

Contaminated Ground Water Migration at Cleanup Sites

The EPA Superfund and Resource Conservation and Recovery Act (RCRA) Programs conduct a number of activities to address the nation's most severely contaminated lands. The programs investigate and collect data on potentially contaminated sites to determine whether they are contaminated and require cleanup. When a potentially hazardous waste site is reported to EPA, trained inspectors determine whether the site presents a hazard to human health and the environment. Sites that pose the greatest threats are placed on the Superfund National Priorities List (NPL) or RCRA Cleanup Baseline. For RCRA, sites are more commonly referred to as RCRA Corrective Action "facilities." For Superfund, this indicator tracks final and deleted NPL and Superfund Alternative Approach (SAA) sites, which together comprise the Superfund Environmental Indicator Baseline sites.

One of EPA's priorities for both the NPL and RCRA Cleanup Baseline sites is preventing the migration of contaminated ground water, often referred to as plumes of contaminated ground water. Protecting the ground water is especially important in areas where it is a source for drinking water and irrigation, or a potential source for future water supplies.

EPA and state officials determine that the migration of contaminated ground water is under control (i.e., not continuing to migrate in concentrations above levels of concern) when ongoing monitoring shows that the contaminant plume is not expanding or negatively impacting surface waters (U.S. EPA, 1999, 2004, 2022d, 2022f). Further migration of contaminated ground water may be prevented by an action taken, such as installation of a pump-and-treat or subsurface barrier system, or by natural attenuation of the contaminants. A determination of whether migration has been prevented is based on monitoring data (usually from hundreds of analytical samples) collected from ground water wells within and surrounding the spatial extent of the ground water plume (U.S. EPA, 1999, 2004, 2022d, 2022f).

This indicator describes the number of sites where government officials have determined that contaminated ground water is not continuing to migrate in concentrations above levels of concern (e.g., that exceed the appropriate drinking water standards). For Superfund, the indicator tracks final and deleted NPL and Superfund Alternative Approach (SAA) sites, which comprise the Superfund Environmental Indicator Baseline. For the RCRA program, the Contaminated Ground Water Migration at Cleanup Sites indicator includes all 3,924 RCRA Cleanup Baseline facilities. The number of sites where ground water contamination is not stable is also noted, as well as the number of sites where there are insufficient data to make a determination. The intention of the indicator is not to capture an action or administrative determination on the part of EPA, but to convey the underlying pressure on the environment and potential for human health effects resulting from contaminated ground water. Between fiscal year (FY) 2002 and 2021, the number of Superfund Environmental Indicator Baseline sites increased by 22 percent (from 1,494 to 1,826). The number of RCRA facilities tracked by EPA as the Cleanup Baseline increased by 129 percent from FY 2000 to FY 2021 (from 1,714 to 3,924). Changes in the RCRA baseline are programmatic determinations and do not necessarily reflect changes in the condition of the environment.

What the Data Show

Of the RCRA Cleanup Baseline facilities, the percentage of facilities where contaminated ground water has been determined to be under control increased from 32 percent (554 out of 1,714 facilities) in fiscal year (FY) 2000 to 89 percent (3,496 out of 3,924 facilities) in FY 2021 (Exhibit 1). This increase represents a combination of facilities where mitigation has halted the migration of contaminated ground water and facilities where data are sufficient to show that contaminated ground water migration was not continuing, regardless of mitigation activities. The percentage of facilities where officials have determined that ground water that is contaminated above levels of concern is migrating beyond the existing area of contamination decreased from 18 percent (306 out of 1,714 facilities) in FY 2000 to 1.1 percent (43 out of 3,924 facilities) in FY 2021. These facilities and the remaining 385 facilities for which data are still insufficient for a determination at the end of FY 2021 tend to be very complex facilities where the appropriate data have yet to be collected due to high costs or technical difficulties.

Contaminated ground water migration has not been an issue at all Superfund NPL and SAA sites. Of those Superfund sites where ground water contamination is present, the percentage where contaminated ground water has been

determined to be under control increased from 61 percent (772 of 1,275 sites) in FY 2002 to 73 percent (1,235 of 1,685 sites) in FY 2021 (Exhibit 2). As of the end of FY 2021, ground water that is contaminated above protective, risk-based levels and is not stable includes 11 percent (188) of these Superfund sites, while the remaining 16 percent (262 sites) had insufficient data to determine whether contaminated ground water is migrating above protective, risk-based levels. These percentages do not include Superfund sites classified as “ground water migration not applicable.”

Limitations

- The Superfund Environmental Indicator Baseline does not represent all of the contaminated or potentially contaminated sites listed in the Superfund Enterprise Management System (SEMS), available at <https://cumulis.epa.gov/supercpad/CurSites/srchsites.cfm>. SEMS contains information on thousands of hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation.
- The indicator results are presented for the number of RCRA Cleanup Baseline facilities tracked each year, not the entire group of about 6,000 hazardous waste management facilities that may be subject to RCRA Corrective Action requirements (e.g., initial assessments and, if needed, more thorough investigations and cleanups). The extent to which people have been affected, or could be affected, by the contaminated ground water at NPL or RCRA Cleanup Baseline facilities is not considered in this indicator, but it is addressed in the [Current Human Exposures Under Control at Cleanup Sites](#) indicator.
- The indicator does not address ground water contaminated at other types of sites, such as sites with leaking underground storage tanks and other sites being addressed solely by state cleanup programs.
- Concentrations of toxic and hazardous contaminants in ground water that must not be exceeded to designate a site as under control vary somewhat from state to state, though they fall within a range determined to be acceptable to EPA (U.S. EPA, 2004, 2022d).

Data Sources

Data for this indicator were provided by EPA's Office of Land and Emergency management (OLEM) (U.S. EPA, 2022a, 2022b). A list showing the current status of every RCRA baseline site is available online on the Cleanups in My Community portal at <https://ofmpub.epa.gov/apex/cimc/f?p=cimc:createtable:0:>. A national summary of the status of Superfund NPL and SAA sites is available online on the Superfund Performance Measures webpage at https://www.epa.gov/superfund/superfund-remedial-performance-measures#gw_anchor (U.S. EPA, 2022e) and site-specific statuses are available online on EPA's Superfund site profile pages, at <https://www.epa.gov/superfund/search-superfund-sites-where-you-live#basic>. Information on the current status of any individual NPL or SAA site can be queried using EPA's Superfund Enterprise Management System (formerly CERCLIS) database (U.S. EPA, 2022c).

References

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U.S. EPA. 2022b. Data provided to ERG by EPA Office of Superfund Remediation and Technology Innovation, within the Office of Land and Emergency Management. August 4, 2022.

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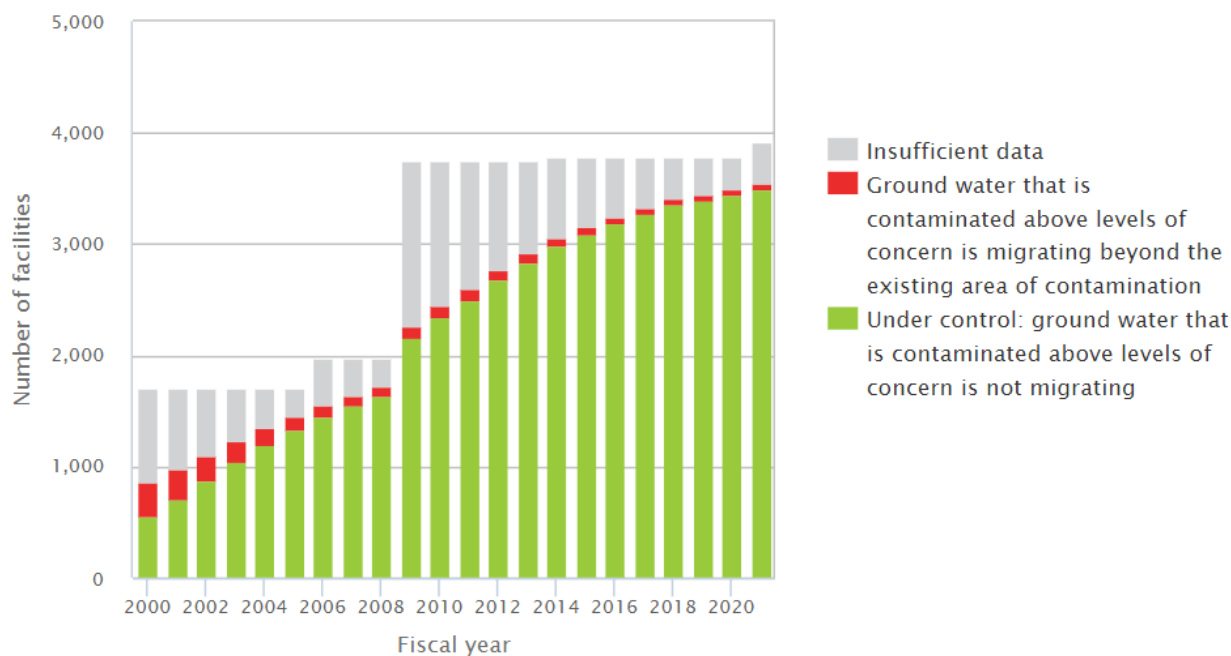
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Exhibit 1. Ground water migration under control status at RCRA Cleanup Baseline facilities for fiscal years 2000–2021

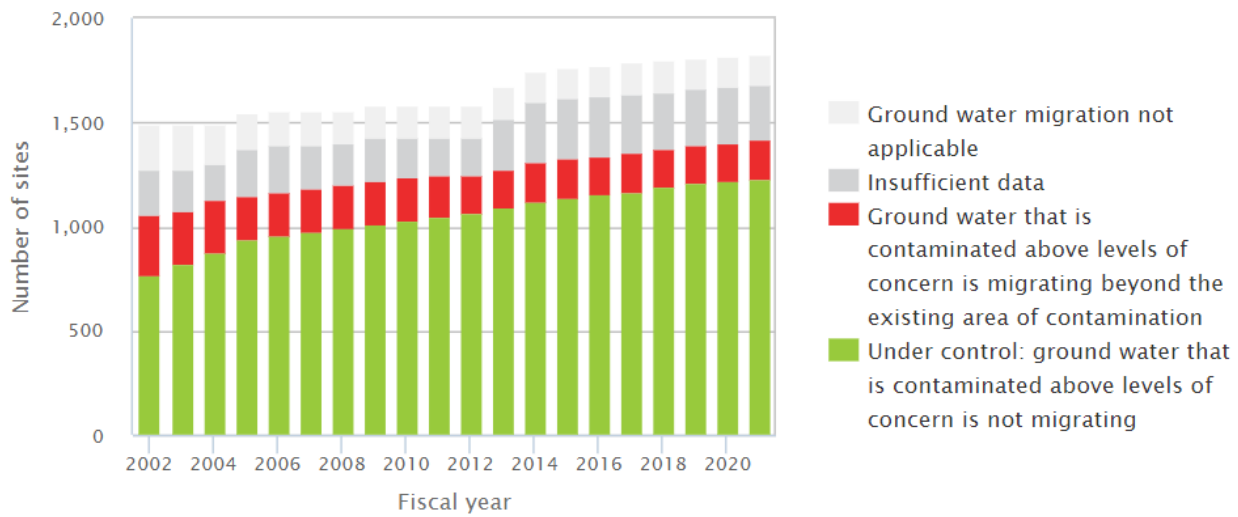


The number of facilities included in the RCRA cleanup baseline changed in 2006, 2009, 2014, and 2021.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: U.S. EPA, 2022a

Exhibit 2. Ground water migration under control status at Superfund Environmental Indicator sites for fiscal years 2002–2021



These data include final and deleted National Priorities List (NPL) sites as well as Superfund Alternative Approach (SAA) sites, which comprise the Superfund Environmental Indicator Baseline sites. The number of sites included in the Superfund Environmental Indicator Baseline changed in 2005, 2006, 2009, and each year from 2013–2021.

For calculating the percentage of Superfund NPL Indicator Baseline sites in the "under control" category, the total does not include the "ground water migration not applicable" sites.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: U.S. EPA, 2022b