the development, revision, evaluation, and approval of analytical methods for unregulated and regulated contaminants to assess and ensure protection of public health from contaminants in drinking water (e.g., polyfluoroalkyl substances [PFAS]). This work supports the activities underway for the Agency's PFAS Action Plan;

- Implement EPA's Drinking Water Laboratory Certification Program,[111] which sets direction for oversight of state, municipal, and commercial laboratories that analyze drinking water samples. Conduct three regional program reviews during FY 2022 and deliver two laboratory certification officer training courses (chemistry and microbiology) for state and regional representatives to ensure the quality of analytical results;

- Partner with states and water systems to optimize their treatment technology and distribution systems under the drinking water Area Wide Optimization Program (AWOP).[112] AWOP is a highly successful technical/compliance assistance and training program that enhances the ability of public water systems to comply with existing microbial, disinfectant, and disinfection byproduct standards, and addresses distribution

[111] For more information, please see: https://www.epa.gov/dwlabcert.
[112] For more information, please see: https://www.epa.gov/sdwa/optimization-program-drinking-water-systems.

system integrity and water quality issues. During FY 2022, EPA expects to work with states and tribes to expand efforts to train and assist systems, including those in disadvantaged and tribal communities. This effort includes identifying performance limiting factors at public water systems and developing and applying tailored tools to help them overcome operational challenges, achieving performance and optimization levels, and addressing health-based compliance challenges; and

- The Unregulated Contaminant Monitoring Rule (UCMR) is a federal direct implementation program coordinated by EPA, as directed by the Safe Drinking Water Act (SDWA). The data collected are used by EPA as part of the Agency's determination of whether to establish health-based standards to protect public health. Sampling activities under the fourth cycle of the Program (UCMR 4) will conclude in 2021 and EPA will compile and publish a final data set in early FY 2022. The Agency also will publish the final rule for the fifth cycle of UCMR monitoring (UCMR 5) and conduct pre-monitoring implementation activities to prepare for the UCMR 5 sampling period (anticipated to be from January 2023 through December 2025). In March 2021, EPA published the proposed UCMR 5 Federal Register notice for public comment. UCMR 5 would be the first cycle of UCMR to implement the monitoring provisions of the America's Water Infrastructure Act of 2018 (AWIA), which requires, subject to the availability of appropriations and adequate laboratory capacity, sampling at all public water systems (PWSs) serving between 3,300 and 10,000 persons, and a representative sample of PWSs serving fewer than 3,300 persons. Key activities for EPA include ensuring laboratories are available to perform the required analyses, managing the field sample collection and sample analysis for small systems, and managing data reporting by large systems. In addition, EPA makes the data available to our state and tribal partners and to the public.

Performance Measure Targets:

Work under this program supports the Safe Drinking Water Act implementation and compliance and requirements in the Drinking Water State Revolving Fund and Categorical Grant: Public Water System Supervision Programs under the STAG appropriation to support safe drinking water for the nation.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (+$66.0) This change to fixed and other costs is an increase due to the recalculation of base workforce costs for existing FTE due to annual payroll increases, adjustments to provide essential workforce support, and changes to benefits costs.

- (+$2,014.0 / +4.0 FTE) This increase of resources and FTE supports regulatory analyses, development and training, and technical assistance for state, tribal, and local communities to address drinking water contaminants (including Lead and PFAS) in their efforts to ensure safe and affordable drinking water. The increase also supports development and implementation of the Lead and Copper Rule Revisions and the Unregulated Contaminant Monitoring Rule. This total includes $9.0 thousand in non-pay and 1.0 FTE to support

implementation of the Evidence Act. This investment also includes $705.0 thousand in payroll costs and essential workforce support costs.

Statutory Authority:

SDWA.

Congressional Priorities

(Dollars in Thousands)

	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Pres Budget	FY 2022 Pres Budget v. FY 2021 Enacted
Environmental Programs & Management	$15,000.0	$21,700.0	$0.0	-$21,700.0
Science & Technology	***$4,992.0***	***$7,500.0***	***$0.0***	***-$7,500.0***
Total Budget Authority	$19,992.0	$29,200.0	$0.0	-$29,200.0

Program Project Description:

In FY 2021, Congress appropriated $7.5 million in the Science and Technology appropriation to fund high priority water quality and water availability research. EPA was instructed by Congress to award grants on a competitive basis, independent of the Science to Achieve Results (STAR) Program, and give priority to not-for-profit organizations that: conduct activities that are national in scope; can provide a 25 percent match, including in-kind contributions; and often partner with the Agency.

FY 2022 Activities and Performance Plan:

Resources are proposed for elimination for this Program in FY 2022.

Performance Measure Targets:

EPA's FY 2022 Annual Performance Plan does not include annual performance goals specific to this program.

FY 2022 Change from FY 2021 Enacted Budget (Dollars in Thousands):

- (-$7,500.0) This Program is eliminated in the FY 2022 President's Budget. The goals of this Program can be accomplished through core statutory programs.

Statutory Authority:

CAA 42 U.S.C. 7401 et seq. Title 1, Part A – Sec. 103 (a) and (d) and Sec. 104 (c); CAA 42 U.S.C. 7402(b) Section 102; CAA 42 U.S.C. 7403(b)(2) Section 103(b)(2); Clinger Cohen Act, 40 U.S.C. 11318; CERCLA (Superfund, 1980) Section 209(a) of Public Law 99-499; Children's Health Act; CWA, Sec. 101 - 121; CWPPRA; CZARA; CZMA 16 U.S.C. 1451 - Section 302; Economy Act, 31 U.S.C. 1535; EISA, Title II Subtitle B; ERDDA, 33 U.S.C. 1251 – Section 2(a); ESA, 16 U.S.C. 1531 - Section 2; FFDCA, 21 U.S.C. Sec. 346; FIFRA (7 U.S.C. s/s 136 et seq. (1996), as amended), Sec. 3(c)(2)(A); FQPA PL 104-170; Intergovernmental Cooperation Act, 31 U.S.C. 6502; MPRSA Sec. 203, 33 U.S.C. 1443; NAWCA; NCPA; National Environmental Education Act, 20 U.S.C. 5503(b)(3) and (b)(11); NEPA of 1969, Section 102; NISA; ODBA Title II; PPA, 42 U.S.C. 13103; RCRA; SDWA (1996) 42 U.S.C. Section 300j-18; SDWA Part E, Sec. 1442

(a)(1); TSCA, Section 10, 15, 26, U.S.C. 2609; USGCRA 15 U.S.C. 2921; WRDA; WRRA; and WWWQA.