



September 2023

NUCLEAR WASTE CLEANUP

Army Corps Could
Benefit from Following
Leading Practices for
Program Management
for Contaminated
Sites

GAO Highlights

Highlights of [GAO-23-105968](#), a report to congressional requesters

Why GAO Did This Study

Atomic energy activities supported by the federal government generated large amounts of radioactive and hazardous waste over several decades of nuclear weapons production and energy research following World War II. This waste has contaminated soil, groundwater, and structures at sites across the country, posing potential risks to human health and the environment. The Corps is responsible for cleaning up or controlling contamination at some of these sites through FUSRAP.

GAO was asked to provide information about the Corps' efforts to clean up contamination under FUSRAP. This report, among other things, (1) describes the reported environmental liabilities associated with active FUSRAP sites and uncertainties around those estimates and (2) examines the extent to which FUSRAP meets leading practices for program management.

GAO reviewed legal requirements, federal accounting standards, agency documents, and leading program management practices; analyzed data on the Corps' cleanup expenditures and total cost estimates; and interviewed agency officials.

What GAO Recommends

GAO is making five recommendations, including that the Corps conduct risk management and develop a life cycle cost estimate for FUSRAP in accordance with leading program management practices. The Corps agreed with our recommendations.

View [GAO-23-105968](#). For more information, contact Nathan Anderson at (202) 512-3841 or AndersonN@gao.gov.

September 2023

NUCLEAR WASTE CLEANUP

Army Corps Could Benefit from Following Leading Practices for Program Management for Contaminated Sites

What GAO Found

The U.S. Army Corps of Engineers (Corps) reported \$2.6 billion in environmental liabilities in fiscal year 2022 for the estimated future costs to investigate and clean up contamination under its Formerly Utilized Sites Remedial Action Program (FUSRAP). Of the 19 active sites in the program, four sites with complicated cleanup remedies or large amounts of contamination make up about three-quarters of this estimate. However, Corps officials said that FUSRAP's environmental liability has the potential to be affected by uncertainties, such as the discovery of additional contamination after completing a cost estimate for remediation. Since 2016, FUSRAP's environmental liability has risen by nearly \$1 billion, an increase that officials attribute to uncertainties, along with inflation.

Formerly Utilized Sites Remedial Action Program Sites in St. Louis, Missouri, and Lockport, New York, Being Cleaned up by the U.S. Army Corps of Engineers



Site in St. Louis County, Missouri



Site in Lockport, New York

Source: GAO. | [GAO-23-105968](#)

GAO's review of FUSRAP documents found that the Corps minimally met selected leading practices for program management related to risk management and cost estimating, among other things. For example:

- **Programs should identify risks and opportunities, document their characteristics, and prepare to manage them.** The Corps does not have a documented program-level risk management process for FUSRAP. A program-level risk management process could help officials identify and manage risks that can affect multiple projects, such as limited staffing in areas like procurement, which officials said can extend some projects' timelines.
- **Programs should have an integrated life cycle cost estimate that is comprehensive.** Corps officials said that they consider FUSRAP's environmental liability estimate to be the program's life cycle cost estimate. However, the environmental liability estimate does not include all costs and does not track costs from previous years. Having an integrated life cycle cost estimate that includes all program costs could enhance FUSRAP management's ability to make risk-informed decisions on how to manage and allocate its resources.

Corps officials said that the agency's standard business practices do not require FUSRAP to adhere to some of the leading practices at the program level. Although not required, following these and other leading practices would better position the Corps to oversee and manage FUSRAP.

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Abbreviations

ACS	American Community Survey
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
Corps	U.S. Army Corps of Engineers
DOE-LM	U.S. Department of Energy's Office of Legacy Management
FUSRAP	Formerly Utilized Sites Remedial Action Program
MSD	Metropolitan St. Louis Sewer District
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PMI	Project Management Institute

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September 19, 2023

The Honorable Jamie Raskin
Ranking Member
Committee on Oversight and Accountability
House of Representatives

The Honorable Cori Bush
House of Representatives

Nuclear weapons production and energy research activities from the 1940s to the 1970s generated large amounts of radioactive contamination and hazardous waste at commercial enterprises that were under contract to the federal government. As a result, contamination of soil, groundwater, and structures occurred at sites across the country, posing potential risks to human health and the environment.

The Formerly Utilized Sites Remedial Action Program (FUSRAP) aims to identify; investigate; and, if necessary, clean up or control contamination that resulted from the nation's early atomic energy program, with the goal of returning the sites to beneficial use for the surrounding communities. The U.S. Army Corps of Engineers (the Corps) manages the response actions, including investigation and cleanup.¹ There are 19 active sites across eight states (see fig. 1).²

¹The Department of Energy's Office of Legacy Management (DOE-LM) is responsible for certain actions before and after the Corps' response at FUSRAP sites. These responsibilities include, among others, performing historical research and providing a FUSRAP eligibility determination as to whether an individual site was used for activities that supported the Nation's early atomic energy program and any required activities at FUSRAP sites beginning 2 years after closeout of the site, such as surveillance, operation, and maintenance of the sites.

²According to Corps officials, the program had a total of 21 active sites as of June 2023. Officials said that they count active sites based on the number of sites for which they request funding. FUSRAP has requested separate funding for the three sites that collectively make up the North St. Louis County sites. Throughout the report, we refer to 19 active FUSRAP sites because we considered the North St. Louis County site to be a single active site based on how the Corps is executing cleanup at the site. See app. I for additional details on how we report on the number of active sites.

Figure 1: Location of Active Sites in the Formerly Utilized Sites Remedial Action Program (FUSRAP), as of January 2023



Source: U.S. Army Corps of Engineers geospatial data. | GAO-23-105968

Federal accounting standards require federal agencies to report environmental liabilities in their annual financial statements.³ The Corps' estimated environmental liabilities—or future cleanup costs—for FUSRAP contribute to the Department of Defense's total environmental liability. As of 2022, the Department of Defense was reporting about \$91 billion in

³Federal accounting standards require agencies to recognize a liability for environmental cleanup costs resulting from past transactions or events when a future outflow or other sacrifice of resources is probable and reasonably estimable. Related guidance is provided to assist federal agencies in determining probable and reasonably estimable liabilities related to their environmental cleanup responsibilities. Federal Accounting Standards Advisory Board, FASAB Handbook of Federal Accounting Standards and Other Pronouncements, as amended (June 30, 2022).

environmental liabilities. In 2017, we added the U.S. government's environmental liabilities to our High-Risk List, due to the growth of those liabilities over the past 20 years.⁴ In our most recent High-Risk List update, we found that departments and agencies, including the Department of Defense, need to take additional steps to address environmental risks and to monitor, report on, and better understand their environmental liabilities.

In 2022, the Corps announced that FUSRAP would be one of the agency's programs included in the White House's Justice40 Initiative.⁵ The goal of the Justice40 Initiative is that 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities. The administration seeks to meet this goal by transforming certain federal programs across the government to ensure that disadvantaged communities receive the benefits of new and existing investments in particular categories, including cleanup of legacy pollution. While the administration has indicated that additional guidance is forthcoming, the Corps will ultimately be required to take certain actions for programs within the scope of the Justice40 Initiative, including FUSRAP.

You asked us to review several aspects of the Corps' efforts to clean up FUSRAP sites. This report (1) describes the reported environmental liabilities associated with active FUSRAP sites and uncertainties that exist around those estimates; (2) examines the extent to which FUSRAP meets selected leading practices for program management; (3) describes how many FUSRAP sites we identified as being near underserved communities, and steps the Corps has taken to implement Justice40; and (4) assesses how the Corps communicates to surrounding communities about active FUSRAP sites, and the views that selected stakeholders have about the Corps' communication.

⁴GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, [GAO-17-317](#) (Washington, D.C.: Feb. 15, 2017). GAO's High-Risk Series identifies federal programs and operations that are high risk because of their vulnerabilities to fraud, waste, abuse, and mismanagement or that need transformation. We updated the High-Risk Series in April 2023. See GAO, *High-Risk Series: Efforts Made to Achieve Progress Need to Be Maintained and Expanded to Fully Address All Areas*, [GAO-23-106203](#) (Washington, D.C.: Apr. 20, 2023).

⁵The Justice40 Initiative was established by executive order in January 2021. Exec. Order No. 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619, 7631-32 (Jan. 27, 2021).

To address the first objective, we reviewed Corps documents and interviewed officials about how they estimate and report on FUSRAP's environmental liabilities, and uncertainties around those estimates. We analyzed data on FUSRAP's environmental liabilities from fiscal years 2016 through 2022—the most recent 7 years of data at the time of our analysis—to determine any changes in the estimates over time. We took steps to assess the reliability of the data, including reviewing Corps guidance and audit reports related to the data, and found them to be sufficiently reliable for our purposes of describing FUSRAP's environmental liabilities.

To address the second objective, we reviewed a prior GAO report that derived nine program management practices from the Project Management Institute's (PMI) standards for program management.⁶ These leading practices for program management, adapted from PMI's *The Standard for Program Management*—Fourth Edition, are generally recognized as the top leading practices for program management. These practices relate to management of scope, cost, schedule, performance, and independent review of performance. While we compared the Corps' management of FUSRAP with all nine of our program management leading practices, we focused on the three leading practices that we identified as foundational to the success of a program: planning, cost estimating, and risk management. See appendix II for further details about how we scored the Corps in all nine areas. We determined that these program management practices were relevant for assessing program management of FUSRAP, and we thus focused our assessment on these practices. We reviewed Corps documents related to program management, such as the FUSRAP Program Management Plan and relevant Engineering Regulations. We also interviewed Corps officials to understand the extent to which FUSRAP is following leading program management practices. We evaluated the Corps documents and

⁶GAO, *Nuclear Waste Cleanup: DOE Could Improve Program and Project Management by Better Classifying Work and Following Leading Practices*, [GAO-19-223](#) (Washington, D.C.: Feb. 19, 2019); and Project Management Institute, Inc., *The Standard for Program Management*, Fourth Edition (2017).

interview responses against the nine leading practices using a 5-point scoring system.⁷

To address the third objective, we obtained and analyzed spatial data on FUSRAP site boundaries from the Corps and American Community Survey 5-year (2017 to 2021) estimates on selected community characteristics at the census tract level.⁸ Specifically, we mapped FUSRAP site boundaries to analyze descriptive statistics on race, ethnicity, and family poverty for census tracts containing and adjacent to the sites. We determined that a FUSRAP site was located near underserved communities if the census tracts containing and adjacent to the site had (1) higher rates of underserved racial or ethnic populations than the rest of the census tracts in the county where the site is located or (2) higher rates of families living at or below the federal poverty level than the rest of the census tracts in the county where the site is located. We also examined the statistical relationship between (1) race, ethnicity, and family poverty; and (2) distance to a FUSRAP site by conducting a regression analysis. The regression analysis allowed us to explore any potential relationship between underserved communities and the location of FUSRAP sites without determining a specific boundary for communities near the site (i.e., census tracts containing and adjacent to the site). We took steps to assess the reliability of the data for these analyses, including conducting standard checks for variables with high rates of missing values, and found them to be sufficiently reliable for our purposes of analyzing if FUSRAP sites are near underserved communities. Appendix III has further details on our methodology and results for the third objective.

To address the fourth objective, we reviewed laws, regulations, and Corps documents regarding public involvement in the waste cleanup process. We also reviewed Corps documents on communication, including site-specific community relations plans and public comments on the Corps' selected cleanup remedies, and interviewed Corps officials

⁷The 5-point scoring categories are: "met" means that evidence was provided that satisfied the leading practice; "substantially met" means that evidence was provided that satisfied a large portion of the leading practice; "partially met" means that evidence was provided that satisfied about half of the leading practice; "minimally met" means that evidence was provided that satisfied a small portion of the leading practice; and "not met" means that no evidence was provided that satisfied the leading practice.

⁸Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, such as streams, highways, railroads, and legal boundaries, and that generally contain between 1,200 and 8,000 people.

about their communication strategies. We also interviewed or received written responses from a total of 16 federal, tribal, state, local, and community stakeholder groups to obtain their views on the Corps' communications about FUSRAP. Representatives from these stakeholder groups included officials from the U.S. Environmental Protection Agency, one Tribal Nation, six regulatory agencies in five states, four local governments, and four community groups. We selected the state agencies based on states that had at least two FUSRAP sites. From the three Corps districts that manage the majority of FUSRAP sites, we selected at least one local government representative and one community group representative that had provided comments on proposed site remedies to be interviewed.

We also conducted site visits to two FUSRAP sites in the St. Louis, Missouri, area and five FUSRAP sites in the Buffalo, New York, area to observe, among other things, communications materials such as signage posted at sites. We selected these locations for site visits because we could observe multiple FUSRAP sites in close proximity to one another. Further, the selected sites were in various phases of the cleanup process, and the sites represented over half of the total environmental liability estimate for FUSRAP, as of the end of fiscal year 2021. See appendix I for further details on our objectives, scope, and methodology.

We conducted this performance audit from April 2022 to September 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

FUSRAP History and Cleanup Process

FUSRAP was established in 1974 by a predecessor of the Department of Energy under the authority of the Atomic Energy Act of 1954, as amended.⁹ In 1997, Congress transferred the FUSRAP program from the Department of Energy to the Corps for program execution.¹⁰ The Corps' response actions under FUSRAP are subject to the administrative, procedural, and regulatory provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and its implementing regulations.¹¹ Figure 2 illustrates the phases of cleanup that typically occur at FUSRAP sites, including activities under the CERCLA cleanup framework and activities that are unique to FUSRAP. For the purposes of this report, we have grouped those activities into the following high-level phases: eligibility determination, investigation, decision, cleanup and long-term stewardship. As shown below, the Department of Energy's Office of Legacy Management (DOE-LM) is responsible for certain aspects of FUSRAP in the eligibility determination phase and long-term stewardship of sites that have been cleaned up by the Corps, among other things.¹² The activities conducted by DOE-LM are outside the typical CERCLA cleanup process set forth in CERCLA's implementing regulations.

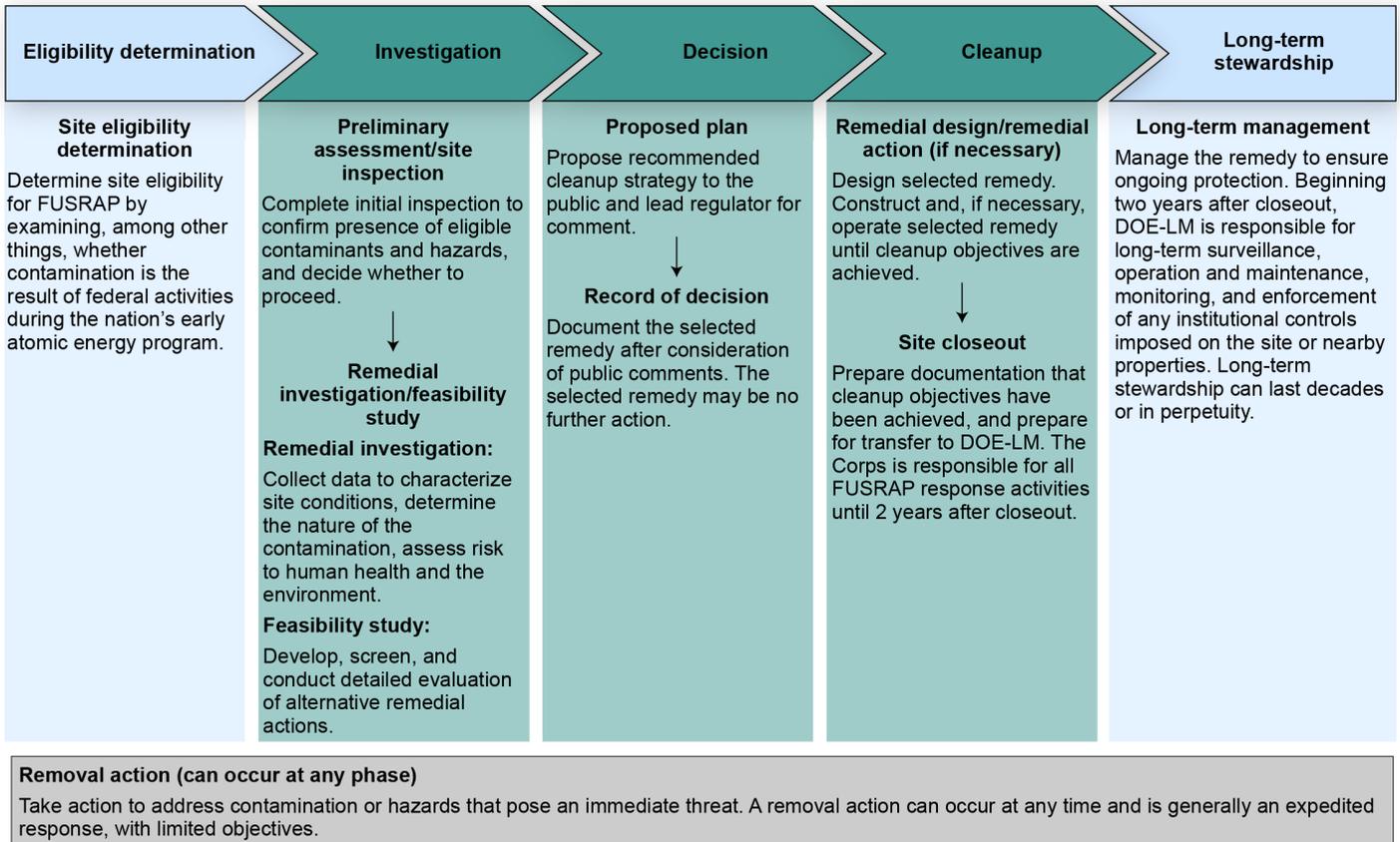
⁹The Manhattan Engineer District, Atomic Energy Commission, and Energy Research and Development Administration were, among others, predecessor agencies to the Department of Energy.

¹⁰Energy and Water Development Appropriations Act, 1998, Pub. L. No. 105-62, 111 Stat. 1320, 1326 (1997).

¹¹The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) constitutes CERCLA's implementing regulations. The NCP provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants in the United States. 40 C.F.R. § 300.1.

¹²Evaluating DOE-LM's role in FUSRAP was outside the scope of this review.

Figure 2: Typical Response Phases and Responsible Federal Entity at a Formerly Utilized Sites Remedial Action Program (FUSRAP) Site



Department of Energy-Office of Legacy Management (DOE-LM) activities

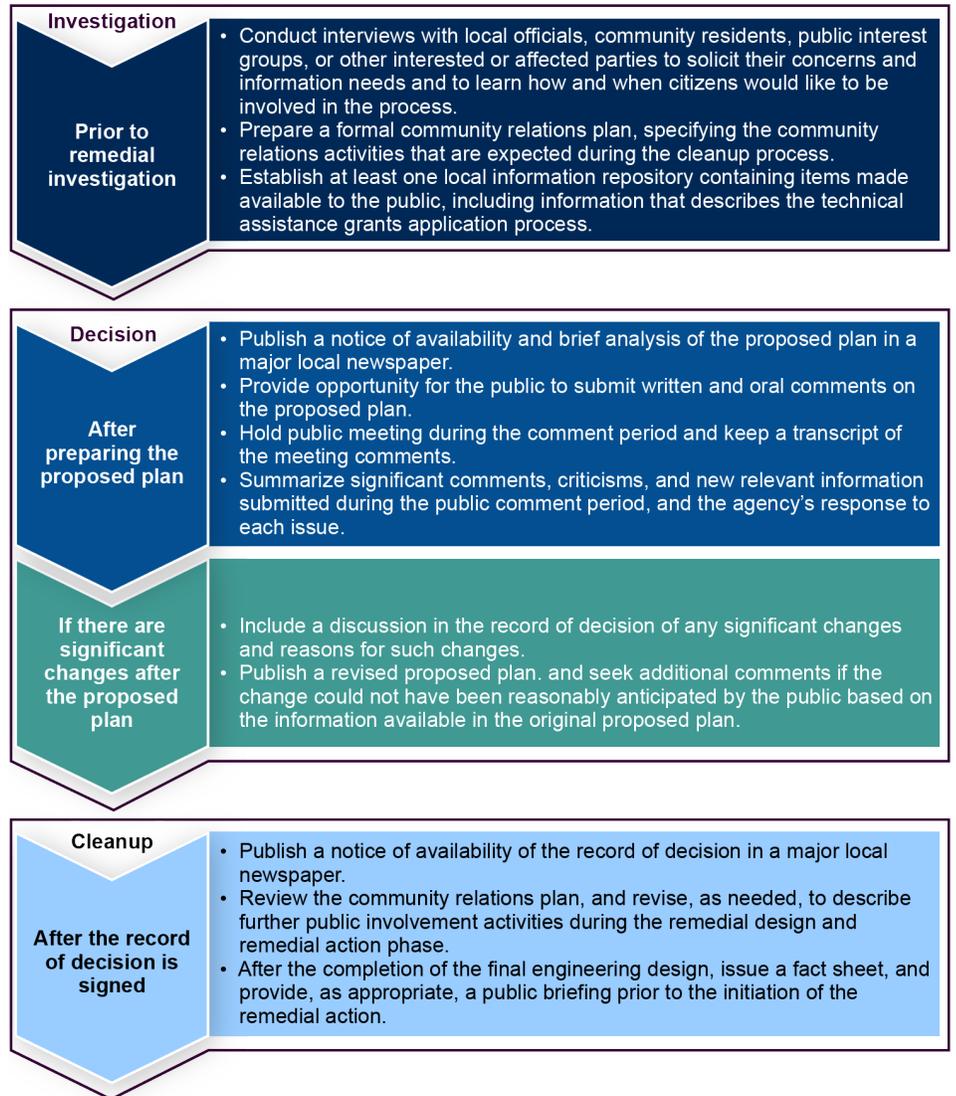
U.S. Army Corps of Engineers (Corps) activities

Source: GAO analysis of laws, regulations, and agency guidance documents. | GAO-23-105968

Notes: For the purposes of this report, we have grouped the typical response activities into the high-level phases of eligibility determination, investigation, decision, cleanup, and long-term stewardship. The response activities depicted above include actions unique to FUSRAP and actions that are part of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) cleanup framework, which is generally set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) located at 40 C.F.R. Part 300. The Corps' response actions under FUSRAP are subject to the administrative, procedural, and regulatory provisions of CERCLA and NCP.

CERCLA and its implementing regulations require certain public participation and community relations activities during the cleanup process. Such activities include conducting community interviews and preparing a formal community relations plan (see fig. 3).

Figure 3: Examples of Community Relations Activities Called for at Specific Cleanup Phases



Source: GAO analysis of laws, regulations, and agency guidance documents. | GAO-23-105968

Notes: The examples included here are called for at different points in a response executed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) cleanup framework. The CERCLA cleanup framework is generally set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) located at 40 C.F.R. Part 300. For the purposes of this report, we have grouped response activities required by the NCP into a number of phases. For a depiction of those phases and a description of the response activities, see figure 2.

Overview of FUSRAP Structure and Operations

Radiological cleanup represents a small portion of the work executed by the Corps' Civil Works Program.¹³ The program's three main mission areas—commercial navigation, flood and storm damage reduction, and aquatic ecosystem restoration—described in the Corps' Civil Works fiscal year 2023 budget request made up about 80 percent of Civil Works' requested budget, while FUSRAP made up about 4 percent. FUSRAP carries out the work of cleaning up sites in a decentralized manner through the Corps' structure of divisions and districts. Corps headquarters directs work to the divisions, which, in turn, assign project management responsibilities to their districts. According to Corps officials, work at the district level is generally performed using contracted staff for investigation and remediation services under Corps supervision. Officials said that the divisions serve as an intermediary between the districts and headquarters and review key district site and budget documents, among other responsibilities.

The FUSRAP National Program Manager, located at the headquarters level, is currently responsible for communicating and monitoring program goals and objectives to the divisions and districts to support consistent program execution.¹⁴ According to PMI, programs include multiple components, such as projects, which are interrelated and managed in a coordinated way to obtain benefits not available from managing them individually. For FUSRAP, each site is considered a project that is part of the larger program, according to Corps documents and officials. In recent years, FUSRAP has received more funding in its annual appropriation than it has requested through the President's annual budget request. We found that the program has not always obligated its full appropriation on an annual basis, which has led the program to have a substantial and

¹³According to its strategic plan, the vision of the Corps' Civil Works Program is to provide innovative and environmentally sustainable solutions to the nation's water resources challenges. The mission includes developing and managing the nation's water resources, supporting commercial navigation, restoring and managing aquatic resources, managing flood risk, and providing engineering and technical services.

¹⁴The duties of the FUSRAP National Program Manager and Business Line Manager are currently being performed under one position at the headquarters level. The Business Line Manager is responsible for leading the overall budget development, defense, and program execution for FUSRAP, among other duties.

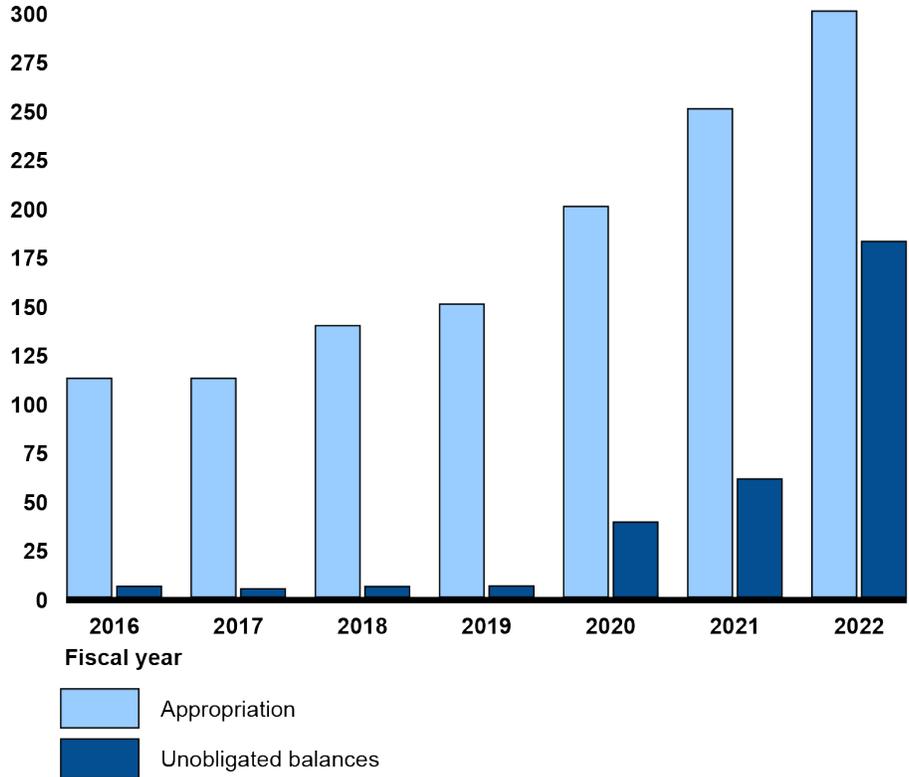
increasing unobligated balance.¹⁵ FUSRAP appropriations are no-year money, meaning that the funds remain available until expended.¹⁶ Between fiscal years 2016 and 2019, the annual appropriation for FUSRAP was about \$130 million, on average. Between fiscal years 2020 and 2022, FUSRAP received an average annual appropriation of about \$250 million. As of the end of fiscal year 2022, the program had an unobligated balance of about \$182 million (see fig. 4). As of February 2023, the Corps had plans to award and fund several remediation contracts in fiscal year 2024 to spend down the unobligated balance.

¹⁵An unobligated balance is the portion of funding provided that has not yet been obligated. An obligation is a definite commitment that creates a legal liability of the U.S. government for the payment of goods and services ordered or received, or a legal duty on the part of the United States that could mature into a legal liability by virtue of actions on the part of the other party beyond the control of the U.S. government.

¹⁶For a no-year account like FUSRAP's, an unobligated balance is carried forward indefinitely until (1) specifically rescinded by law; or (2) the head of the agency concerned or the President determines that the purposes for which the appropriation was made have been carried out, and disbursements have not been made from the appropriation for 2 consecutive years.

Figure 4: Formerly Utilized Sites Remedial Action Program (FUSRAP) Annual Appropriation and Unobligated Balance, Fiscal Years 2016–2022

Dollars (in millions)



Source: GAO analysis of U.S. Army Corps of Engineers documents. | GAO-23-105968

Notes: FUSRAP appropriations depicted above are no-year money, meaning that they remain available until expended.

FUSRAP Site Characteristics

The 19 active sites currently being cleaned up by the Corps vary in terms of size and location, extent and type of contamination, ownership, and phase of the cleanup process. These variations require that the Corps address each site differently based on its unique characteristics.

Origins of St. Louis Airport Site Contamination

The St. Louis Airport Site stored radioactive waste resulting from activities carried out by commercial enterprises in support of the Manhattan Project. By 1960, there were approximately 50,000 empty drums and approximately 3,500 tons of contaminated steel and scrap metal stored onsite. Runoff from the site contaminated sediments in nearby Coldwater Creek, and flood events have moved this contaminated sediment downstream and within the creek's floodplain.



Storage of Barrels of Radioactive Waste at the St. Louis Airport Site, One of the North St. Louis County sites, for the Manhattan Project, Circa 1958

Source: U.S. Army Corps of Engineers (photo). | GAO-23-105968

Size and location. FUSRAP sites vary in size—from roughly a single acre to 2,400 acres. Most of the sites are located in urban areas, but some are located in suburban and rural areas. Land use on and near contaminated sites also varies. For example, the W. R. Grace at Curtis Bay site is located on an industrialized peninsula in Baltimore, Maryland, and is surrounded by bodies of water and a city landfill. On the other hand, the Tonawanda Landfill in Tonawanda, New York, is directly adjacent to residential backyards and a railroad line. At some sites, contamination may have spread to nearby properties, called vicinity properties, that the Corps is also investigating and cleaning up, as appropriate.

Type and extent of contamination. The radioactive contamination generally found at FUSRAP sites are low levels of uranium, thorium, radium, and their associated decay products.¹⁷ According to the Center for Disease Control's Agency for Toxic Substances and Disease registry, exposure to higher levels of contaminants, such as radium, over a long period may result in harmful effects, including anemia, cataracts, and fractured teeth, among other conditions. The Corps states that while FUSRAP sites may contain radioactivity at levels above current regulatory guidelines, none of the sites pose an immediate health risk to the public or environment, given current land uses. These contaminants can be located in soils or in groundwater. Some FUSRAP sites also have contaminated buildings that may need to be demolished. Finally, some FUSRAP sites have buried waste in landfills that have been closed for long periods and need to be monitored to ensure that contamination will not migrate or be exhumed and disposed of elsewhere.

¹⁷Other nonradiological wastes (e.g., chemical) may be mixed with the radiological wastes. The Corps considers the following substances to be within the scope of FUSRAP cleanup activities: (1) radioactive contamination and hazardous substances resulting from the nation's early atomic energy program activities, (2) other radioactive contamination or hazardous substances commingled with contamination from early atomic energy program activities, and (3) any other hazardous substances found on property owned by the U.S. government for which the U.S. government is liable under CERCLA and is at sites transferred for action to the Corps during the transfer of responsibility for execution of the program from the Department of Energy to the Corps.

Formerly Utilized Sites Remedial Action Program (FUSRAP) in the News

A study released in October 2022 stated that radioactive contamination was detected above acceptable levels at Jana Elementary School, part of the Hazelwood School District, in Florissant, Missouri. The school is located about 8,100 meters downstream from the St. Louis Airport Site near the Coldwater Creek 500-year floodplain. In response to the study's release, the school district closed Jana Elementary School.

Since October 2022, the U.S. Army Corps of Engineers (the Corps) has conducted additional surveys of structure surfaces both inside and outside the school and taken soil samples. As of June 2023, the Corps has released three final reports that include results from surveys of building surface structures and soil samples from the surrounding outside play areas, among others. According to the Corps, the reports confirm that Jana Elementary School is not contaminated by radioactive contaminants related to the nation's early atomic energy program.

Source: GAO Review of U.S. Army Corps of Engineers documents. | GAO-23-105968

Ownership. Most active FUSRAP sites consist of properties that are owned by private entities.¹⁸ The Corps must obtain legal right of entry to access privately owned properties for any response actions.

Phase of cleanup. FUSRAP sites each generally work through the phases of cleanup outlined above. At an individual site, there may be multiple operable units representing specific areas or materials on the site that are at different phases in the cleanup process.¹⁹ For example, the Maywood Chemical Superfund Site has a soils and buildings operable unit and a groundwater operable unit that are going through the cleanup process along two different time frames.

¹⁸The exceptions are the Niagara Falls Storage Site, the Iowa Army Ammunition Plant, and the Middlesex Sampling Plant, which are owned by the federal government. Additionally, according to Corps officials, the Department of Energy owns a portion of one of the properties on the Maywood Site.

¹⁹Under the NCP, an operable unit is a discrete action that comprises an incremental step toward comprehensively addressing site problems. Site cleanup can be divided into a number of operable units, depending on the complexity of the problems at the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site. See 40 C.F.R. § 307.14.

The Corps Reported \$2.6 Billion in Environmental Liabilities for Contaminated Sites, but Uncertainties May Affect Future Estimates

Of the Reported \$2.6 Billion in Environmental Liabilities, Four Sites Made up 75 Percent of the Total Estimate

The Corps reported about \$2.6 billion in environmental liabilities for FUSRAP in fiscal year 2022. Corps officials said that FUSRAP's environmental liability has the potential to be affected by uncertainties, including sites without complete cost estimates for cleanup, and the amount and accessibility of contamination at sites.

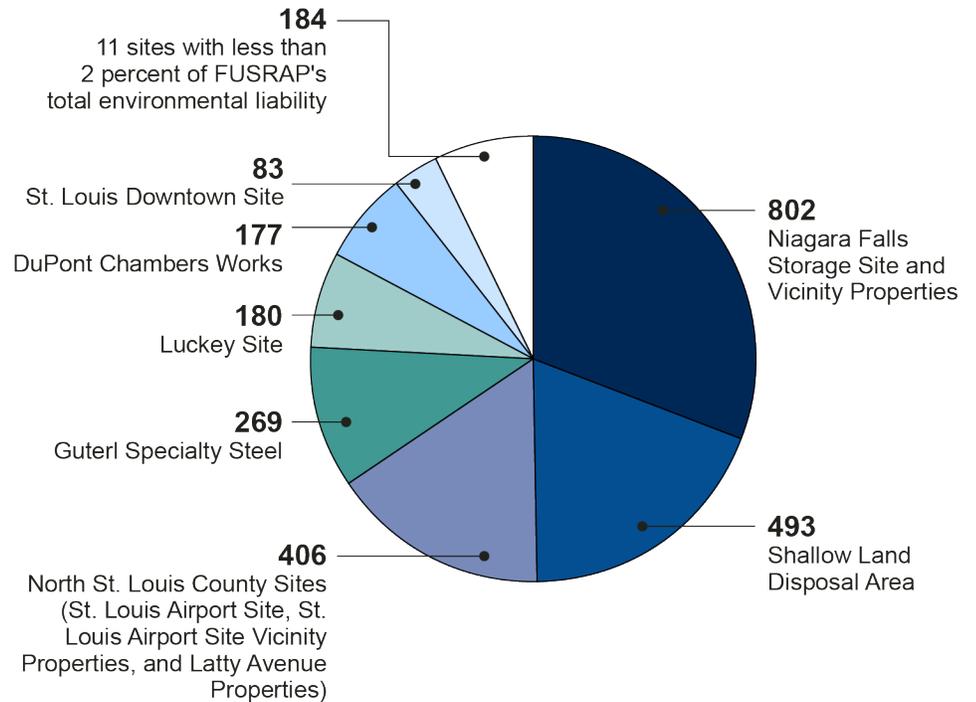
The Corps reported about \$2.6 billion in environmental liabilities for FUSRAP, according to the agency's fiscal year 2022 financial statement. This figure represents the estimated costs to investigate and clean up 18 of the 19 active sites currently in the program.²⁰ The Corps did not report any environmental liabilities for the final active site—the Maywood Chemical Superfund Site—on the fiscal year 2022 financial statement. Officials said that they consider Maywood to be a “government-acknowledged” site under federal accounting standards for which the government is not legally liable for cleanup but chooses to perform the cleanup nonetheless.²¹ Four sites made up about three-quarters of FUSRAP's total environmental liability estimate: the Niagara Falls Storage Site and Vicinity Properties, Shallow Land Disposal Area, North St. Louis County Sites, and Guterl Specialty Steel (see fig. 5).

²⁰The \$2.6 billion estimate represents 2022 dollars and does not include long-term stewardship costs associated with the sites after the Corps transfers the sites to DOE-LM. Additionally, investigations at several active sites have not progressed to the point where environmental liabilities for cleanup at those sites are reasonably estimable. For those sites, only investigation costs are currently reported as a part of the environmental liabilities for FUSRAP and, therefore, this estimate does not include the total future cleanup cost for such sites.

²¹For government-acknowledged cleanup, the accounting standards do not require reporting a complete future cleanup cost estimate. Instead, cleanup costs are reported as liabilities only to the extent that the agency is authorized to formally accept financial responsibility for cleanup; has appropriations; and either actual cleanup activities have been performed but not yet paid for, or there are amounts that are otherwise due and payable (e.g., grants).

Figure 5: Share of Formerly Utilized Sites Remedial Action Program (FUSRAP) Environmental Liability Estimate, by Site, Fiscal Year 2022

Environmental liability (dollars in millions)



Source: GAO analysis of U.S. Army Corps of Engineers environmental liability data. | GAO-23-105968

Notes: The 11 FUSRAP sites that individually contribute less than 2 percent to FUSRAP's environmental liability include the Harshaw Chemical Company Site, the Iowa Army Ammunition Plant, the Joslyn Manufacturing and Supply Company, the Middlesex Municipal Landfill, the Middlesex Sampling Plant, the Seaway Industrial Park, the Staten Island Warehouse, the Superior Steel Site, the Sylvania Corning Plant, the Tonawanda Landfill, and the W. R. Grace at Curtis Bay Site.

The four sites making up the largest share of FUSRAP's environmental liability generally require complex cleanup remedies or have a large geographic area requiring cleanup—both of which contribute to the large environmental liability estimates. For example, the Niagara Falls Storage Site includes an Interim Waste Containment Structure housing several kinds of buried wastes with higher levels of radioactivity than the contamination at other FUSRAP sites, according to Corps officials. The Corps has proposed to design and build special systems and technology to exhume, package, and ship this waste offsite to an appropriate disposal area.

Uncertainties Affect
FUSRAP's Environmental
Liability Estimates, Such
as Sites without a
Complete Estimate and
Amount and Accessibility
of Contamination

Over the past 7 years, FUSRAP's environmental liability estimate has grown by nearly \$1 billion, or 63 percent. Yearly inflation adjustments have contributed to about half of this growth. The other half, according to Corps officials, stems from cleanup-related uncertainties, such as sites that did not have a complete estimate in 2016 because they were still under investigation, as well as sites where the understanding of the amount and accessibility of the contamination has changed over time. These uncertainties have the potential to affect FUSRAP's environmental liability estimates as the Corps continues investigating and cleaning up active sites in the program.

Sites without a complete estimate. When a site is newly added to the program, the Corps reports an environmental liability estimate for the site that includes the estimated cost to perform investigations and feasibility studies and prepare the proposed plan and record of decision, according to Corps guidance on reporting environmental liabilities for FUSRAP and other programs. Once additional information is gathered through the feasibility study, the agency updates that environmental liability estimate to include the lowest-cost estimate of the acceptable cleanup alternatives presented in the feasibility study.²² Finally, once the cleanup remedy is finalized in the record of decision, the Corps reports the estimated cost of the selected remedy (including only 2 years of any long-term monitoring activities) as its environmental liability for that site.²³

The Corps has reported new environmental liability estimates after finalizing the feasibility study at four sites since the end of fiscal year 2016, leading to an approximately \$300 million increase in FUSRAP's overall environmental liability, as of fiscal year 2022. These sites include Guterl Specialty Steel, the Middlesex Sampling Plant, the Middlesex

²²The NCP requires a "no action alternative" be developed in each feasibility study. Accordingly, the Corps considers a no-action alternative in its feasibility studies with a cost estimate of zero dollars. According to Corps officials, if the no action alternative is not protective of human health and the environment, it is not considered to be an acceptable cleanup alternative and is not included in the range of alternatives that is used to report environmental liabilities.

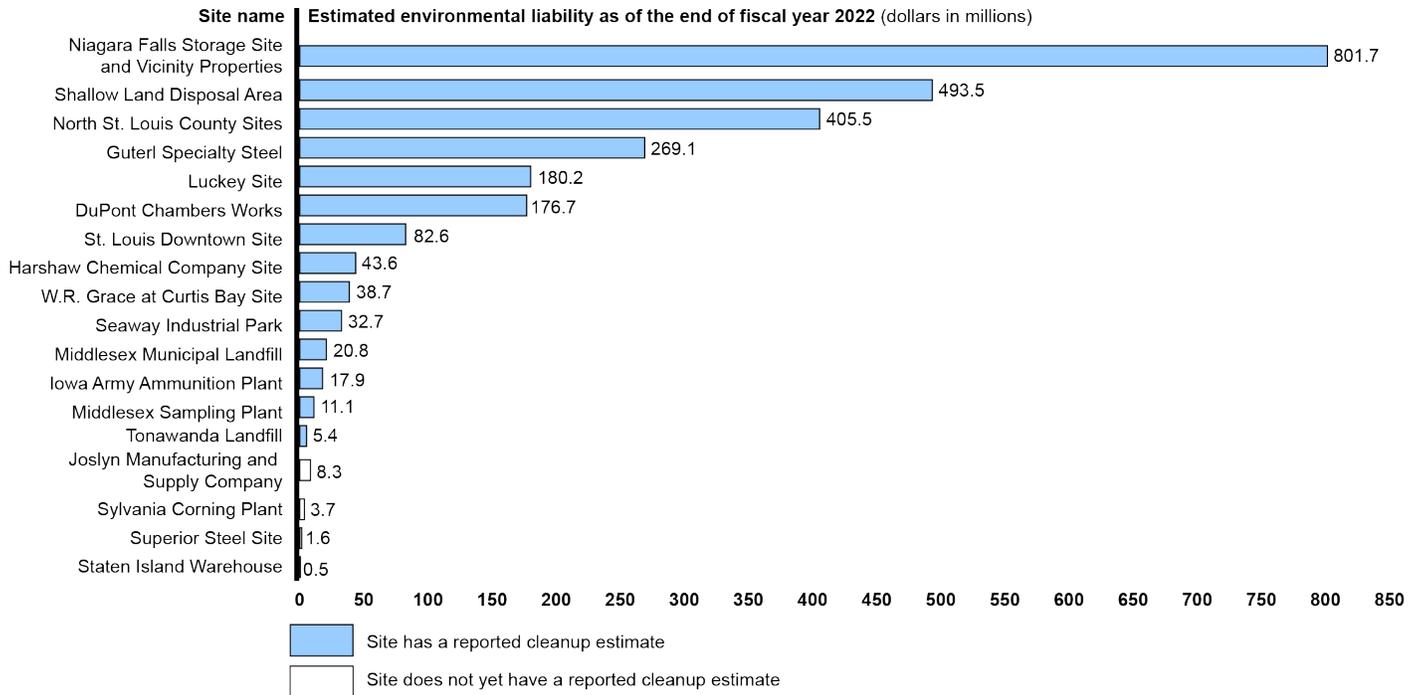
²³The federal accounting standards and related guidance provide for agencies to report estimated costs as investigations proceed and then update estimates as new information is developed. The Federal Accounting Standards Advisory Board, FASAB Handbook of Federal Accounting Standards and Other Pronouncements, as amended.

Municipal Landfill, and the Niagara Falls Storage Site and Vicinity Properties.²⁴

An additional four FUSRAP sites have the potential to increase FUSRAP's environmental liability because they are early on in the investigation phase and, thus, do not yet have a reported environmental liability estimate for total future cleanup costs (see fig. 6). Preliminary assessments, site inspections, and remedial investigations conducted by the Corps have shown that all four of these sites have evidence of contamination that is potentially eligible for cleanup under FUSRAP and, therefore, will likely have an environmental liability for cleanup once feasibility studies are complete. For example, as of January 2023, the Corps was developing a feasibility study for the Sylvania Corning Plant, where the Corps' remedial investigations have shown that groundwater contamination poses a risk to human health if used as an untreated drinking water source. If the Corps determines that any of these sites will require cleanup, those associated costs will increase FUSRAP's overall environmental liability estimate.

²⁴The Corps has divided up the cleanup at the Niagara Falls Storage Site into several operable units that each follow the CERCLA process. These operable units include the Interim Waste Containment Structure, the Balance of Plant operable unit, and the groundwater operable unit. The new cleanup estimate that the Corps reported between fiscal years 2016 and 2022 was for the Balance of Plant and groundwater operable units.

Figure 6: Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites, by Status of Reporting Environmental Liabilities, as of Fiscal Year-End 2022



Source: GAO analysis of U.S. Army Corps of Engineers documents and environmental liability data. | GAO-23-105968

Amount of contamination. Uncertainties around the amount of contamination on a site also affect FUSRAP’s environmental liability—even after the Corps has estimated a cleanup environmental liability for a site. Corps officials said that uncertainty around the amount of contamination can lead to additional investigation and cleanup activities, ultimately increasing costs.

For example, the Corps estimated in fiscal year 2016 that remaining cleanup at DuPont Chambers Works would cost about \$68 million based on the amount of contamination and remedy outlined in the 2013 record of decision for the site. After beginning work on the site, the Corps discovered significantly greater amounts of waste in both existing and newly discovered areas of the site. Corps officials said that this was, in part, due to lack of historical documentation and information about where materials had been moved on the site, which officials said was last used for the nation’s early atomic energy program in the late 1940s. In fiscal year 2021, the Corps prepared an updated environmental liability estimate of about \$155 million for the site based on the increased amount

of contamination—a nearly 130 percent increase from the Corps’ estimate at the end of fiscal year 2016.

Officials also said that uncertainties around the amount of contamination within the 10-year floodplain of Coldwater Creek—part of the North St. Louis County Sites—has led to increases in FUSRAP’s environmental liability estimate. In fiscal year 2016, the Corps estimated that it would cost about \$177 million to clean up the North St. Louis County Sites. Corps officials said that the original record of decision, published in 2005, included estimated costs associated with investigating and cleaning up the creek itself. Subsequently, the Corps determined the need to expand its investigation and cleanup scope to include the 10-year floodplain of the creek. The Corps developed an updated estimate for the North St. Louis County Sites in fiscal year 2018 to include the costs associated with this increased scope, according to officials. As of the end of fiscal year 2022, the estimated environmental liability for the North St. Louis County sites was \$406 million—a nearly 130 percent increase from the fiscal year 2016 estimate of about \$177 million. Corps officials said that they plan to publish an explanation of significant differences for the North St. Louis County Sites, which will include an updated cleanup estimate that may lead to further changes in the environmental liability estimate.²⁵

Physical access to the contamination. Uncertainties around physical access to the contamination have also affected FUSRAP’s environmental liability estimates, according to officials. Sometimes the Corps does not have physical access to the contamination, such as contaminated soils under a building that the property owner is currently using. The remedial investigation process is the Corps’ first opportunity to understand the accessibility of the contamination and develop a project time frame and cost estimate, according to officials. However, accessibility can change after project time frames and costs have been estimated following the remedial investigation, feasibility study, or record of decision.

For example, the Corps did not have access to certain contaminated soils that were under buildings and other structures at the St. Louis Downtown Site. These inaccessible soils were documented in a 2014 record of

²⁵The NCP provides for an agency to publish an explanation of significant differences when the remedial action significantly changes following the record of decision but does not fundamentally alter the remedy selected in the record of decision with respect to scope, performance, or cost. 40 C.F.R. § 300.435(c)(2)(i). According to Corps officials, an explanation of significant differences is published when cleanup costs are expected to see an increase of 50 percent or more from the estimate stated in the record of decision.

decision stating that no further action was warranted to be protective of human health and the environment. Subsequently, the property owner decided to stop work at certain locations on the property to allow the Corps access to remediate the contaminated soils. As a result, the Corps determined that additional cleanup work was necessary and increased the environmental liability estimate for the site from about \$17 million in fiscal year 2017 to about \$96 million in fiscal year 2018, an increase of about 450 percent.

Legal access to private properties. Given that most FUSRAP sites are privately owned, Corps officials also said that uncertainty around gaining legal permission to access the properties to begin investigation and cleanup work can affect estimated timelines and, therefore, environmental liabilities.

For example, while officials said that they had completed the record of decision for Guterl Specialty Steel located in Lockport, New York, in February 2023, as of April 2023, officials said that they were still working on gaining legal permission to access the site to move forward with cleanup. Given that inflation increased FUSRAP's environmental liability by about a quarter of a billion dollars in fiscal year 2022 alone, delays due to property access have the potential to increase FUSRAP's overall environmental liability.

The Corps Minimally Met Selected Leading Practices for Program Management Related to Planning, Cost Estimating, and Risk Management

Our review of FUSRAP's documents, policies, and procedures found that the Corps minimally met GAO leading practices for program management related to planning, cost estimating, and risk management. While we compared the Corps' management of FUSRAP with all nine of our program management leading practices identified in our prior work, we focused on the three leading practices that we identified as foundational to the success of a program: planning, cost estimating, and risk management. See appendix II for our assessment of all nine leading practices. Corps officials said that their standard business practices do not require FUSRAP management to do some of the activities described

Value of Program Management Planning

Program management includes executing and monitoring multiple related projects to achieve benefits. For example, multiple projects may require support from the same staff, or multiple projects may face similar risks that could be more effectively addressed at a program level. Effective program management can allow organizations to achieve benefits not available by managing component projects individually.

The program management plan details the policies and procedures that the program will follow to achieve its outcomes. Key components include identification of deliverables and stakeholders, as well as the schedule for key activities. Many programs have tasks that are dependent on the completion of others, and the program management plan includes details on those dependencies.

The program roadmap summarizes major program events, such as milestones, on a timeline. It is a high-level visual representation of more detailed program documents that can be shared with stakeholders to convey the status and future plans for the program.

Source: GAO analysis of Project Management Institute standards. | GAO-23-105968

in the selected leading practices at the program level.²⁶ Our leading practices for program management, which are adapted from the PMI's *The Standard for Program Management*—Fourth Edition, are generally recognized as the top leading practices for program management.²⁷

Planning—having a program management plan that is regularly updated.²⁸ A comprehensive program management plan formally expresses the organization's concept, vision, mission, and expected benefits produced by the program. It also defines program-specific goals and objectives.

FUSRAP has a 2022 program management plan that includes the majority of the sections described in the leading practice, such as schedule, communications, and an acquisition strategy. However, these sections do not have details on how such areas will be managed in an integrated way to achieve program-wide benefits. In general, the Corps defers this management to divisions and districts. For example, the section on FUSRAP's acquisition strategy does not identify program-wide strategies, such as how FUSRAP will share contracting support staff to ensure that securing cleanup contracts does not delay site timelines. Instead, it states that acquisition strategies will be developed at the division and district level. Corps officials said that the availability of contracting staff varies by district, with some districts, such as Buffalo, having dedicated contracting staff. In contrast, the New York and Philadelphia Districts rely on contracting staff in other districts, and it can be difficult to get contracting support, according to Corps officials. A program-wide acquisition strategy could help to minimize delays related to contract execution.

²⁶U.S. Army Corps of Engineers, *Business Process, Regulation No. ER 5-1-11* (Washington, D.C.: July 31, 2018). This regulation establishes policy and doctrine to accomplish all work performed by the Corps. And U.S. Army Corps of Engineers, *Project Management Business Process Manual, Version 1.0* (Washington, D.C.: May 2009). This document is intended to assist the Corps in operating as a team-based organization functioning regionally. The manual is meant to give the Corps the ability to plan work, to manage time, people, and finances; to determine shortfalls; and to provide corrective actions.

²⁷GAO-19-223; and Project Management Institute, Inc., *The Standard for Program Management*, Fourth Edition (2017).

²⁸We did not assess how frequently the Corps updates its program management plan because its current plan does not have key information needed to fully meet our leading practice for a program management plan.

Similarly, the availability of technical experts, such as health physicists, varies by district. For example, the Buffalo District has a fairly robust bench of technical experts, while the New York District uses technical experts from other districts, according to district officials. Headquarters officials added that some districts have struggled to attract and retain health physicists at the current government salary in some locations. A program-wide view of staffing resources could give headquarters officials better insight into potential staffing issues and may help to further reduce delays at the project level.

Officials said that the Corps' standard business practices require all FUSRAP project sites to have a project management plan that contains many of the components discussed in the leading practices. However, officials said that a plan with the same level of detail is not required at the headquarters FUSRAP program level. With a more comprehensive program management plan that includes details on how resources are planned at the program level, FUSRAP management would have better oversight of how the program is operating and meeting its objectives to clean up the sites. A more comprehensive program management plan could also include information about how to allocate staffing resources and capacity to ensure that they are shared effectively and efficiently among project sites.

Planning—having a roadmap that is regularly updated.²⁹ The program roadmap is the chronological representation of key dependencies between major milestones, and it provides a high-level view of program milestones and decision points, among other things.

FUSRAP officials said that they do not have a roadmap for the program. Officials said that they use budget sheets at the project level that are updated annually and monthly situation reports for each site to track program execution and performance. These documents, however, do not depict key dependencies between projects, communicate linkages between business strategies and planned work, reveal and explain any gaps, or provide a high-level view of key milestones and decision points. According to officials, the Corps' standard business practices do not require programs to have a specific roadmap document. However, one district developed a roadmap that includes some information described in the leading practice. This district-level roadmap is used for high-level

²⁹We did not assess how frequently the Corps updates its roadmap because FUSRAP does not have a roadmap.

planning and to communicate information to senior leadership. The roadmap includes information such as the CERCLA phase that each site is in and when the district expects that the site will advance to the next phase. The roadmap provides other information, such as when the district expects to award contracts for each site and the duration of the contracts. For example, in 2021, the district awarded cleanup contracts for three sites, which may have allowed district officials to identify and plan for when they would need support from contracting staff.

Value of Program Management Cost Estimating, and Risk Management

Life cycle cost estimates attempt to define all the costs of a program, from inception through final delivery of the benefits of the program. Life cycle cost estimates are used to evaluate what resources are required at key decision points, sequence work in a cost-effective manner, and develop baselines to measure performance. Having a realistic estimate of future estimated costs can assist an organization in allocating resources.

Risk management identifies risks that could affect the program, documents their characteristics, and prepares for their successful management. This includes defining program risk thresholds, performing the initial program risk assessment, and developing a high-level program risk response strategy.

Source: GAO analysis of Project Management Institute standards. | GAO-23-105968

If FUSRAP had a roadmap, program management would be better able to quickly assess individual project site progress through the CERCLA phases; anticipate challenges facing the program, such as an upcoming need for contracting staff or to address community concerns; and communicate strategic goals to all sites.

Cost estimating—having an integrated, comprehensive life cycle cost estimate that is updated on a regular basis.³⁰ A life cycle cost estimate is integrated when an organization aligns the cost estimates from multiple program components, such as the cost estimates of its projects, to develop an overall program cost estimate. This estimate is comprehensive when it completely defines the program and reflects the current schedule and technical baseline.³¹

FUSRAP regularly captures information that feeds into the Corps' environmental liability estimates, as required by federal accounting standards, and the Corps considers this the program's life cycle cost estimate. However, the environmental liabilities estimate is not an integrated life cycle cost estimate because it does not include all program expenditures, including costs from previous years, costs for potential

³⁰We did not assess how frequently the Corps updates its life cycle cost estimate because its current cost estimate does not have key information needed to fully meet our leading practice for a life cycle cost estimate.

³¹GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, GAO-20-195G (Washington, D.C.: March 2020). The technical baseline should document the underlying technical and program assumptions necessary to develop a cost estimate and update changes as they occur. The objective is to provide a common description of the program—including a detailed technical, program, and schedule description of the system—from which all life cycle cost estimates will be derived. The technical baseline can be a single document or several documents stored in one location. It is also important that the technical baseline contain no cost data so that it can be used as the common baseline for independently developed estimates.

sites, and certain other monetary flows.³² By not including costs from previous years in the life cycle estimate, the Corps does not have a complete picture of the total cost of FUSRAP. Further, while costs from previous years and costs for potential future sites are not tracked as environmental liabilities, in accordance with the accounting standards, they still represent expenditures incurred by the program and would be appropriate for inclusion in a full life cycle cost estimate. Their exclusion limits the program's ability to track how costs change over time and better understand the magnitude of changes in relation to total program costs. According to the Corps' standard business practices, all projects are required to have a project management plan that establishes baseline plans for scope, cost, and schedule, among other things, against which performance can be measured for individual projects. However, we found that the Corps' standard business practices do not require life cycle cost estimates at the program level.

While not required, having a comprehensive life cycle cost estimate, including costs from previous years, that is regularly updated could improve management's ability to track total program costs to clean up contamination at active sites. Further, by using an integrated life cycle cost estimate that includes all costs associated with each site (such as costs from previous years and potential sites), the Corps could enhance its ability to make risk-informed decisions on how to manage and allocate its resources.

Risk management—conducting program risk management throughout the life of the program. A program risk is an event, opportunity, or condition that, if it occurs, may affect the success of the program. A program risk can result in a negative consequence or positive opportunity. The program risk identification activity, such as a risk register, identifies risks, documents their characteristics, and prepares for their successful management.

FUSRAP does not have a formal risk management plan or risk identification activity for the program as a whole, according to the FUSRAP Program Management Plan and our discussions with Corps officials. While the plan has a section on risk management, it does not detail how risk, such as uncertainties related to environmental liability

³²These additional monetary flows include expected expenditures for investigations and cleanup at government-acknowledged FUSRAP sites.

estimates, will be evaluated for the program as a whole. Rather, it states that risk management is performed at the project level and should be documented in project management plans for each site.³³ According to the Corps' standard business practices, all projects are required to have a project management plan that covers risk. However, FUSRAP officials stated that they do not consider assessing risks to be a requirement at the program level.

Devolving all risk management to the project level results in the Corps potentially missing both risks and opportunities that affect the broader program. For example, as previously stated, the program had an unobligated balance of about \$182 million at the end of fiscal year 2022, in part because of limited staffing resources in areas like procurement and technical expertise. A program-level risk management process targeted to areas like procurement would help FUSRAP management identify opportunities to more efficiently allocate resources across projects. Further, better risk management could help the Corps plan for uncertainties, such as the discovery of more contamination requiring cleanup, that may affect future environmental liability

We Identified Eight FUSRAP Sites near Underserved Communities; the Corps Has Begun to Implement the Justice40 Initiative

Out of 19 active FUSRAP sites, our geospatial analysis identified eight sites near underserved communities, which can face barriers in accessing federal services due to race, ethnicity, poverty status, and other factors,

³³Our review of site project management plans suggests that risk management is not consistently conducted across the program. For example, the Buffalo District has information about their assessed risks in their project management plans, but the project management plans for the Philadelphia District's DuPont Chambers Works site and the New York District's Maywood site do not include risk assessments.

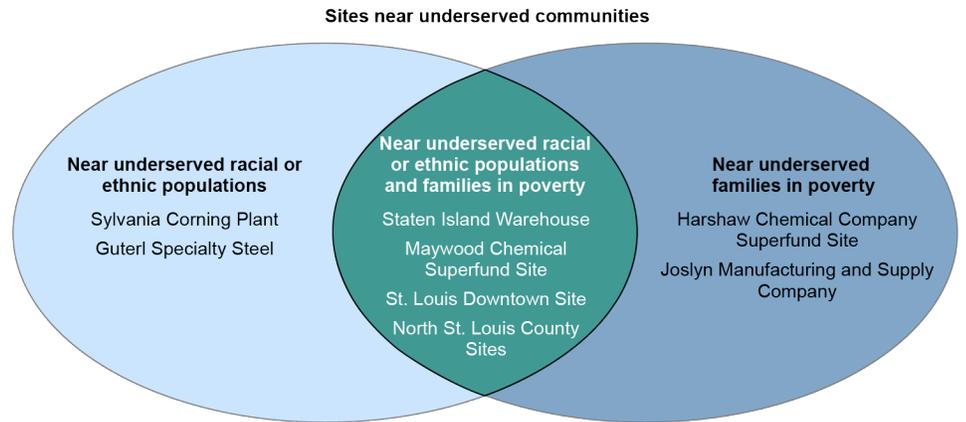
according to a 2021 executive order.³⁴ Specifically, these eight sites were within or adjacent to communities with higher rates of underserved racial or ethnic populations or families in poverty when compared with the rest of the county where the sites are located.³⁵

Four of the eight sites—the Staten Island Warehouse, the Maywood Chemical Superfund Site, the North St. Louis County Sites, and the St. Louis Downtown Site—were near both underserved racial or ethnic populations and families in poverty when compared with the rest of the county where the site is located (see fig. 7).

³⁴We used the term “underserved” based on Executive Order 13985, issued in January 2021, which generally directs federal agencies to assess whether members of underserved communities face systemic barriers in accessing benefits and opportunities available under the agencies’ policies and programs and whether agency action may be necessary to advance equity in their programs. The executive order describes underserved communities as including Black, Latino, Indigenous or Native American people, Asian Americans or Pacific Islanders, or people of other races; or people otherwise adversely affected by persistent poverty or inequality, among others. Exec. Order No. 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, 86 Fed. Reg. 7009, 7009 (Jan. 20, 2021). Given this description, we chose to analyze the percent of underserved racial or ethnic populations and the percent of families in poverty to determine if FUSRAP sites are located near underserved communities.

³⁵We chose to define communities near a FUSRAP site as the census tracts containing and adjacent to the FUSRAP site boundary because we determined that census tracts were the smallest possible study area surrounding the site that would also produce reliable estimates. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, such as streams, highways, railroads, and legal boundaries, and that generally contain between 1,200 and 8,000 people. In determining how many sites were located near underserved racial or ethnic populations, we analyzed the percent of the population residing in the census tracts near the site that reported their race as Black, Asian, Native American, multiracial, or other, or reported their ethnicity as Hispanic. In determining how many sites were located near families in poverty, we analyzed the percent of families living at or below 100 percent of the poverty level. According to the Census Bureau, the average estimated poverty threshold for a family of four in 2021 was about \$28,000. See app. I for additional details on our scope, methodology, and results.

Figure 7: Eight Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites That We Identified near Underserved Communities Compared with Communities in the Rest of the County Where the Site Is Located



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017–2021) estimates. | GAO-23-105968

Notes: The remaining 11 active FUSRAP sites were not located near underserved communities according to our geospatial analysis. We defined communities near the sites as the census tracts containing or adjacent to the site’s boundary. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, among other characteristics. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

For the remaining 11 active sites, our geospatial analysis did not identify the sites as being in or adjacent to communities with higher rates of underserved racial or ethnic populations or families in poverty compared with the communities in the rest of the county where the site is located.³⁶ Appendix III contains detailed results of our analyses for all 19 active FUSRAP sites.

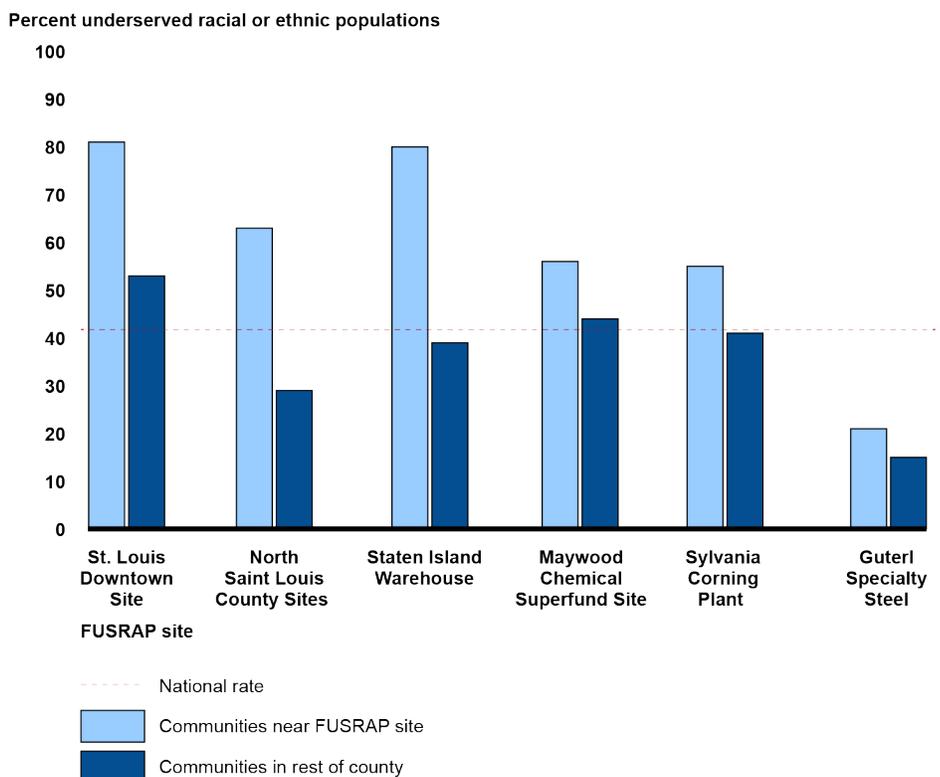
Underserved Racial or Ethnic Populations

Our analyses showed that the communities near six of the eight sites we identified had higher rates of underserved racial or ethnic populations compared with the communities in the rest of the county where the site is

³⁶To examine the relationship between (1) race, ethnicity, and family poverty; and (2) distance to a FUSRAP site, we also conducted a regression analysis. The regression analysis allowed us to determine if, generally speaking, census tracts with higher rates of underserved racial or ethnic populations, or higher rates of families in poverty, were associated with being closer to or farther away from a FUSRAP site, where distance is not limited by the census tracts containing or adjacent to a FUSRAP site. For example, some of our results indicated that while a FUSRAP site was not located near underserved communities, according to our geospatial analysis, census tracts with higher rates of underserved communities were associated with being closer to the FUSRAP site, according to our regression analysis. See app. III for details on the regression analysis.

located (see fig. 8).³⁷ The rate of underserved racial or ethnic populations in the communities near these sites, with the exception of Guterl Specialty Steel, were also higher than the national rate of about 41 percent.

Figure 8: Percentage of Underserved Racial or Ethnic Populations in Underserved Communities near Certain Sites in the Formerly Utilized Sites Remedial Action Program (FUSRAP)



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

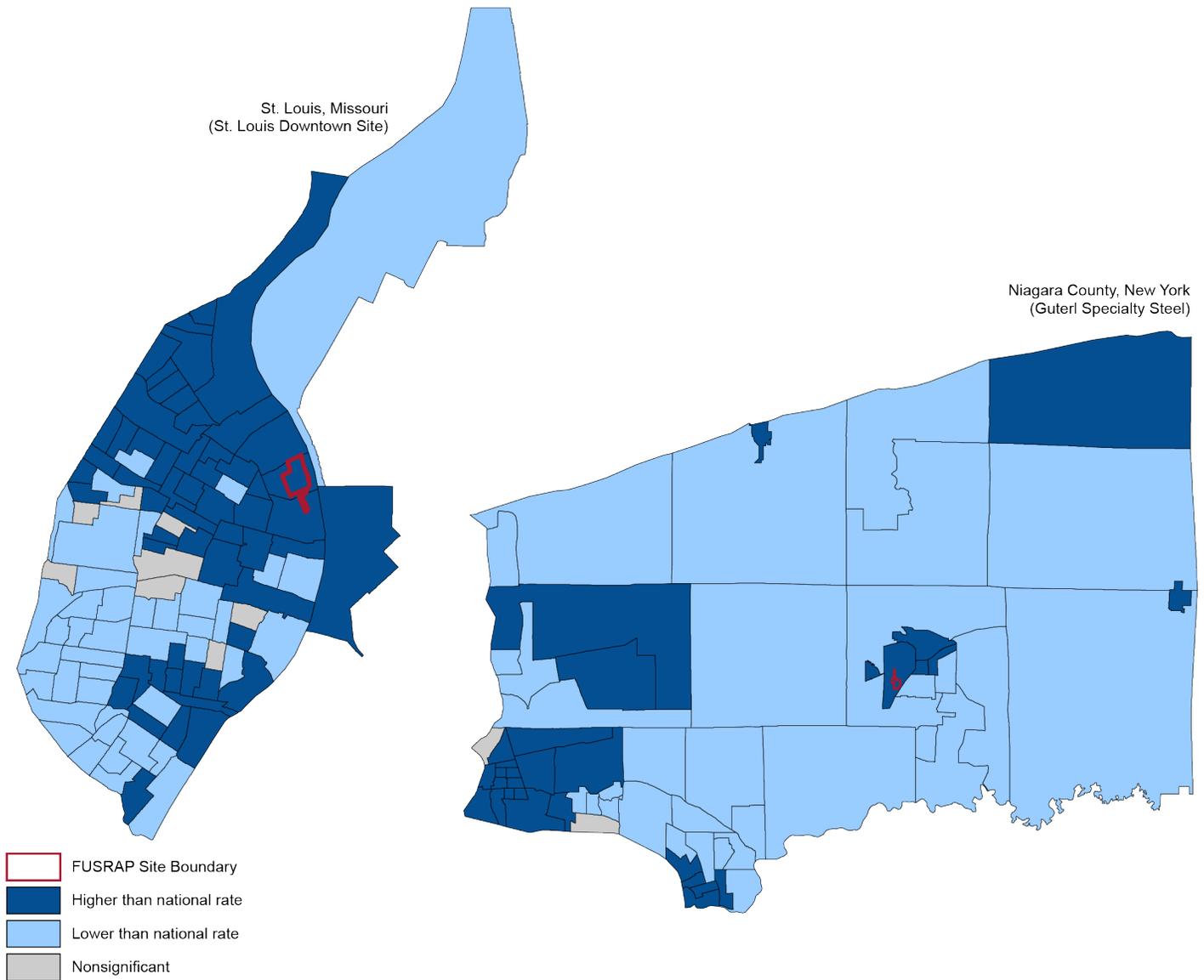
Notes: We defined communities near a FUSRAP site as the census tracts that contain and are adjacent to the FUSRAP site boundary. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, among other characteristics. We determined that a site was located near underserved racial or ethnic populations if these census tracts had higher rates of non-White or Hispanic populations than the rest of the census tracts in the county where the site is located at the 95 percent confidence level. In other words, the difference between the communities near a FUSRAP site and the communities in the rest of the county being due to chance alone is less than 5 percent. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

³⁷Results are statistically significant at the 5 percent confidence level—meaning that the difference being due to chance alone is less than 5 percent.

We also examined the spatial distribution of underserved racial or ethnic populations in the counties where we identified FUSRAP sites near underserved communities. Specifically, we examined whether the rate of underserved racial or ethnic populations in each community within the county was higher, lower, or equal to the national rate of about 41 percent. Communities with higher rates of underserved racial or ethnic populations than the national rate were more prevalent throughout some counties than others, such as the city of St. Louis (see fig. 9).³⁸

³⁸The city of St. Louis—where the St. Louis Downtown Site is located—is an independent city, meaning that it operates as both a city and a county. It is a separate area and jurisdiction from St. Louis County.

Figure 9: Community Rates of Underserved Racial or Ethnic Populations Compared with the National Rate in Select Counties with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

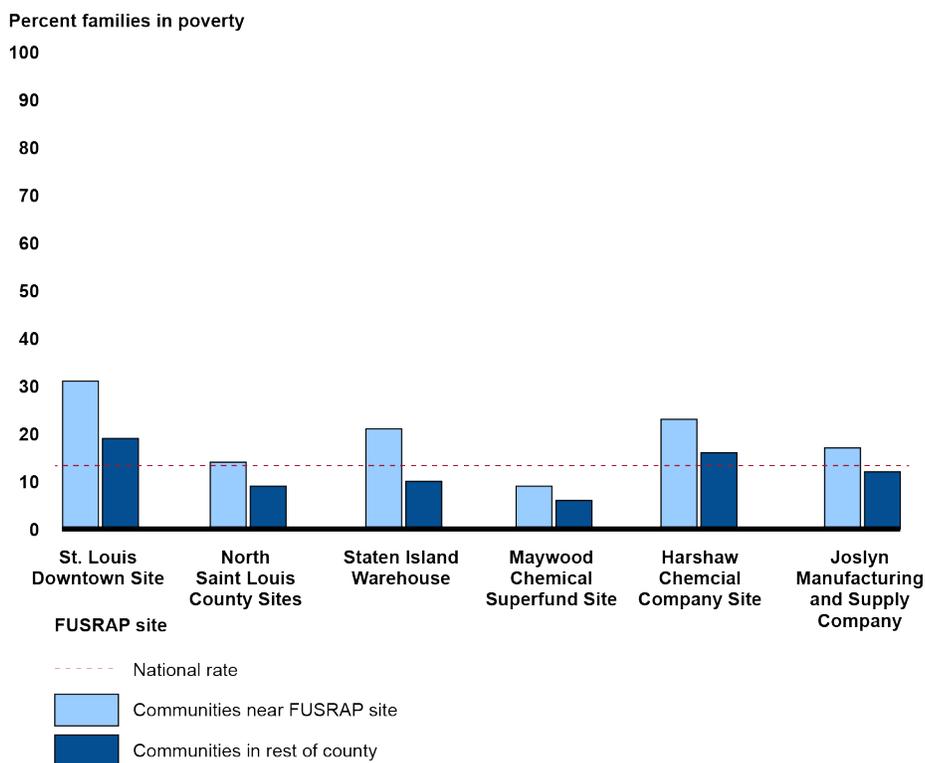
Notes: The city of St. Louis—where the St. Louis Downtown Site is located—is an independent city, meaning that it operates as both a city and a county. It is a separate area and jurisdiction from St. Louis County. For each community's rate of underserved racial or ethnic populations, the statistical significance of rates, rather than the rates themselves, were used to classify each community as higher than or lower than the nationwide rate. In other words, if the rate in a given census tract was higher than the national rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as "higher than national rate," regardless of the

magnitude of difference between the census tract and the national rate. A nonsignificant rate for a community means that it is statistically the same as the national rate. The national rate of underserved racial or ethnic populations was about 41 percent at the time of our analysis. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

Families in Poverty

Our analysis also showed that the communities near six of the eight sites we identified had higher rates of families in poverty compared with the rest of the county where the site is located (see fig. 10).³⁹ The rate of family poverty in the communities near four of these six sites—with the exception of the North St. Louis County Sites and the Maywood Chemical Superfund Site—were also higher than the national rate of about 13 percent.

Figure 10: Percentage of Families in Poverty in Underserved Communities near Certain Sites in the Formerly Utilized Sites Remedial Action Program (FUSRAP)



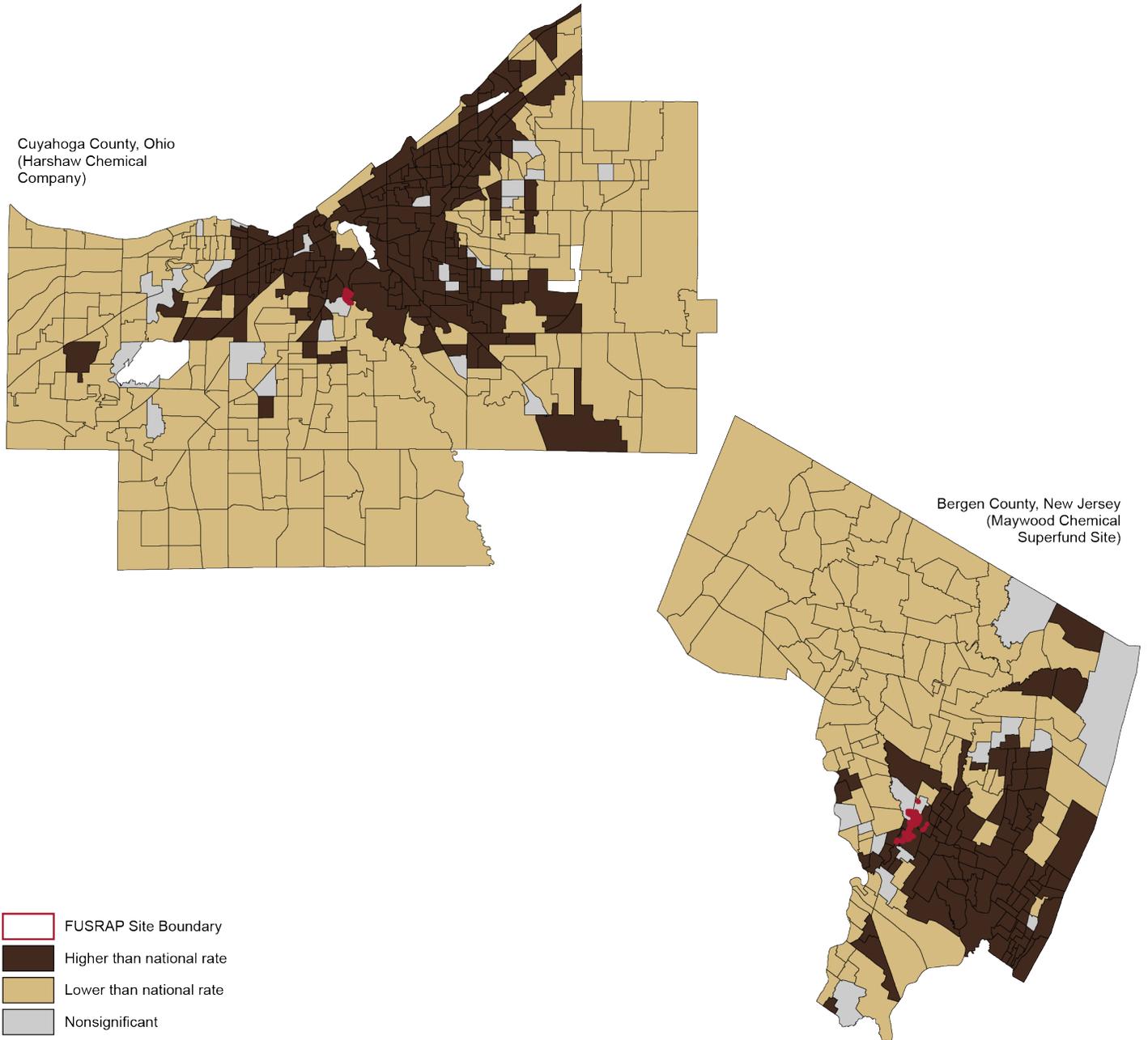
Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

³⁹Results are statistically significant at the 95 percent confidence level. In other words, the difference between the communities near a FUSRAP site and the communities in the rest of the county being due to chance alone is less than 5 percent.

Notes: We defined communities near a FUSRAP site as the census tracts that contain and are adjacent to the FUSRAP site boundary. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, among other characteristics. We determined that a site was located near families in poverty if these census tracts had higher rates of families living at or below the federal poverty threshold than the rest of the census tracts in the county where the site is located at the 95 percent confidence level. In other words, the difference between the communities near a FUSRAP site and the communities in the rest of the county being due to chance alone is less than 5 percent. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

We also examined the spatial distribution of families in poverty in the counties where we identified FUSRAP sites near underserved communities. Specifically, we examined whether the rate of families in poverty in each community within the county was higher, lower, or equal to the national rate of about 13 percent. Communities with higher rates of families in poverty than the national rate were more prevalent throughout some counties than others, such as Cuyahoga County, Ohio (see fig. 11).

Figure 11: Community Rates of Family Poverty Compared with the National Rate in Select Counties with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

Notes: For each community's rate of family poverty, the statistical significance of rates, rather than the rates themselves, were used to classify each community as higher than or lower than the

nationwide rate. In other words, if the rate in a given census tract was higher than the overall national rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than national rate,” regardless of the magnitude of difference between the census tract and the national rate. A nonsignificant rate for a community means that it is statistically the same as the national rate. Blank census tracts indicate no data in that tract. The national rate of families in poverty was about 13 percent at the time of our analysis. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

FUSRAP Has Taken Initial Steps to Implement Justice40

The Corps has named FUSRAP as one of the agency’s programs participating in the White House’s Justice40 Initiative, which seeks to make certain federal investments with a goal that 40 percent of the overall benefits of such investments flow to disadvantaged communities.⁴⁰ In March 2022, the Assistant Secretary of the Army for Civil Works issued interim guidance for implementing Justice40 in Army Corps Civil Works programs, which includes FUSRAP. The guidance states that the Corps will generally focus its environmental justice activities on three broad areas: (1) improving outreach and access to Civil Works information and resources, (2) improving access to Civil Works technical service programs and maximizing the reach of Civil Works projects to benefit disadvantaged communities, and (3) ensuring that any updates to Civil Works policies and guidance will not result in a disproportionate impact on disadvantaged communities. Subsequently, in December 2022, the Corps issued a memorandum that required each district to enhance its environmental justice strategic plan with an outreach strategy and to designate an environmental justice coordinator.

Corps officials said that FUSRAP has taken the initial actions outlined in Corps guidance for implementing Justice40, as of March 2023. For example:

⁴⁰Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, directed the Chair of the Council on Environmental Quality, the Director of the Office of Management and Budget, and the National Climate Advisor, in consultation with the White House Environmental Justice Advisory Council, to jointly publish recommendations on how certain federal investments might be made toward achieving a goal that 40 percent of the overall benefits flow to disadvantaged communities. Within 60 days of the recommendations being published, the executive order directed agency heads to identify applicable program investment funds based on the recommendations. The Office of Management and Budget published interim implementation guidance for the Justice40 Initiative in July 2021. That guidance states that until further guidance is provided, agencies should consider appropriate data, indices, and screening tools to determine whether a specific community is disadvantaged based on a combination of variables that may include, among others, low income, high or persistent poverty; high unemployment and underemployment; racial and ethnic residential segregation; linguistic isolation; high housing cost burden and substandard housing.

-
- Each Corps district with a FUSRAP mission has developed an environmental justice strategic plan. Corps officials said that while the plans will apply to all Corps programs in those districts, the plans are not program specific and, therefore, do not specifically state how Justice40 will apply to FUSRAP.
 - Each Corps district has identified an environmental justice coordinator. These district coordinators will be responsible for coordinating efforts with their division and headquarters, according to the Corps' December 2022 memorandum.

Corps officials also said that they used the Council on Environmental Quality's Climate and Economic Justice Screening Tool to identify individual FUSRAP sites that are located in disadvantaged communities. The Corps' identified 10 sites in disadvantaged communities, including five of the sites that we identified as being near underserved communities based on our analysis, according to agency documentation.⁴¹ The five sites that the Corps identified as being near underserved communities that our analysis did not were the Seaway Industrial Park, the Tonawanda Landfill, the W.R. Grace at Curtis Bay site, the Middlesex Municipal Landfill, and the Middlesex Sampling Plant. Our analysis identified three sites near underserved communities that the Corps did not in using the screening tool—the Joslyn Manufacturing and Supply Company, the Maywood Chemical Superfund Site, and the Sylvania Corning Plant. We identified different sites than the Corps because our analysis methods differed from the screening tool's methodology. For example, our analysis uses race and ethnicity, in addition to poverty, as indicators for underserved communities, whereas the tool uses income, but not race and ethnicity, as an indicator for disadvantaged communities.

Corps officials said that future steps that they anticipate taking in response to Justice40 will likely focus on increasing communications above and beyond CERCLA and NCP requirements and revising existing community relations plans to better reflect Justice40 priorities. As of

⁴¹The Corps' analysis determined that all three of the sites that make up the North St. Louis County Sites were in disadvantaged communities. We considered these three sites, collectively, to be one of the 10 that they identified. The Council on Environmental Quality released a beta version of its Climate and Economic Justice Screening Tool in February 2022. Version 1.0 of the tool was released in November 2022, after we had begun our analysis. Subsequently, the Council on Environmental Quality, the Office of Management and Budget, and the National Climate Advisor issued a memorandum to federal department and agency heads in January 2023, indicating that federal agencies should start using the tool to identify geographically defined disadvantaged communities for any programs within the scope of the Justice40 Initiative.

March 2023, officials said that there were no plans to change how FUSRAP prioritizes funding as a result of Justice40.

Stakeholders' Views on the Corps' Communications Provide Path for Implementing Justice40 Strategy

In December 2022, the Corps released an interim environmental justice strategic plan for community outreach and engagement as part of its efforts to implement the Justice40 initiative.⁴² In it, the Corps outlines its vision for Justice40, including that it will improve the timing and quality of outreach to local communities and form strong partnerships within and outside of the government, among other objectives.

CERCLA and the NCP call for the Corps to carry out certain public participation and community relations activities at specific phases of the cleanup process, as summarized in figure 3 above.⁴³ In our interviews with Corps officials, we identified several ways that the Corps communicates information about FUSRAP sites with stakeholders. For example, Corps districts have held regular public meetings or used ongoing electronic communication, such as fact sheets, newsletters, and local text alert systems, to share information and solicit comments and feedback. Further, several stakeholders with whom we spoke said that they have found Corps officials to be accessible and responsive. Nevertheless, stakeholders with whom we spoke shared the following ways that the Corps could improve its communication.⁴⁴

Build trust with communities. The Corps should focus on building trust through its communication with the communities surrounding the FUSRAP sites, according to state and local officials, and community leaders with whom we spoke.

⁴²U.S. Army Corps of Engineers, *Interim Environmental Justice Strategic Plan: Community Outreach & Engagement* (Dec. 19, 2022).

⁴³See, for example, 42 U.S.C. § 9617; 40 C.F.R. §§ 300.155(c); 300.415(n); 300.430(c); 300.435(c).

⁴⁴We met with state environmental regulatory agency officials from five states (Missouri, New Jersey, New York, Ohio and Pennsylvania), government officials from one tribal government (Tuscarora Nation), and four local governments (Borough of Lodi, New Jersey; City of Hazelwood, Missouri; City of Tonawanda, New York; and St. Louis Airport Authority, Missouri), and with leaders of groups representing community interests for sites in three communities (Buffalo, New York; Hicksville, New York; and St. Louis, Missouri). Officials from the Hicksville Water District joined our conversation with the Hicksville, New York, community group.

An official with the Missouri state regulator suggested that the Corps use outside entities to build trust with communities near FUSRAP sites. As a past example, the Missouri state regulator had a cooperative agreement with the Corps until 2019, according to the official. Under the agreement, the state regulator would review and comment on the Corps' project plans, could conduct independent monitoring and sampling as part of the feasibility study, would conduct public education and community relations activities with the Corps, and would respond to inquiries about the FUSRAP sites directed at the state, among other activities.⁴⁵ According to the official, the state regulator is a trusted entity in communities.

A leader of a community group near the Sylvania Corning Plant site, along with officials from the Hicksville Water District, said that they would like the Corps to actively seek the community's opinion in their decision-making. A Hicksville Water District official said that it often feels like the Corps is communicating with the community after decisions have been made or after a report has been published, rather than soliciting opinions before making decisions. The Hicksville Water District official added that the Corps could share sampling test results in a timely manner and have regular meetings with their respective stakeholders as a way to build trust.

Another community leader from the St. Louis area raised concerns regarding the clarity and transparency of communications from the Corps to property owners. This leader shared that communications from the Corps regarding levels of contamination on a particular property may lead people to believe that no contamination is present in instances where contamination may be present but falls below cleanup levels established by the Corps through the CERCLA process or outside the types of contaminants addressed through FUSRAP.

Improve readability of information. Officials from two local governments and three community group leaders shared that they would like the Corps' communications materials to be more readable and easier to understand. For example, a community group leader from Hicksville, New York, said that most people in the community do not have the background expertise to understand and interpret the information in the Corps' reports, such as the remedial investigation, about the extent of contamination and the potential risk to the community. The community

⁴⁵According to Corps officials, the state regulator continues to have opportunities to review, comment, and make recommendations about the Corps' project plans and timing, even in the absence of a cooperative agreement.

leader said that they rely on experts at the Hicksville Water District to interpret the data. While this leader said that the Corps' fact sheets are understandable, another community group leader from the St. Louis area shared that they have found the Corps' descriptions and information about contamination levels in the fact sheets to be difficult to understand.

Use a variety of formats for meetings and other communication. An official with the Missouri state regulator said that it may be helpful for the Corps to regularly reassess the formats of communication that it uses to share information with the public. The official with the state regulator said that their office has found that the preferred format of communication depends on the site and the community they are trying to reach. The official added that it is best to use as many formats as possible, including social media and working with local community leaders.

In addition, leaders from three community groups shared somewhat different perspectives about the effectiveness of events hosted by the Corps, such as in-person public meetings or virtual open houses. A leader from one St. Louis area community group said that its members have communicated some concerns about the format of the public meetings. For example, the St. Louis District has hosted poster sessions where residents go from booth to booth to learn about the work going on, but there have been some questions about information not being shared equally with all residents as a result of this format—that is, if someone asks a question, the response is not made available to everyone in attendance.

A leader for a different St. Louis community group said that they think it is important to keep these public meetings online because the forum is more accessible. In contrast, a leader with a Hicksville, New York, community group shared that there are a lot of older community members who do not have access to, or do not know how to access, a virtual presentation and would prefer to have in-person meetings.

Reaching Broader Audiences in the St. Louis Area

A St. Louis community leader said that their group was involved in a lawsuit filed in 2007 by the United States and the State of Missouri against the Metropolitan St. Louis Sewer District (MSD) that alleged violations of the Clean Water Act. The leader said that the community group's goal in the lawsuit was to warn community members of purported E. coli contamination in Coldwater Creek allegedly caused by sewage overflows. The parties settled the lawsuit, and the resulting consent decree requires MSD to place signs on certain streams, creeks, and drainage ditches to warn the public not to play, swim, or fish because of possible sewage overflow that could cause illness. The consent decree states that these signs should be visible to the public approaching by land and that signs must be permanently placed in all recreation areas, such as golf courses, within the posting area. According to U.S. Army Corps of Engineers (the Corps) officials, such signs have generally not been placed around Formerly Utilized Sites Remedial Action Program sites because the Corps cannot access private property to install signs without first getting a property owner's permission in writing.

Source: GAO analysis of interviews. | GAO-23-105968

Broaden the main target audience beyond property owners. Leaders from three community groups, in addition to tribal government officials, said that they would like the Corps to broaden its main target audience to communicate with as many members of the community as possible. The Corps communicates with property owners about potential contamination on their property; however, a community leader said that it would be helpful if the Corps had “boots on the ground” to go door to door in the community to talk to people who may not be property owners about the sites. Leaders from the two St. Louis area community groups expressed concerns for renters near Coldwater Creek. One leader expressed concern about renters being unaware of the contamination history on the property they are renting, adding that they have noticed that a lot of out-of-town landlords have purchased land near the creek.

While our interviews found evidence that the Corps engages in a wide array of public participation and community relations activities during FUSRAP cleanups, these efforts have not always resulted in the Corps earning the trust of the communities affected by FUSRAP sites. According to the Corps' December 2022 interim environmental justice strategic plan issued in support of the Justice40 Initiative, the Corps has set a goal to improve the quality and timing of community outreach, in part by assessing community needs and priorities at the district level. The interim plan states that each district will enhance its district-level environmental justice strategic plan with an outreach strategy that is specifically targeted to the district's area of responsibility. As of March 2023, each district that executes FUSRAP has developed an environmental justice strategic plan.

As previously mentioned, radiological cleanup is a small portion of the Corps' overall portfolio, and FUSRAP made up about 4 percent of the Civil Works' requested budget for fiscal year 2023. In August 2022, the Corps identified FUSRAP as one of the 11 programs to be included in the Corps' Justice40 efforts, and the districts are working to implement Justice40. So far, however, no district level environmental justice strategic plans mention any actions specific to FUSRAP. As each district develops its outreach strategies, the communities near FUSRAP sites may have unique needs and concerns that differ from the larger Civil Works mission areas, such as flood and storm damage reduction. Therefore, the FUSRAP program has opportunities to ensure that Justice40-related outreach is effective for FUSRAP communities by providing input to district outreach strategies to ensure that the needs of FUSRAP communities are addressed, in keeping with the Corps December 2022 interim environmental justice strategic plan. This could include information

we heard from tribal, state, and local government officials, as well as community groups.

Conclusions

According to the latest estimate, the Corps reported \$2.6 billion in environmental liabilities for FUSRAP sites, an increase of nearly \$1 billion over the past 7 years. Environmental liabilities continue to be on our High-Risk List, due to their growth government wide—despite federal agencies spending billions each year on cleanup efforts.

The Corps decentralizes its program management and community outreach for FUSRAP across its sites, districts, and divisions, and there is limited integration at the program level. FUSRAP could benefit from a centralized strategy to ensure that the Corps is making risk-informed decisions. Specifically, opportunities exist for the Corps to improve its overall program management by implementing some activities identified in selected GAO leading practices related to planning, cost estimating, and managing risk:

- By developing a more comprehensive program management plan, including details on shared staffing resources in areas like procurement, FUSRAP management would be more efficient at using shared resources to achieve cleanups.
- If FUSRAP had a roadmap for the program, management would be better able to assess progress and communicate progress to stakeholders.
- By having a comprehensive cost estimate that aligns estimates from all program components and includes expenditures from previous years, FUSRAP would have greater insight as to a full life cycle cost for the program and, therefore, be better positioned to make risk-informed decisions to manage and allocate its resources.
- Improved risk management activities at the program level as a whole, not just at the project level, would help the Corps plan for uncertainties that may affect future environmental liability estimates and identify opportunities to efficiently allocate resources across projects.

Finally, opportunities also exist for the Corps to improve outreach and build better relationships with tribal, state, and local government officials, and community leaders around FUSRAP sites as it moves toward implementing the Justice40 initiative.

Recommendations for Executive Action

We are making a total of five recommendations:

The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers update the FUSRAP Program Management Plan to follow leading practices for program management, for example, by including details in the plan on how to allocate staffing resources shared among project sites. (Recommendation 1)

The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers create a program roadmap for FUSRAP that follows leading practices for program management, for example, by tracking CERCLA phases for each site and projecting when sites would need contracting support or technical expertise. (Recommendation 2)

The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers develop a comprehensive, integrated life cycle cost estimate for FUSRAP that follows leading practices for program management, for example, by including both past and future program costs. (Recommendation 3)

The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers conduct risk management for FUSRAP at the program level that follows leading practices for program management, for example, by developing a risk register. (Recommendation 4)

The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers include the specific needs of FUSRAP communities in district level outreach strategies being developed in support of the Justice40 Initiative. (Recommendation 5)

Agency Comments

We provided the Corps and DOE-LM with a draft of this report for review and comment. The DOE-LM had no comments on the draft report. The Corps provided official comments, reproduced in appendix IV, and generally concurred with our recommendations. The Corps did add a comment about recommendation 1 describing the roles of headquarters, divisions, and districts and noting that headquarters is not typically involved in specific staffing decisions at the division or district level. However, the Corps stated that they will review staffing practices and

identify opportunities to ensure that divisions and districts have the staff they need to meet mission requirements.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Corps and DOE, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact Nathan Anderson at (202) 512-3841 or AndersonN@gao.gov.

Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.

A handwritten signature in black ink that reads "Nathan Anderson". The signature is written in a cursive style with a long, sweeping underline.

Nathan Anderson
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report (1) describes the reported environmental liabilities associated with active sites in the U.S. Army Corps of Engineers (the Corps) Formerly Utilized Sites Remedial Action Program (FUSRAP) and uncertainties that exist around those estimates; (2) examines the extent to which FUSRAP meets selected leading practices for program management; (3) describes how many FUSRAP sites we identified as being located near underserved communities, and steps the Corps has taken to implement Justice40¹; and (4) assesses how the Corps communicates to surrounding communities about active FUSRAP sites, and the views that selected stakeholders have about the Corps' communications.

According to the Corps, the number of active FUSRAP sites as of June 2023 is 21. Officials said that they count active sites based on the number of sites for which they request funding. In fiscal year 2023, the Corps requested separate funding for the three sites that make up the North St. Louis County Sites. However, these three sites are collectively presented as the North St. Louis County Sites in the fiscal year 2022 FUSRAP annual update report and in the 2005 record of decision establishing a cleanup remedy for the site. Therefore, throughout the report, we refer to 19 active FUSRAP sites and count the North St. Louis County Sites as a single active site.

To describe the reported environmental liabilities associated with active FUSRAP sites, we reviewed documents and analyzed data on FUSRAP's estimated environmental liabilities from fiscal years 2016 through 2022—the most recent 7 years of data at the time of our analysis. The Corps provided quarterly and annual environmental liability estimate data for each active FUSRAP site. We reviewed these data to determine changes in FUSRAP's annual environmental liability estimate for the program and for individual sites. We interviewed Corps officials about increases in the annual estimates that exceeded published cost estimates for certain sites, or sites where environmental liabilities were increasing year-over-year. To assess the reliability of the environmental liability data, we reviewed Corps guidance on how the data are compiled, reviewed audit reports from fiscal years 2017 to 2021 from the Office of Inspector General of the Department of Defense, interviewed Corps officials, and performed standard data checks for obvious errors or outliers, where appropriate.

¹The Justice40 Initiative was established by executive order in January 2021. Exec. Order No. 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619, 7631-32 (Jan. 27, 2021).

We determined the data were reliable for the purposes of analyzing changes in environmental liability estimates over time.

To identify potential uncertainties that could affect FUSRAP's future environmental liability estimate, we reviewed our past work on the federal government environmental liabilities and reviewed examples of uncertainties raised in FUSRAP-specific interviews and site visits. We interviewed officials about these potential uncertainties, including site-specific examples where the uncertainty affected a site's environmental liability estimate, and asked them to identify any others.

To examine the extent to which FUSRAP meets leading practices for program management, we reviewed a prior GAO report that derived nine program management practices from the Project Management Institute's standards for program management.² These leading practices for program management, adapted from the Project Management Institute's *The Standard for Program Management—Fourth Edition*, are generally recognized as the top leading practices for program management. These practices related to management of scope, cost, schedule, performance, and independent review of performance. We determined that these nine program management practices were relevant for assessing program management in FUSRAP, and we thus focused our assessment on these practices. While we compared the Corps' management of FUSRAP with all nine of our program management leading practices identified in our prior work, we focused on the three leading practices that we identified as foundational to the success of a program, specifically related to planning, cost estimating, and risk management. We determined that they are foundational because many of the remaining leading practices build upon the successful implementation of the planning, cost estimating, and risk management practices.

To assess the Corps against these leading program management practices, we reviewed various Corps documents, including the 2022 FUSRAP Program Management Plan; Corps Engineering Regulations; procedures specific to Corps divisions; and examples of site project management plans from each district, among others. We interviewed Corps officials to discuss the nine leading practices and to identify any

²GAO, *Nuclear Waste Cleanup: DOE Could Improve Program and Project Management by Better Classifying Work and Following Leading Practices*, [GAO-19-223](#) (Washington, D.C.: Feb. 19, 2019); and Project Management Institute, Inc., *The Standard for Program Management*, Fourth Edition (2017).

supporting program and policy documentation related to managing FUSRAP. We then compared these documents with the nine leading practices we selected and analyzed the extent to which the documents illustrate the leading practices, using a 5-point scoring system.³ Comprehensive results from our analysis of the nine program management practices are in appendix II.

To determine how many FUSRAP sites we identified as being near underserved communities, we analyzed selected characteristics of communities near active FUSRAP sites using data from the American Community Survey (ACS) 5-year estimates for 2017 to 2021. Appendix III provides further technical details on our analyses and results. To describe steps that the Corps has taken to implement the Justice40 Initiative, we interviewed Corps officials about how the program has begun to identify disadvantaged communities and implement Justice40 in the context of FUSRAP.⁴ We reviewed Corps directives and guidance documents related to implementing Justice40, such as a 2022 memorandum announcing which Civil Works programs would be participating in Justice40 and a 2022 memorandum directing Corps districts about enhancing their environmental justice strategic plans, and interviewed Corps officials about how these documents apply to FUSRAP.

To assess how the Corps communicates to surrounding communities about active FUSRAP sites, we reviewed relevant laws and regulations regarding public involvement in the waste cleanup process, including the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan. We also reviewed Corps documents on communication, including site-specific community relations plans and public comments on the Corps' selected cleanup remedies, and interviewed Corps officials about their communication strategies.

³The 5-point scoring system included the following metrics: "met" means that evidence was provided that satisfied the leading practice; "substantially met" means that evidence was provided that satisfied a large portion of the leading practice; "partially met" means that evidence was provided that satisfied about half of the leading practice; "minimally met" means that evidence was provided that satisfied a small portion of the leading practice; and "not met" means that no evidence was provided that satisfied the leading practice.

⁴The aim of the Justice40 Initiative is that certain federal investments be made toward a goal that 40 percent of the overall benefits flow to disadvantaged communities. Exec. Order No. 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619 (Jan. 27, 2021).

To describe the views that selected stakeholders have about the Corps' communications, we interviewed or received written responses about FUSRAP's public communication activities from a total of 16 federal, tribal, state, local, and community stakeholder groups. Representatives from these stakeholder groups included officials from the U.S. Environmental Protection Agency, one Tribal Nation, six regulatory agencies in five states, four local governments, and four community groups. The one Tribal Nation was identified by the Corps as an active stakeholder to FUSRAP. We selected the state agencies based on states that had at least two FUSRAP sites. Further, we interviewed local stakeholders that have been involved in FUSRAP, including local municipal representatives and community groups. We asked the Buffalo, St. Louis, and New York Districts to provide us a list of active local stakeholders, because these districts manage the most sites in the program. Each district provided a short list of contacts. From those lists, we then checked if any of the local governments and community stakeholder groups had provided comments on FUSRAP's proposed plan documents. On the basis of that smaller list, we then contacted at least one local government representative and one community group to be interviewed. We identified common themes from our discussions with stakeholders about the Corps' past communications and suggestions for future communications.

We also conducted site visits to two FUSRAP sites near St. Louis, Missouri, and five FUSRAP sites near Buffalo, New York, to interview Corps officials about project management of the sites in those areas and observe, among other things, communications materials such as signage posted at sites. We selected these locations for site visits because we could observe multiple FUSRAP sites in close proximity to one another. Further, the selected sites were in various phases of the cleanup process, and these sites represented over half of the total environmental liability estimate for FUSRAP, as of the end of fiscal year 2021.

We conducted this performance audit from April 2022 to September 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comparison of FUSRAP Policies and Procedures and GAO Leading Program Management Practices

We assessed the extent to which the Formerly Utilized Sites Remedial Action Program's (FUSRAP) policies and procedures align with nine GAO leading practices for program management related to scope, cost, schedule performance, and independent reviews. We found that FUSRAP minimally met eight of the nine practices and partially met one of the nine practices.

Our leading practices for program management were adapted from the Project Management Institute's (PMI) *The Standard for Program Management*—Fourth Edition, which are generally recognized as the top leading practices for program management.¹ We determined that these nine program management practices were relevant for assessing program management in FUSRAP, and we thus focused our assessment on these practices.

FUSRAP policies and procedures were assessed based on our review of relevant documentation from the U.S. Army Corps of Engineers (the Corps), written response to information requests, and on interviews with program officials. We used the following scoring system, which we applied to the responses and documentation we received from the Corps for each leading practice. The five scoring categories are

- **met:** we found complete evidence that satisfied the leading practice;
- **substantially met:** we found evidence that satisfied a large portion of the leading practice;
- **partially met:** we found evidence that satisfied about half of the leading practice;
- **minimally met:** we found evidence that satisfied a small portion of the leading practice; and
- **not met:** we found no evidence that satisfied the leading practice.

If the score for a leading practice was “met” or “substantially met,” we concluded that FUSRAP policies and procedures incorporated the leading

¹Project Management Institute, Inc., *The Standard for Program Management*, Fourth Edition (2017); and GAO, *Nuclear Waste Cleanup: DOE Could Improve Program and Project Management by Better Classifying Work and Following Leading Practices*, [GAO-19-223](#) (Washington, D.C.: Feb. 19, 2019). In [GAO-19-223](#), we identified nine program management leading practices based on PMI standards related to a program's management of scope, cost, schedule performance, and independent review of performance. In the course of that audit, we shared these selected leading practices with PMI representatives and incorporated their feedback, as appropriate.

practice. In contrast, if the score was “partially met,” “minimally met,” or “not met,” we concluded that FUSRAP policies and procedures did not incorporate the leading practice.

While the activities described below are leading practices, FUSRAP is not specifically required to do these activities at the program level.

Our Assessment of FUSRAP Policies with Our Leading Practices for Program Management

1. **Having a program management plan and a roadmap that are regularly updated.**² *Minimally met.* FUSRAP has a 2022 program management plan that includes the majority of the sections described in the leading practice, such as schedule, communications, and an acquisition strategy. However, these sections do not include detail on how such areas will be managed in an integrated way to achieve program-wide benefits. For example, in general, the Corps defers management of acquisitions to its divisions and districts. Further, it is not clear how frequently the program management plan will be updated.

FUSRAP officials acknowledged that they do not have a roadmap for the program. Officials said that they use budget sheets at the project level that are updated annually and monthly situation reports for each site to track program execution and performance. These documents, however, do not depict key dependencies between projects, communicate linkages between business strategies and planned work, reveal and explain any gaps, or provide a high-level view of key milestones and decision points.

²The program management plan consists of the full set of documents required to manage the program. These documents include a cost management plan, procurement management plan, quality management plan, requirements management plan, schedule management plan, and scope management plan. The program management plan formally expresses the organization’s concept, vision, mission, and expected benefits produced by the program; it also defines program-specific goals and objectives. The program roadmap is the chronological representation that depicts key dependencies between major milestones; communicates the linkage between the business strategy and the planned, prioritized work; reveals and explains the gaps; and provides a high-level view of key milestones and decision points.

- 2. Having a comprehensive, integrated life cycle cost estimate that is updated on a regular basis.**³ *Minimally met.* FUSRAP regularly captures information that feeds into the Corps' environmental liabilities estimates, as required by federal accounting standards, and considers this the program's life cycle cost estimate. However, the environmental liabilities estimate is not an integrated life cycle cost estimate because it does not include all program expenditures, including costs from previous years, costs for potential sites, and certain other monetary flows.⁴ By not including costs from previous years in the life cycle estimate, the Corps does not have a complete picture of the total cost of the FUSRAP program. Further, while costs from previous years and costs for potential sites are not tracked as environmental liabilities, in accordance with the accounting standards, they still represent expenditures incurred by the program and would be appropriate for inclusion in a full life cycle cost estimate. This limits the program's ability to analyze how costs change over time and better understand the reasons for changes in total program costs.
- 3. Having a comprehensive, integrated master schedule that is updated on a regular basis.**⁵ *Minimally met.* Corps officials provided a project execution spreadsheet as its program schedule. The spreadsheet is used for milestone and increment tracking and, when combined with the budget, is considered the master schedule for the program. According to the GAO Schedule Assessment Guide, an integrated master schedule includes the entire required scope of effort, including the effort necessary from all government, contractor, and other key parties for a program's successful execution from start to finish. The project execution spreadsheet for FUSRAP does not

³A life cycle cost estimate is integrated when an organization aligns the cost estimates from multiple program components, such as the cost estimates of its subprograms and projects, to develop an overall program cost estimate. A life cycle cost estimate is comprehensive when it completely defines the program and reflects the current schedule and technical baseline. See GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, [GAO-20-195G](#) (Washington, D.C.: March 2020).

⁴These additional monetary flows include expected expenditures for investigations and cleanup at government-acknowledged FUSRAP sites.

⁵A program's integrated master schedule is the top-level program document that defines the individual component schedules and dependencies between program components (individual project, site, and program level activities) required to achieve the program goal. See GAO, *Schedule Assessment Guide: Best Practices for Project Schedules*, [GAO-16-89G](#) (Washington, D.C.: December 2015).

include information about specific activities that contribute to each milestone, such as the next cleanup phase.

- 4. Conducting program risk management throughout the life of the program.⁶ *Minimally met.*** FUSRAP does not have a formal risk management plan or risk identification activity for the program as a whole, according to the FUSRAP Program Management Plan. While the plan has a section on risk management, it does not detail how risk, such as uncertainties related to environmental liability estimates, will be evaluated for the program as a whole. Rather, it states that risk management is performed at the project level and should be documented in project management plans for each site.

Delegating risk management to the project level results in the Corps potentially missing both risks and opportunities that affect the broader program. For example, the program had an unobligated balance of about \$182 million at the end of fiscal year 2022, in part because of limited staffing resources in areas like procurement and technical expertise.

- 5. Measuring performance against both a program's life cycle cost and integrated master schedule baselines.⁷ *Minimally met.*** We found that FUSRAP does not have a life cycle cost estimate nor an integrated master schedule. As a result, FUSRAP does not have a documented program-level cost or schedule baseline. Instead, according to Corps officials, each FUSRAP project sets cost and schedule baselines on an annual basis. Those baselines are annually reviewed as part of the project's risk analysis process. Corps officials said that the baseline for each project gets rolled up for the program's overall cost and schedule baseline.

- 6. Completing performance reporting and analysis in a way that provides a clear picture of program performance.⁸ *Minimally met.*** According to Corps officials, program performance is monitored on an

⁶A program risk is an event or series of events or conditions that, if they occur, may affect the success of the program. A program risk can result in a negative consequence or a positive opportunity. The program risk identification activity determines which risks might affect the program, documents their characteristics, and prepares for their successful management.

⁷A cost baseline incorporates all available financial information to track a program's costs. Once a cost baseline is set, this becomes the primary financial target against which the program is measured.

⁸The ability to act quickly to resolve program problems depends on having information of their causes early. Management can make better decisions that lead to greater success if it has accurate progress assessments of program status.

ongoing basis through monthly situation reports and calls with FUSRAP site staff. The situation reports track project milestones, but these milestones do not clearly link to overall program metrics. For example, there is no information about spending activity. Further, the milestones in the situation reports and their baselines are different for each site and do not link to any division-wide goals (such as total number of properties returned to beneficial use within a division) or program-wide goals (such as the goal to obligate 95 percent of funding). While FUSRAP establishes program metrics each year, the goals are updated from year to year. While this may allow officials to track progress throughout the year against their annual goals, it is unclear if there is a mechanism to track longer-term goals over the program's life cycle. Further, the metrics are not clearly linked to schedule and life cycle cost, making it unclear from the program perspective if officials have a comprehensive idea of whether the program is being executed on time and within budget.

7. **Monitoring and controlling the program, including conducting root cause analyses and developing corrective action plans.**⁹ *Minimally met.* According to Corps officials, FUSRAP does not have a formal root cause analysis process or corrective action plans that they use to monitor and control the program. The program is monitored and controlled through monthly phone calls where management reviews situation reports for each project. Issues and any related corrective actions are discussed during these reviews.
8. **Having a lessons learned database.**¹⁰ *Partially met.* According to Corps officials, FUSRAP has a process to document some lessons learned but does not have a lessons learned database. During an annual meeting, districts discuss lessons learned from the prior year, which get saved as slide decks that management can refer back to during the year. Officials said that management informally tracks challenges and lessons learned from year to year through these slide decks.

⁹Monitoring and controlling includes collecting, measuring, and disseminating performance information and assessing overall program trends. An effective corrective action plan must address how program personnel should respond to each finding, and it must set realistic dates for implementing corrective actions.

¹⁰Lessons learned are a compilation of knowledge gained that should be readily available to any existing or future program to facilitate continuous learning and avoid similar pitfalls and are critical in establishing an effective risk management plan.

- 9. Having an independent oversight body that conducts periodic reviews of the progress of the program in delivering its expected benefits.**¹¹ *Minimally met.* According to Corps officials, FUSRAP does not have a formal oversight body that conducts periodic reviews of the program's progress in delivering its expected benefits. The Corps' Environmental Munitions Center of Expertise performs some oversight functions, particularly by reviewing technical documents for consistency across the program and reviewing individual project cost estimates, but it does not conduct programmatic audits or complete independent third-party estimates. The Environmental Munitions Center of Expertise also reviews and approves district cost estimates, but does not complete an independent cost estimate.

¹¹PMI defines an audit as a structured, independent process used to determine if project activities comply with organizational and project policies, processes, and procedures. A quality audit is usually conducted by a team external to the project, such as the organization's internal audit department, Program Management Office, or by an auditor external to the organization.

Appendix III: Geospatial and Statistical Analysis of Distance to FUSRAP Sites and Community Characteristics

We used two methods to analyze how many Formerly Utilized Sites Remedial Action Program (FUSRAP) sites are located near underserved communities: (1) geospatial analyses and (2) regression analyses. We selected the percentage of non-White or Hispanic populations, which we refer to as underserved racial or ethnic populations, and the percentage of families in poverty as indicators of underserved communities because these populations are identified, among others, as underserved in Executive Order 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*.¹ According to the executive order, underserved communities could face barriers in accessing federal services due to race, ethnicity, and poverty status, among other factors.

Methods

Geospatial Data

We obtained geospatial data containing the boundary of each active FUSRAP site from the U.S. Army Corps of Engineers (the Corps) and geospatial data containing all census tracts for the 16 counties that contain FUSRAP sites from the U.S. Census Bureau. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, such as streams, highways, railroads, and legal boundaries, and that generally contain between 1,200 and 8,000 people. We refer to census tracts as “communities” interchangeably.

We mapped the site boundaries and census tracts. To define communities near a FUSRAP site, we identified the census tracts containing or adjacent to the FUSRAP site boundary.² We chose this definition because we determined that it was the smallest possible study area surrounding a site that would also produce reliable estimates. The number of census tracts that we identified as the communities near each

¹We used the term “underserved” based on Executive Order 13985, issued in January 2021, which generally directs federal agencies to assess whether members of underserved communities face systemic barriers in accessing benefits and opportunities available under the agencies’ policies and programs and whether agency action may be necessary to advance equity in their programs. The executive order describes underserved communities as Black, Latino, Indigenous or Native American people, Asian Americans or Pacific Islanders, or people of other races; or people otherwise adversely affected by persistent poverty or inequality, among others. Exec. Order No. 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, 86 Fed. Reg. 7009 (Jan. 20, 2021).

²Due to their irregular shapes, some census tracts that were not containing or adjacent to the site and, therefore, not included in our identification of communities near the site, may actually be closer to the site than the furthest border of a tract that is containing or adjacent to the site.

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FUSRAP site ranged from as low as 16 tracts near the Iowa Army Ammunition Plant to as high as 428 tracts near the Harshaw Chemical Company Site. For some FUSRAP sites located close to one another, the census tracts that we identified as being near the site were the same for both sites. These sites include the Middlesex Municipal Landfill and the Middlesex Sampling Plant in Middlesex County, New Jersey; and the Seaway Industrial Park and the Tonawanda Landfill in Erie County, New York.

To assess the reliability of the Corps geospatial data, we mapped the FUSRAP site boundaries and visually compared the maps that we generated to published maps contained in official site documents and asked Corps officials about any discrepancies. We determined these data to be sufficiently reliable for the purposes of identifying communities that are near the sites.

**Community
Characteristics**

To measure community characteristics, we used data from the American Community Survey (ACS) 5-year estimates for 2017 to 2021, which are available at the census tract level. To assess the reliability of the ACS data, we took several steps. Because ACS estimates are based on a probability procedure, we chose to use 5-year data to obtain the most reliable information at the census tract level and examined and disclosed the margin of error at the 95 percent confidence interval. We excluded from our analyses certain ACS variables that had higher rates of missing information. We determined the data to be sufficiently reliable for the purposes of analyzing the selected characteristics of communities near FUSRAP sites. After taking these steps, we focused on community characteristics that were discussed in relevant executive orders related to environmental justice and underserved communities.³ Specifically, we selected (1) the percentage of non-White or Hispanic populations, which we refer to as underserved racial or ethnic populations; and (2) the

³Executive Order 14008, issued in January 2021, created the Justice40 Initiative, which directed certain entities to publish recommendations on how certain federal investments might be made toward a goal that 40 percent of the overall benefits flow to disadvantaged communities. At the time we began our analysis, there was no standard community indicators for “disadvantaged” in the context of the Justice40 initiative. As a result, we decided to use the description of “underserved communities” provided in Executive Order 13985 to select our community characteristics for analysis. Exec. Order No. 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619 (Jan. 27, 2021); and Exec. Order No. 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, 86 Fed. Reg. 7009 (Jan. 20, 2021).

percentage of families living at or below 100 percent of the federal poverty level.⁴

Geospatial Analysis

We conducted a geospatial analysis to assess how many FUSRAP sites were located near underserved communities based on our selected characteristics (race and ethnicity, and poverty) and our definition of near (census tracts containing and adjacent to the sites), using census tracts as the geographic unit of analysis. We considered these census tracts near the site to be underserved if they had higher rates of

- underserved racial or ethnic populations than the rest of the census tracts in the county where the site is located or
- families living at or below the federal poverty level than the rest of the census tracts in the county where the site is located.⁵

To explore the spatial distribution of community characteristics in the counties containing active FUSRAP sites, we developed probability maps. In all 16 counties, for each census tract, we examined the rate of underserved racial or ethnic populations and the rate of families in poverty relative to county- and nation-wide rates. The statistical significance of rates, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than, or equal to the county- and nation-wide rates for these characteristics. For example, if the rate of underserved racial or ethnic populations in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than county rate,” regardless of the magnitude of difference between that census tract’s rate and the county rate. Statistical significance is determined by one-tailed tests based on a Poisson distribution. These maps allowed for the study of spatial patterns without considering nonsignificant random variations and accounted for potentially small population sizes in certain census tracts. These maps do not allow for a quantitative assessment of whether community

⁴For the purposes of this report, we measured non-White or Hispanic residents as the percent of the population that reported their race as Black, Asian, Native American, multiracial, or other, or reported their ethnicity as Hispanic. According to the Census Bureau, the average estimated poverty threshold for a family of four in 2021 was about \$28,000.

⁵We considered the census tracts near the FUSRAP site to be underserved only if a particular community characteristic was statistically higher than the census tracts in the rest of the county at the 95 percent confidence level—meaning that the difference being due to chance alone is less than 5 percent.

characteristics are associated with proximity to a FUSRAP site. To perform this work, we developed a series of regression models.

Regression Analysis

To evaluate the reliability of our definition of communities near a FUSRAP site (census tracts containing or adjacent to the site boundary), we developed a statistical model to assess the extent to which distance to a FUSRAP site was associated with the selected community characteristics. For example, the geospatial analysis may show that communities near the site have a lower rate of families in poverty than the communities in the rest of the county, but the statistical model may show that higher rates of poverty are associated with being closer to the FUSRAP site in that county. These results would indicate that if our definition of “near” were expanded to a slightly larger area, then those communities near the site may be identified as underserved when compared with the rest of the county.

For each site, the outcome in our model was a measure of the distance between a community and the FUSRAP site, and each model included one community characteristic (either race and ethnicity, or poverty).⁶ We did not include both of the characteristics in a single model because they were highly correlated with each other.⁷ Our objective was to test whether census tracts with higher rates of underserved racial or ethnic populations or census tracts with higher rates of families in poverty were associated with being a closer or farther distance from a FUSRAP site. The number of tracts in a given county determined the number of observations in the model. We did not include the county containing the Iowa Army Ammunition Plant, with 16 tracts, in our regression analysis because we determined that we had too few observations to produce reliable estimates.

⁶The distance was calculated between a community’s (i.e., census tract’s) centroid and the FUSRAP site centroid. We then used the logarithm of distance as our outcome measure in order to satisfy model assumptions and to scale the effect of distance.

⁷A statistical model that simultaneously includes related characteristics can describe the association between each individual characteristic in the model and the outcome, while accounting for all characteristics included in the model. Not including characteristics simultaneously may result in misleading conclusions. On the other hand, if two characteristics are highly related to each other, then including both characteristics in a model is unnecessary and causes problems with statistical estimation. For example, communities with high percentages of families living in poverty also tended to be communities with high percentages of underserved racial and ethnic populations.

Results

Geospatial Analysis

As previously stated in the report, our geospatial analysis comparing the communities near FUSRAP sites with the communities in the rest of the counties showed that eight out of 19 active FUSRAP sites are located near underserved communities (see table 1). Specifically, we identified six sites that are located near communities with statistically higher rates of underserved racial or ethnic populations and six sites that are located near communities with statistically higher rates of families in poverty. Of these, four sites were located near communities with statistically higher rates of both community characteristics.

For the remaining 11 sites, the communities near the site had statistically lower or the same rates of underserved racial or ethnic populations, or families in poverty, than the communities in the rest of the county. Our statistical models, discussed in the next section, revealed a more nuanced story about the association between underserved communities and distance to a FUSRAP site for some of these 11 sites.

Table 1: Demographic Characteristics of Communities near Active Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites Compared with Communities in the Rest of the County Where the Site Is Located

FUSRAP site	Underserved racial or ethnic populations			Families in poverty			Site near underserved communities
	Near FUSRAP site (%)	Rest of county (%)	Difference (%)	Near FUSRAP site (%)	Rest of county (%)	Difference (%)	
St. Louis Downtown Site	80.80	53.44	27.36	13.50	8.68	4.82	Yes
Staten Island Warehouse	79.91	38.95	40.96	20.85	9.93	10.92	Yes
North St. Louis County Sites	63.34	29.09	34.25	13.50	8.68	4.82	Yes
Maywood Chemical Superfund Site	56.03	44.12	11.91	9.39	6.20	3.19	Yes
Sylvania Corning Plant	55.16	41.25	13.91	5.48	5.46	0.02 ^a	Yes
Middlesex Municipal Landfill	54.34	59.14	-4.80	6.84	8.43	-1.59 ^a	No
Middlesex Sampling Plant	54.34	59.14	-4.80	6.84	8.43	-1.59 ^a	No
W.R. Grace at Curtis Bay Site	50.11	72.82	-22.71	15.99	20.02	-4.03	No

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FUSRAP site	Underserved racial or ethnic populations			Families in poverty			Site near underserved communities
	Near FUSRAP site (%)	Rest of county (%)	Difference (%)	Near FUSRAP site (%)	Rest of county (%)	Difference (%)	
Harshaw Chemical Company Site	41.74	42.04	-0.30	23.19	16.38	6.81	Yes
Joslyn Manufacturing and Supply Company	28.69	27.47	1.22 ^a	16.64	11.97	4.67	Yes
DuPont Chambers Works	25.46	28.79	-3.33 ^a	13.16	12.94	0.22 ^a	No
Guterl Specialty Steel	20.74	14.93	5.81	13.12	12.37	0.75 ^a	Yes
Superior Steel Site	11.79	22.90	-11.11	5.93	11.26	-5.33	No
Seaway Industrial Park	11.06	25.95	-14.89	9.77	13.93	-4.16	No
Tonawanda Landfill	11.06	25.95	-14.89	9.77	13.93	-4.16	No
Luckey Site	9.58	13.70	-4.12	8.66	13.79	-5.13	No
Niagara Falls Storage Site and Vicinity Properties	8.43	16.81	-8.38	6.99	13.42	-6.43	No
Iowa Army Ammunition Plant	8.14	16.75	-8.61	9.54	16.29	-6.75	No
Shallow Land Disposal Area	5.52	3.60	1.92 ^a	11.28	10.73	0.55 ^a	No

Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017–2021) estimates. | GAO-23-105968

Notes: We defined communities near a FUSRAP site as any census tracts that contain or are adjacent to the site boundary. Census tracts are statistical subdivisions of counties whose boundaries follow geographic features, such as streams, highways, railroads, and legal boundaries, and that generally contain between 1,200 and 8,000 people. We identified a FUSRAP site as being near underserved communities if the communities near the site had higher rates of underserved racial or ethnic populations than the rest of the census tracts in the county where the site is located or had higher rates of families living at or below the federal poverty level than the rest of the census tracts in the county where the site is located. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

^aDifference in rates is not significant at the 95 percent confidence level, meaning that the rate of underserved racial or ethnic populations and the rate of families in poverty is statistically equal in the communities near the site and in the rest of the county.

Regression Analysis

We carried out a series of regressions that served as a tool to evaluate the reliability of our definition of communities near the site (census tracts containing and adjacent to the site) used in our geospatial analysis. The regressions did not define a specific boundary for a community near the FUSRAP site but, rather, for all census tracts in the same county as the FUSRAP site, observed the distance of a census tract to the FUSRAP

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site and whether that distance is related to the tract's demographics (race and ethnicity, or poverty).⁸

The outcome variable for our regressions was a measure of distance between the census tract and the FUSRAP site.⁹ For each site, the covariate in each model was the demographic characteristics of a tract: percent of a tract that is made up of individuals or families in poverty and percent of a tract that is made up of underserved racial or ethnic populations.¹⁰ Through the regression, we statistically assessed whether the census tract distance to a FUSRAP site tends to decrease as the census tract demographic characteristic (race and ethnicity, or poverty) increases.

The regression results showed that for seven of the eight sites that we identified as being near underserved communities in our geospatial analysis, communities with higher rates of the selected characteristic were associated with being closer to the FUSRAP site. For example, in St. Louis County, which contains the North St. Louis County Sites, communities with higher rates of underserved racial or ethnic populations were statistically associated with being closer to the FUSRAP site.

However, for the Guterl Specialty Steel site, our regression model showed that communities with higher rates of underserved racial or ethnic populations were associated with being farther from the site, even though the geospatial analysis showed that communities near the site had higher rates of underserved racial or ethnic populations than the rest of the county. Our probability map for Niagara County—where the Guterl

⁸For each site, the data consisted of all census tracts that are in the same county as that of the FUSRAP site and, regardless of county, any tract that contained or was adjacent to the FUSRAP site. For ease of description, we refer to these as the census tracts in the county with the FUSRAP site.

⁹Specifically, in our ordinary least squares regression with robust standard errors, we use the logarithm of distance as our outcome variable in order to satisfy model assumptions and to scale the effect of distance. The main steps for calculating this distance are as follows: Using data containing the boundary of each active FUSRAP site from the Corps, we obtained the centroid of each FUSRAP site's polygon. Using census data, we obtained the centroid of each census tract within the county that contains the FUSRAP site. We then calculated the greater circle of distance between each census tract centroid and the FUSRAP site centroid and applied the logarithm to that distance to determine the outcome measure for that census tract.

¹⁰Because the demographics of the percent of families in poverty within a community and the percent of underserved racial or ethnic populations within a community are generally highly correlated, we report results based on bivariate regressions that only examine one of these covariates at a time.

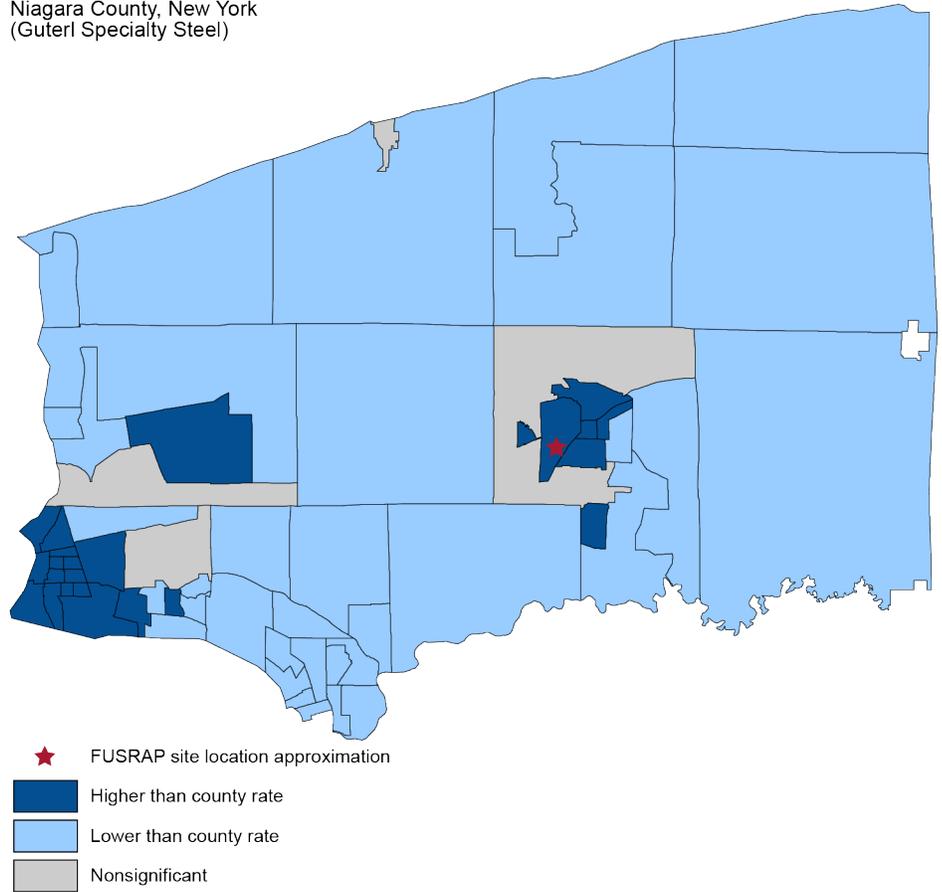
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Specialty Steel site is located—provides further geospatial context into the results of our two analyses (see fig. 12). Specifically, the map shows that the communities concentrated near the Guterl Specialty Steel site have statistically higher rates of underserved racial or ethnic populations than the overall county rate but that there is also a concentration of communities in the southwest portion of the county that have statistically higher rates of underserved racial or ethnic populations than the overall county rate. This concentration of communities farther from the site could have influenced the regression results to indicate that communities with higher rates of underserved racial or ethnic populations are associated with being farther from the site.

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Figure 12: Formerly Utilized Sites Remedial Action Program (FUSRAP) Site Location and Community Rates of Underserved Racial or Ethnic Populations in Niagara County, New York, Compared with the Overall County Rate

Niagara County, New York
(Guterl Specialty Steel)



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

Notes: The statistical significance of the rate of underserved racial or ethnic populations, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than, or equal to the county-wide rate. In other words, if the rate in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than county rate,” regardless of the magnitude of difference between the census tract and the county rate. Blank census tracts indicate no data in that tract. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points. Statistical significance is determined by one-tailed tests based on a Poisson distribution.

For the other 11 FUSRAP sites that we did not identify in our geospatial analysis as being located near underserved communities, the regression analysis showed that five additional sites could be considered to be located near underserved communities when looking at a larger

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geographic area around the sites. These five sites include the Middlesex Sampling Plant, the Middlesex Municipal Landfill, the Seaway Industrial Park, the Tonawanda Landfill, and the Shallow Land Disposal Area. Specifically, for these five sites, the regression analysis showed that communities with higher rates of underserved racial or ethnic populations or families in poverty were statistically associated with being closer to the site (see table 2).

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Table 2: Geospatial and Regression Analysis Results on Active Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites Located near Underserved Communities

FUSRAP site	Number of tracts	Higher rate in the communities near the site (geospatial analysis)		Relationship between community characteristic and distance to FUSRAP site, that is, closer or farther from site (regression analysis)		FUSRAP site identified as being near underserved populations	
		Families in poverty (%)	Underserved racial or ethnic populations (%)	Families in poverty (%)	Underserved racial or ethnic populations (%)	Geospatial	Regression
Saint Louis Downtown Site	106	Yes	Yes	Closer	Closer	Yes	Yes
Harshaw Chemical Company Site	428	Yes	N/A	Closer	Closer	Yes	Yes
Joslyn Manufacturing and Supply Company	96	Yes	N/A	Closer	Closer	Yes	Yes
Maywood Chemical Superfund Site	203	Yes	Yes	Closer	Closer	Yes	Yes
North Saint Louis County Sites	239	Yes	Yes	Closer	Closer	Yes	Yes
Staten Island Warehouse	126	Yes	Yes	Closer	Closer	Yes	Yes
Sylvania Corning Plant	286	N/A	Yes	N/A	Closer	Yes	Yes
Guterl Specialty Steel	66	N/A	Yes	Farther	Farther	Yes	No
Middlesex Sampling Plant	193	N/A	No	N/A	Closer	No	Yes
Middlesex Municipal Landfill	193	N/A	No	N/A	Closer	No	Yes
Seaway Industrial Park	261	No	No	Closer	Closer	No	Yes
Shallow Land Disposal Area	22	N/A	N/A	N/A	Closer	N/A	Yes
Tonawanda Landfill	261	No	No	Closer	Closer	No	Yes
DuPont Chambers Works	26	N/A	N/A	N/A	N/A	N/A	N/A
Iowa Army Ammunition Plant	16	No	No	N/Aa	N/Aa	No	N/Aa
Luckey Site	34	No	No	N/A	N/A	No	N/A
Niagara Falls Storage Site and Vicinity Properties	66	No	No	N/A	N/A	No	N/A
Superior Steel Site	394	No	No	N/A	N/A	N/A	N/A
W.R. Grace at Curtis Bay Site	203	No	No	N/A	Farther	No	No

Legend: Closer = As the demographic characteristic increases, the distance to a FUSRAP site decreases. Tracts with higher percentages of the demographic characteristic are associated with being closer to the FUSRAP site compared with tracts with lower percentages of the demographic characteristic. For example, tracts with higher percentages of underserved racial or ethnic populations are associated with being closer to the FUSRAP site.

Farther = As the demographic characteristic increases, the distance to a FUSRAP site increases. Tracts with higher percentages of the demographic characteristic are associated with being farther from the FUSRAP site compared with those tracts with lower percentages of the demographic characteristic. For example, tracts with higher percentages of individual or families in poverty are associated with being farther from the FUSRAP site.

N/A = There is no statistically significant association between the particular demographic characteristic and the distance to the FUSRAP site at the 95 percent confidence level.

Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017–2021) estimates. | GAO-23-105968

Notes: We assessed the relationship of distance between a census tract and the FUSRAP site and the demographic characteristic using a regression model. The outcome in our model is the logarithm

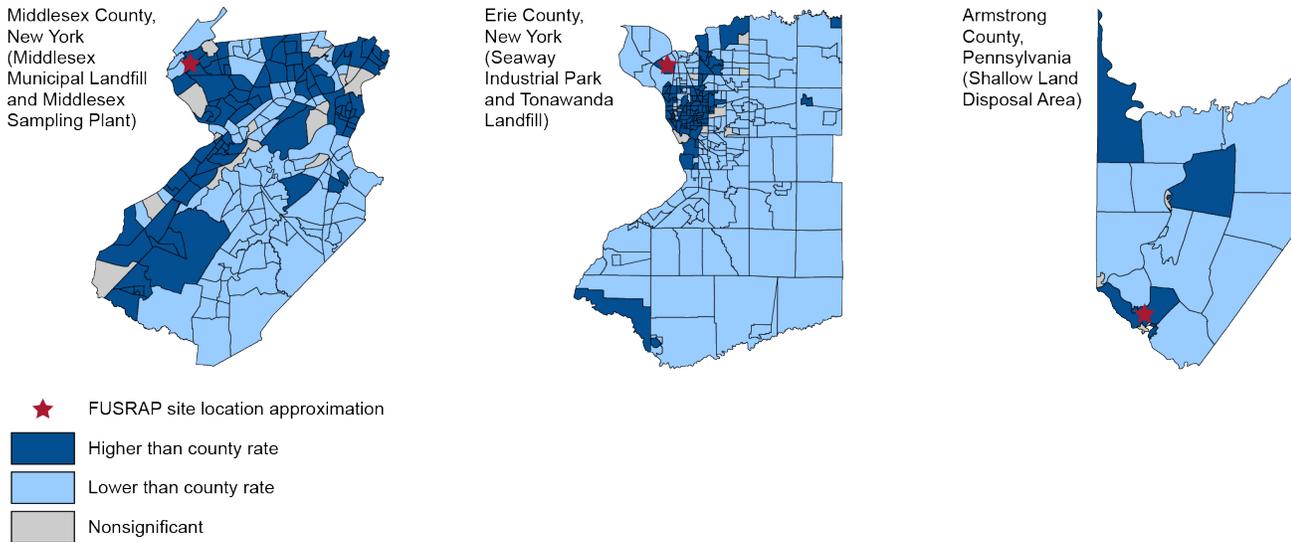
Appendix III: Geospatial and Statistical Analysis of Distance to FUSRAP Sites and Community Characteristics

of distance in order to satisfy model assumptions and to scale the effect of distance. This allowed us to assess whether increases in the demographic characteristics are associated with increases in distance to the FUSRAP site (“Closer”: a positive association) or decreases in the distance to the FUSRAP site (“Farther”: a negative association). All associations are significant at the 95 percent confidence level, meaning that the difference being due to chance alone is less than 5 percent. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points.

^aDue to a small number of census tracts (16) in the county, we were not able to estimate a regression model for the Iowa Army Ammunition Plant.

Our probability maps for the three counties where these five sites are located illustrate that the sites appear to be located next to some communities that have statistically lower rates of underserved racial or ethnic populations than the county rate. However, when looking at the location of the site in the context of the whole county, there generally appears to be concentrations of communities with higher rates of underserved racial or ethnic populations than the county rate near the site (see fig. 13).

Figure 13: Community Rates of Underserved Racial or Ethnic Populations Compared with the Overall County Rate for Three Counties with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

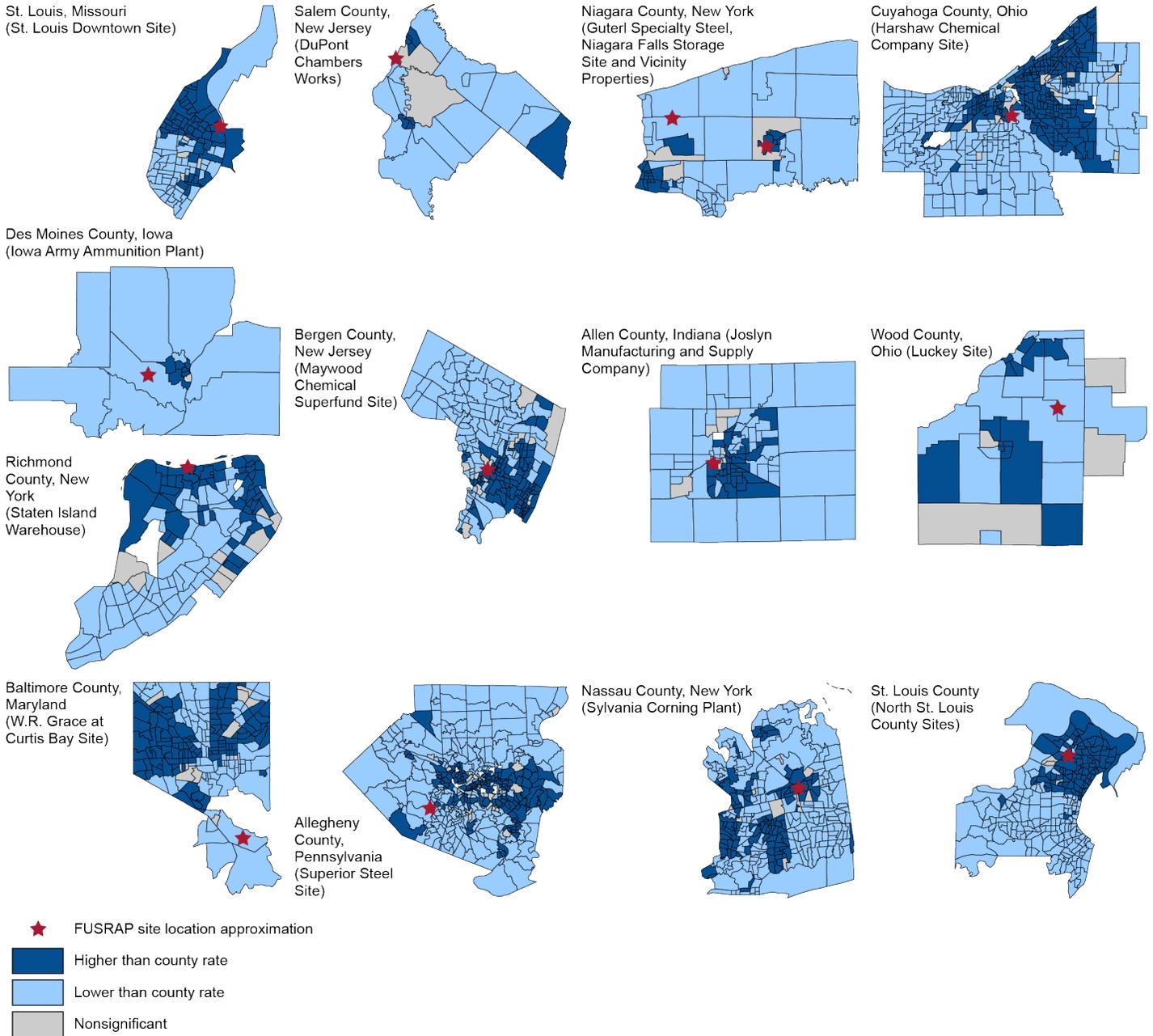
Notes: The statistical significance of the rate of underserved racial or ethnic populations, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than, or equal to the county-wide rate. In other words, if the rate in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than county rate,” regardless of the magnitude of difference between the census tract and the county rate. Blank census tracts indicate no data in that tract. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points. Statistical significance is determined by one-tailed tests based on a Poisson distribution.

**Appendix III: Geospatial and Statistical
Analysis of Distance to FUSRAP Sites
and Community Characteristics**

See figure 14 for maps of the rate of underserved racial or ethnic populations compared with the overall county rate in the other 13 counties containing active FUSRAP sites.

Appendix III: Geospatial and Statistical Analysis of Distance to FUSRAP Sites and Community Characteristics

Figure 14: Probability Maps of the Rate of Underserved Racial or Ethnic Populations Compared with the County Rate for 13 Counties with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

Notes: The statistical significance of the rate of underserved racial or ethnic populations, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than,

**Appendix III: Geospatial and Statistical
Analysis of Distance to FUSRAP Sites
and Community Characteristics**

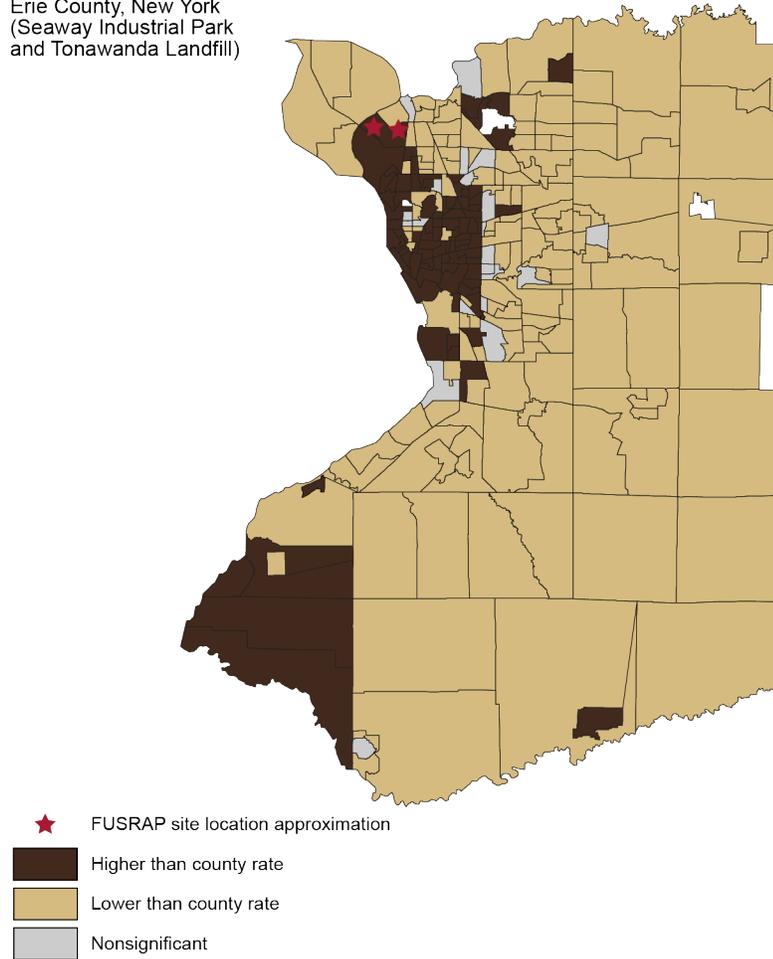
or equal to the county-wide rate. In other words, if the rate in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than county rate,” regardless of the magnitude of difference between the census tract and the county rate. Blank census tracts indicate no data in that tract. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points. Statistical significance is determined by one-tailed tests based on a Poisson distribution.

Further, our probability map for Erie County, where two of the five sites are located, illustrates that the sites appear to be located next to some communities that have statistically lower rates of family poverty than the overall county rate. However, when looking at the location of the site in the context of the whole county, there generally appear to be concentrations of communities with higher rates of family poverty than the county rate near the site (see fig. 15).

**Appendix III: Geospatial and Statistical
Analysis of Distance to FUSRAP Sites
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Figure 15: Community Rates of Family Poverty Compared with the Overall County Rate for One County with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites

Erie County, New York
(Seaway Industrial Park
and Tonawanda Landfill)



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

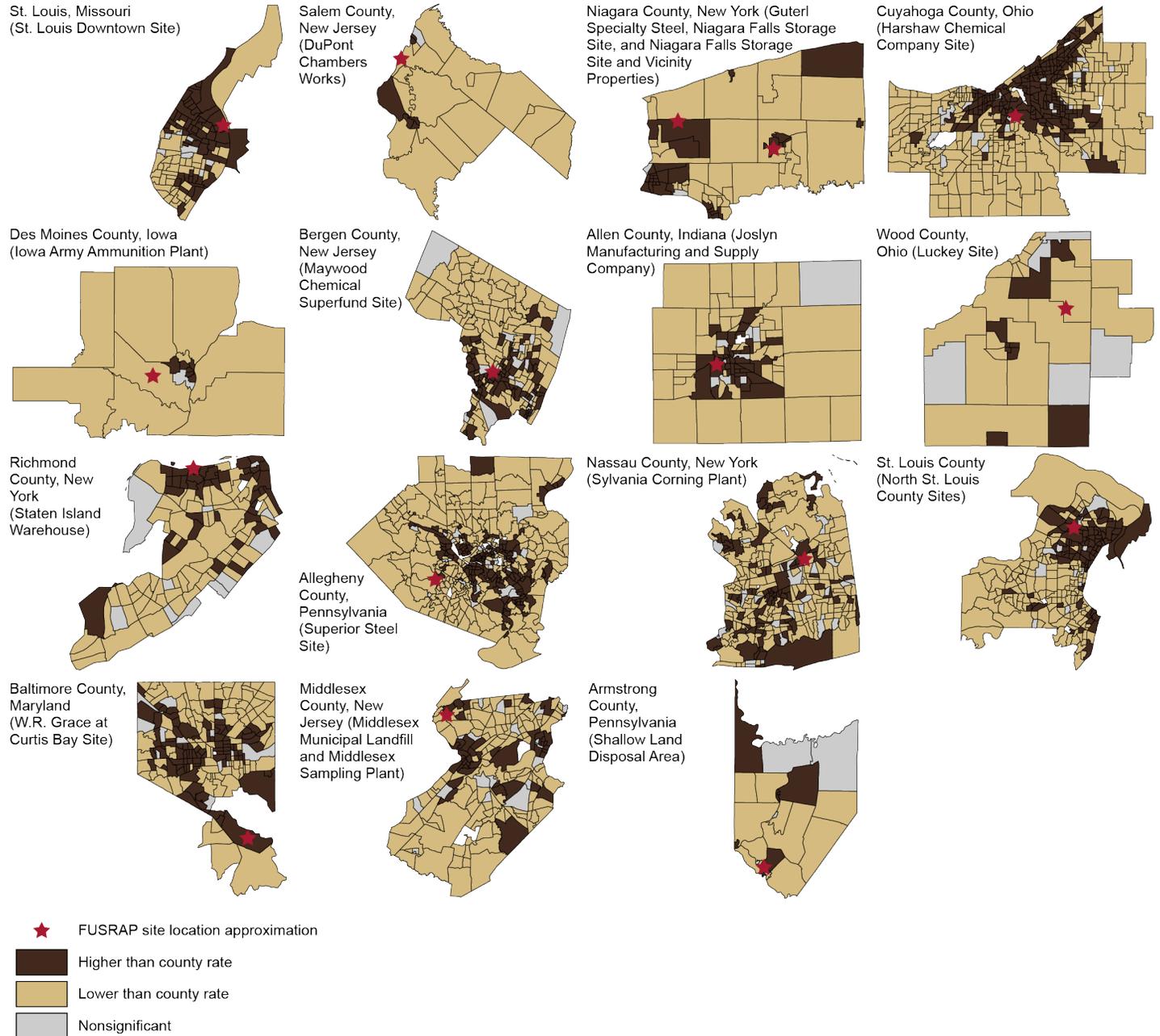
Notes: The statistical significance of the rate of families in poverty, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than, or equal to the county-wide rate. In other words, if the rate in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as “higher than county rate,” regardless of the magnitude of difference between the census tract and the county rate. Blank census tracts indicate no data in that tract. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points. Statistical significance is determined by one-tailed tests based on a Poisson distribution.

**Appendix III: Geospatial and Statistical
Analysis of Distance to FUSRAP Sites
and Community Characteristics**

See figure 16 for maps of the rate of families in poverty compared with the overall county rate in the other 15 counties containing active FUSRAP sites.

Appendix III: Geospatial and Statistical Analysis of Distance to FUSRAP Sites and Community Characteristics

Figure 16: Probability Maps of the Rate of Families in Poverty Compared with the County Rate for 15 Counties with Formerly Utilized Sites Remedial Action Program (FUSRAP) Sites



Source: GAO analysis of U.S. Army Corps of Engineers geospatial data and U.S. Census Bureau American Community Survey (ACS) 5-year (2017-2021) estimates. | GAO-23-105968

Notes: The statistical significance of the rate of families in poverty, rather than the rates themselves, were used to classify each census tract as statistically higher than, lower than, or equal to the county-

**Appendix III: Geospatial and Statistical
Analysis of Distance to FUSRAP Sites
and Community Characteristics**

wide rate. In other words, if the rate in a given census tract was higher than the overall county rate and that difference was statistically significant at the 95 percent confidence level, then that census tract was marked as "higher than county rate," regardless of the magnitude of difference between the census tract and the county rate. Blank census tracts indicate no data in that tract. All ACS estimates have a 90 percent confidence interval that is within +/-7 percentage points. Statistical significance is determined by one-tailed tests based on a Poisson distribution.

Appendix IV: Comments from the Department of Defense



SECRETARY OF THE ARMY
WASHINGTON

06 SEP 2023

Mr. Nathan Anderson
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Anderson:

On behalf of the Department of Defense, I am providing the response and associated comments on the GAO Draft Report, GAO-23-105968, "Nuclear Waste Cleanup: Army Corps Could Benefit from Following Leading Practices for Program Management for Contaminated Sites," dated July 13, 2023 (GAO Code 105968).

We welcome this opportunity to review and comment on the draft report. We further value the GAO staff's professionalism, collaboration, and insights during this project.

Thank you for your consideration of our response and comments. My point of contact is Ms. Sharron DaCosta-Chisley, Assistant for Water Resources Management, Sharron.H.DaCosta-Chisley.civ@army.mil, 571-278-6547.

Sincerely,

A handwritten signature in black ink, reading "Christine E. Wormuth", is positioned below the "Sincerely," text.

Christine E. Wormuth

Encls
1. Comments on Draft Report
2. Technical Comments

- 2 -

ENCLOSURE 1

GAO Draft Report Dated July 13, 2023

GAO-21-105968 (GAO CODE 105968)

**“NUCLEAR WASTE CLEANUP: ARMY CORPS COULD BENEFIT FROM
FOLLOWING LEADING PRACTICES FOR PROGRAM MANAGEMENT FOR
CONTAMINATED SITES”**

**ARMY COMMENTS
TO THE GAO RECOMMENDATIONS**

RECOMMENDATION 1: The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers update the FUSRAP Program Management Plan to follow leading practices for program management, for example, by including details in the plan on how to allocate staffing resources shared among project sites.

DoD RESPONSE: The DoD concurs with comment on the GAO recommendation.

In the draft report, the GAO recommends that USACE Headquarters (HQUSACE) take a more central role in allocating staffing resources shared among project sites. This recommendation conflicts with USACE’s standard business practice. HQUSACE does play an important role setting the mission and vision for the organization and provides financial resources to the Divisions and Districts to accomplish program and project goals. However, HQUSACE currently allows Divisions and Districts to decide how to allocate their staffing resources within their portfolio of project sites. To help ensure staffing requirements are met, HQUSACE performs workload/workforce assessments across the enterprise and partners with our Divisions and Districts to explore areas to improve retention and recruitment. USACE will review our current staffing practices and identify opportunities to ensure Divisions and Districts have the staff they need to meet mission requirements.

RECOMMENDATION 2: The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers create a program roadmap for FUSRAP that follows leading practices for program management, for example, by tracking CERCLA phases for each site and projecting when sites would need contracting support or technical expertise.

- 3 -

DoD RESPONSE: DoD concurs with GAO's assessment and will work with Army to develop a plan for creating a program roadmap for FUSRAP that follows leading practices for program management, for example, by tracking CERCLA phases for each site and projecting when sites would need contracting support or technical expertise.

RECOMMENDATION 3: The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers develop a comprehensive, integrated lifecycle cost estimate for FUSRAP that follows leading practices for program management, for example, by including both past and future program costs.

DoD RESPONSE: DoD concurs with GAO's assessment and will work with Army to develop a comprehensive, integrated lifecycle cost estimate for FUSRAP that follows leading practices for program management, for example, by including both past and future program costs.

RECOMMENDATION 4: The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers conduct risk management for FUSRAP at the program level that follows leading practices for program management, for example, by developing a risk register.

DoD RESPONSE: DoD concurs with GAO's assessment and will work with Army to develop plans to conduct risk management for FUSRAP at the program level that follows leading practices for program management, for example, by developing a risk register.

RECOMMENDATION 5: The Secretary of the Army should ensure that the Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers include the specific needs of FUSRAP communities in district level outreach strategies being developed in support of the Justice40 Initiative.

DoD RESPONSE: DoD concurs with GAO's assessment and will work with Army to develop guidance to include the specific needs of FUSRAP communities in district level outreach strategies being developed in support of the Justice40 Initiative.

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Nathan Anderson at (202) 512-3841 or AndersonN@gao.gov

Staff Acknowledgments

In addition to the contact named above, Janice Poling (Assistant Director), Kelsey Sagawa (Analyst in Charge), Taylor Bailey, Patrick Bernard, Jennifer Echard, Cindy Gilbert, Claudia Hadjigeorgiou, Jennifer Leotta, John Mingus, Cory Ryncarz, Caitlin Scoville, Sara Sullivan, Sonya Vartivarian, and Benjamin Wilder made key contributions to this report.

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