



## Hazardous Waste





## EXECUTIVE SUMMARY

There are an estimated 35 million tons of hazardous materials managed annually in the United States.<sup>1</sup> In general, there is adequate capacity for the treatment and disposal of these materials through the year 2044. However, progress toward mitigating legacy sites where hazardous waste was produced and improperly disposed of has stalled. There are approximately 1,300 Superfund sites where cleanup activities are either incomplete or not yet begun, roughly the same number as four years ago. Meanwhile, the Superfund budget has remained essentially flat at around \$1.1 billion over the last 10 years.<sup>2</sup> The two other hazardous waste programs — one for brownfields and one for hazardous waste regulated under the Resource Conservation and Recovery Act — are also in a steady state. In general, grant funding for the Brownfields Program has increased, but the program is still oversubscribed, with just 30% of applicants receiving funding. Meanwhile, resilience is a growing concern at many hazardous waste sites. Around 60% of all nonfederal Superfund sites are located in areas that may be impacted by flooding, storm surge, wildfires, or sea level rise related to climate change effects.<sup>3</sup>

### CAPACITY & CONDITION

Recognizing that hazardous waste disposal without planning and management endangers the public health and environment, Congress passed the Resource Conservation and Recovery Act (RCRA) in 1976 to manage hazardous waste from generation to disposal. The RCRA Corrective Action (CA) program drives the cleanup of legacy sites, while the RCRA permitting program governs the generation and proper transport, treatment, and disposal of hazardous waste for ongoing operations that result in hazardous waste. To clean up hazardous waste produced and improperly disposed of prior to the enactment of RCRA, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980. CERCLA created the hazardous waste cleanup program commonly referred to as “Superfund.”

The Environmental Protection Agency’s (EPA) 2019

National Capacity Assessment Report indicates that there is adequate capacity nationwide for the treatment and disposal of hazardous waste through the year 2044. The 25-year capacity is noteworthy given that there has been significant consolidation of commercial hazardous waste management facilities. In contrast, the number of hazardous waste generators has increased, primarily reflecting increased compliance within the retail sector on RCRA reporting requirements.<sup>4</sup>

The amount of hazardous materials requiring long-term management has decreased by 22% between 2001 and 2019, from 45 million tons to 35 million tons per year. Another 1.5 million tons of hazardous wastes — such as metals, solvent, or other recovery — were managed by recycling. The number of facilities where hazardous wastes are managed has decreased from over 2,100 to 964 over that period.<sup>5</sup>

Assuming per- and polyfluoroalkyl substances (PFAS) are determined to be hazardous substances under CERCLA, it is likely to result in more sites being added to the Superfund program. Unfortunately, due to the fact that PFAS compounds are difficult and costly to treat, they will present a significant challenge to our current hazardous waste infrastructure.

## Superfund

Superfund is a mature program, and technologies for cleanup are advancing; however, the capacity of the program to take on very large and complex sites, including contaminated sediment sites and area-wide impacts from legacy mining sites, is not sufficient to address the scope of the problem. While the impact of cleanup activities is clearly significant, increased enforcement, liability provisions and technical requirements have led to a significant reduction in careless disposal of hazardous materials.

The National Priorities List (NPL), maintained by EPA, contains the list of sites covered by Superfund. The NPL is routinely updated as sites are cleaned and removed from the list, and other sites are discovered, evaluated, and added. As of April 2020, there were 1,178 non-Federal Superfund sites, 157 Federal Sites (i.e., Superfund sites where another federal department or agency is

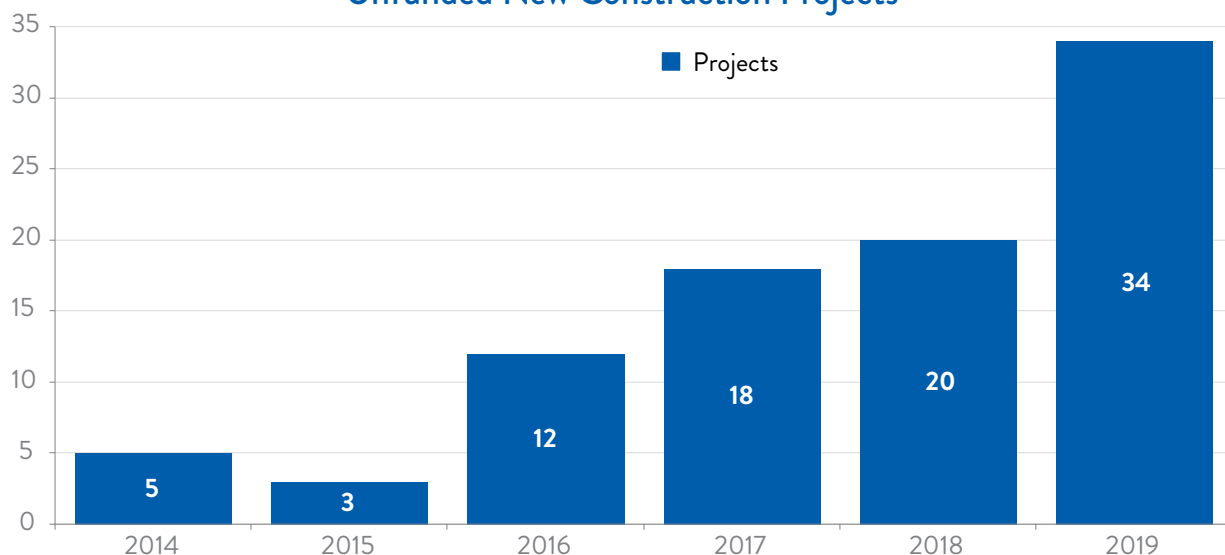
**The Superfund program has been essentially “steady state”—the rate of deletions from the NPL plus remedial construction completions has been very close to the rate at which new sites have been added to the NPL.**

responsible for the cleanup), and 51 sites proposed for the NPL. There are 424 former Superfund sites, sites that have been cleaned up and deleted from the NPL.<sup>6</sup>

Additionally, it is estimated that there are as many as 500,000 abandoned mines in our nation.<sup>7</sup> Abandoned mine lands (AMLs) pose health risks like radiation exposure, poisoned fish, and contaminated soil, water, and air. Surface runoff carries AML-originated silt and debris down-stream, which is often contaminated by metals and acid. Acid mine drainage (AMD) from abandoned mines poses significant risks to surface water and groundwater. Abandoned uranium mines pose the added threat of radiation exposure to the list of health concerns.

The Superfund program has been essentially “steady state”—the rate of deletions from the NPL plus remedial construction completions has been very close to the rate at which new sites have been added to the NPL. In 2017, EPA revised the Hazard Ranking System (HRS), the evaluation system used to determine if sites should be considered for inclusion on the NPL based on the threat to human health and the environment. In that revision, EPA added the potential for exposure to hazardous substances via vapor intrusion, where vapor-forming chemicals migrate from the subsurface into overlying buildings.

## Unfunded New Construction Projects



There has been a yearly increase in the number of sites ready to be cleaned up; however, funding is lacking. In essence, these are “shovel-ready” cleanup projects to protect human health and the environment that are not moving forward because of insufficient funding. These unfunded projects tend to stay unfunded; of the 34 unfunded remedial construction projects in FY 2019, 16 had been unfunded for two or more years, and six had been unfunded for four or more years. This has led to the growth of the backlog of deferred projects. That growth in backlog has occurred despite a decrease in the number of NPL additions over the last several years. For example, only seven sites were added in FY 2019.

When funding is available, Superfund cleanups are successful in converting contaminated sites into commercially viable properties to the economic benefit of communities. In 2017, EPA established a Superfund Task Force and has undertaken a sustained effort to examine the Superfund program and develop recommendations to expedite the remediation of sites and return them to communities. At the end of FY 2018, 529 current and former Superfund sites were in reuse or continued use, supporting 8,690 businesses that provided 195,465 jobs, resulting in \$13.3 billion in estimated annual employment income and \$52.4 billion in annual sales — many times EPA’s expenditures at these sites. Fifty-nine of those sites are home to renewable energy projects, with an installed capacity of 360 megawatts.<sup>8</sup>

**At the end of FY 2018,  
529 current and  
former Superfund  
sites were in reuse or  
continued use, supporting  
8,690 businesses  
that provided  
195,465 jobs,  
resulting in  
\$13.3 billion  
in estimated annual employment  
income and \$52.4 billion  
in annual sales**

## Resource Conservation and Recovery Act (RCRA)

Whereas the Superfund program manages legacy hazardous waste sites, RCRA provides instructions for current hazardous waste generation. Under RCRA, hazardous waste is managed from the moment it is generated to its final disposal. More than 80% of all generated hazardous waste is produced by the chemical manufacturing industry and the petroleum and coal products manufacturing industry. Over half the nation’s hazardous waste is generated in the state of Texas.<sup>9</sup>

The “RCRA universe” includes over 45,000 facilities that generate large quantities of hazardous waste, about 1,200 hazardous waste management facilities, and approximately 8,000 hazardous waste recycling facilities. In addition, 3,779 contaminated sites, covering over 18 million acres (approximately the size of South Carolina) are being cleaned up under the RCRA Corrective Action (CA) program.<sup>10</sup>

The effectiveness of RCRA can be measured by how well it is protecting populations and preventing exposure to hazardous chemicals. Program data from FY 2018 shows that 95% of RCRA CA facilities have controls in place that prevent human exposure to toxic chemicals, and 89% of RCRA facilities are effectively preventing the migration of contaminated groundwater. Complete construction of remediation systems has been achieved at 70% of RCRA CA sites, and 36% have achieved environmental performance goals.<sup>11</sup>

## Brownfields

There are an estimated 450,000 brownfield sites in the U.S. Brownfields differ from Superfund sites in the degree and nature of the contamination, and often in the site’s commercial potential. Cleaning up and reinvesting in brownfield sites increases local tax bases, facilitates job growth, utilizes existing infrastructure, reduces development pressures from open land, and both improves and protects the environment. There are multiple federal grant programs that provide funding and incentives that support brownfields cleanup and revitalization.

Brownfields redevelopment has resulted in significant economic and environmental benefits, with an economic benefit ratio of 20:1 for every federal dollar spent, increasing home values near former brownfield sites, business expansion, and job growth related to infrastructure improvements and improved business performance. Since 2006, approximately 150,000 sites have been cleaned up, facilitating the creation of more than 144,000 jobs, with 2 million acres made ready for reuse.<sup>12</sup>

## FUNDING & FUTURE NEED

The Superfund budget has remained essentially flat at around \$1.1 billion since 2009. In FY 2019, funding limitations resulted in deferring cleanup on 34 sites that were ready for remedial construction. Funding limitations have resulted in a growing backlog of deferred cleanups. In constant dollars, funding for the Superfund program has decreased by 43% since FY 2000.<sup>13 14</sup>

In FY 2018, the Superfund Enforcement Program obtained commitments from private parties of approximately \$453 million for site cleanup and \$80 million to reimburse the EPA. Historically, approximately 70% of Superfund cleanup activities has been paid for by the parties found responsible (PRPs) for cleanup.<sup>15</sup>

The 2017 Tax Cut and Jobs Act allows investors to defer or reduce taxes on capital gains for projects built within census tracts of low-income and distressed communities designated as “Opportunity Zones (OZ).” Investments in cleaning up and redeveloping brownfields sites in an OZ affords investors significant tax benefits, making more projects financially attractive. The 2018 Brownfields Utilization, Investment, and Local Development Act (“BUILD Act”) increased the funding limit for brownfields remediation grants from \$200,000 per site to \$500,000.

Since 2017, the number of EPA employees has declined by 8%.<sup>16</sup> Declines can significantly compromise EPA’s ability to effectively implement its responsibilities. With loss of EPA Superfund project managers, scientists, engineers, and procurement professionals, EPA’s ability to keep pace with program needs is questionable.



*Creative Commons*

HAZARDOUS WASTE IS STORED IN NEW YORK.

State waste management agencies do much of the work under RCRA, relying on federal grants to fund much of their programs. It is critical that states and EPA maintain sufficient expertise and resources to process permits in a timely manner, enhance compliance reporting, expand technical assistance to manufacturing and other waste generators, and improve and streamline permitting processes.<sup>17</sup>

For FY 2020, EPA issued 155 grants for communities and tribes totaling over \$65.6 million in EPA brownfields funding through multiple grant programs<sup>18</sup>. Brownfields competitive grant programs remain substantially over-subscribed, with approximately 30% of grant proposals receiving funds.

## PUBLIC SAFETY & RESILIENCE

The core purpose of the nation's hazardous waste infrastructure is public safety — preventing the release of, and exposure to, hazardous and toxic substances. Therefore, the infrastructure is generally fit for that core purpose. However, its resilience is less certain. A 2019 Government Accountability Office (GAO) report found that about 60% (945 of 1,571) of all nonfederal National Priorities List (NPL) sites are located in areas that may be impacted by flooding, storm surge, wildfires, or sea level rise related to climate change effects.<sup>19</sup> A clear demonstration of this risk occurred in 2017, when Hurricane Harvey dumped nearly 50 inches of rain over the greater Houston area, damaging several Superfund sites that contain hazardous substances. At the San Jacinto River Waste Pits site near Houston, floodwaters eroded the containment structure, releasing highly toxic wastes including dioxins into the river. In 2018, the Carr

Fire in California burned through the Iron Mountain Mine site near Redding, California, nearly destroying the water treatment system. According to the GAO report, some high-density propylene lines that caught fire nearly resulted in an explosion in the mine.<sup>21</sup>

Hazardous waste infrastructure also has an impact on climate. As reported under EPA's Greenhouse Gas Reporting Program, the waste sector contributed 134 million metric tons of CO<sub>2</sub>-equivalents in 2018, representing about 2.0% of direct, reported U.S. emissions.<sup>21</sup> New technologies and waste reduction strategies have the potential to reduce the hazardous waste management sector's contribution to climate change and strengthen the resiliency of our hazardous waste infrastructure.

## INNOVATION

Remediation technologies continue to improve, and more effective site characterization and cleanup strategies are being employed by EPA, other federal entities, and the private sector, emphasizing adaptive management and optimization of treatment systems.



## Hazardous Waste



## RECOMMENDATIONS TO RAISE THE GRADE

- Increase funding for Superfund at a level sufficient to eliminate the backlog of unfunded remedial actions within a three-year period, while also accelerating the implementation of positive program reforms identified by EPA's Superfund Task Force.
- Address staff shortages, training gaps, and contracting delays in the Superfund program.
- Focus on Superfund and RCRA Corrective Action sites located near historically disadvantaged, low income communities, as these communities have been disproportionately harmed by exposure to contamination from these sites.
- Accelerate and increase investment in PFAS research aimed at characterization, treatment, and analysis of these compounds, as well as understanding health impacts. Drive that research to establish a protective and scientifically sound regulatory framework for managing PFAS in the environment.
- Emphasize a robust technical focus and establish a stable, designated funding source for mining site cleanup, which already consumes a large percentage of the Superfund budget.
- Expand brownfields grant programs to support investment in pre-development site characterization activities, increasing leverage and stimulating greater investment from state, regional, local, and private funding sources.
- Conduct further research on more sustainable, cost-effective remedial approaches for mining sites.
- Invest in technology to optimize and improve efficiency of groundwater treatment systems.

## SOURCES

1. U.S. Environmental Protection Agency, 2020a. RCRAInfo, Hazardous Waste Report data, reporting years 2001-2017.
2. House Committee on Appropriation for the Department of Interior, Environment, and Related Agencies, multiple years.
3. U.S. Government Accountability Office, "Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change," GAO-20-73, October 18, 2019.
4. U.S. Environmental Protection Agency, "National Capacity Assessment Report Pursuant to CERCLA Section 104(c)(9)," December 17, 2019.
5. U.S. Environmental Protection Agency, <https://rcrapublic.epa.gov/rcrainfoweb/action/modules/br/summary/summarysearch;jsessionid=F52B8ECB8812AC217D90778C30D4EA89>
6. U.S. Environmental Protection Agency, Superfund, "Superfund: National Priorities List (NPL)."



## Hazardous Waste



### SOURCES (Cont.)

7. U.S. Environmental Protection Agency, Superfund, “Abandoned Mine Lands: Site Information.”
8. U.S. Environmental Protection Agency, “Superfund FY 2019 Annual Accomplishments Report,” EPA publication number 540R20001.
9. U.S. Environmental Protection Agency, “Superfund Task Force Final Report,” EPA publication number 540R119008, September 2019.
10. U.S. Environmental Protection Agency, Hazardous Waste, “Measuring Progress at Resource Conservation and Recovery Act (RCRA) Corrective Action Facilities.”
11. U.S. Environmental Protection Agency, Hazardous Waste, “Measuring Progress at Resource Conservation and Recovery Act (RCRA) Corrective Action Facilities.”
12. U.S. Environmental Protection Agency, Brownfields, “Brownfields Program Accomplishments and Benefits: Leveraging Resources to Revitalize Communities.”
13. Probst K, “Superfund 2017: Cleanup Accomplishments and the Challenges Ahead,” 2017.
14. Probst K, New York University School of Law and Environmental Law Institute, “Looking Back to Move Forward: Resolving Health & Environmental Crises,” Chapter 6: Superfund at 40: Unfulfilled Expectations, November 2020.
15. U.S. Environmental Protection Agency, “Superfund FY 2019 Annual Accomplishments Report,” EPA publication number 540R20001.
16. U.S. Environmental Protection Agency, “FY 2021 EPA Budget in Brief,” February 2020.
17. Personal Communications, Association of State & Territorial Solid Waste Management Officials, April 24, 2020.
18. U.S. Environmental Protection Agency, Brownfields, “Brownfields Program Accomplishments and Benefits: Leveraging Resources to Revitalize Communities.”
19. U.S. Government Accountability Office, “Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change,” GAO-20-73, October 18, 2019.
20. U.S. Government Accountability Office, “Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change,” GAO-20-73, October 18, 2019.
21. U.S. Environmental Protection Agency, “Inventory of Greenhouse Gas Emissions and Sinks: 1990-2018.”