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Delays and Dangers: Evaluating the Efficiency of the Environmental Protection Agency Superfund Program in Illinois

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Abstract- This report evaluates the efficiency of the Superfund program in Illinois through the lens of "delays and dangers": how long it takes to control exposures and achieve cleanup milestones, why those timelines stretch, and what the prolonged timelines mean for public health, ecosystems, community trust, and public and private costs. The analysis integrates the federal legal framework, regulatory mechanics for listing and delisting, and several Illinois-focused case studies—especially complex Great Lakes sediment work and multi-party industrial "mega-site" contexts—where delays are most consequential. The report relies primarily on federal regulations (Title 40), Federal Register rulemakings, official Superfund administrative record documents, and health assessments/consultations produced under the public-health authorities associated with Superfund. (40 C.F.R. pt. 300 app. A, 2023; 40 C.F.R. § 300.425, 2014; Environmental Protection Agency, 2013; Illinois Department of Public Health, 2004a; Illinois Department of Public Health, 2012). First, Superfund's design explicitly trades speed for procedural, technical, and legal robustness. The program's structure—Hazard Ranking System (HRS) scoring, notice-and-comment rulemaking for the National Priorities List (NPL), multi-stage remedial investigation and feasibility study (RI/FS), formal remedy decision documents, enforceable instruments with potentially responsible parties (PRPs), and long-term operation/maintenance (O&M) and five-year reviews—builds legitimacy and scientific defensibility but creates many points where progress can slow or pause. The controlling regulation for remedial priority-setting and deletion (§ 300.425) and the HRS appendix show how formalized and staged the pipeline is. (40 C.F.R. § 300.425, 2014; 40 C.F.R. pt. 300 app. A, 2023). Second, in Illinois, the most delay-prone site archetypes are (a) contaminated sediment sites connected to Great Lakes harbors and nearshore ecosystems and (b) complex industrial corridors with multiple disposal areas, groundwater migration pathways, and multiple PRPs. These archetypes are especially vulnerable to: iterative remedy changes, multi-agency coordination burdens, contested allocation of responsibility, and long monitoring horizons. The Waukegan Harbor/Outboard Marine context shows how sediment and fish-bioaccumulation dynamics can require staged remedies and extended confirmatory monitoring, while the Sauget industrial corridor illustrates how multi-area landfill/lagoon systems and groundwater–river interactions embed long timelines and technical uncertainty. (Environmental Protection Agency, 2017; Illinois Department of Public Health, 2004a; Illinois Department of Public Health, 2012).

Keyword: Key themes include the Superfund program, cleanup delays, and risk management timelines shaped by regulatory frameworks such as Comprehensive Environmental Response, Compensation, and Liability Act and oversight by the Environmental Protection Agency. Core concepts include the Hazard Ranking System (HRS), National Priorities List (NPL), remedial investigation/feasibility study (RI/FS), and potentially responsible parties (PRPs). The report emphasizes contaminated sediments, industrial mega-sites, and multi-agency coordination challenges, along with distinctions between exposure control, groundwater migration control, and site deletion. Broader issues include public health impacts, ecosystem risks, long-term monitoring and maintenance, institutional controls, and trade-offs between procedural rigor and cleanup efficiency.

I. Introduction and Scope

Superfund, formally the federal program for investigating and cleaning up the nation's most hazardous contaminated sites—has always been a governance problem as much as a technical one. It requires the federal government and states to identify high-risk sites, impose or negotiate cleanup responsibility, select and implement remedies under uncertainty, communicate risks over long periods, and sustain land-use controls and monitoring that may last decades. In Illinois, these challenges are concentrated in industrial and transportation corridors along major rivers and Lake Michigan, where contamination intersects dense populations, legacy industrial infrastructure, and economically and culturally valuable water bodies. (40 C.F.R. § 300.425, 2014; Illinois Department of Public Health, 2012; Illinois Department of Public Health, 2004a).

The title of this report, "Delays and Dangers", signals an evaluative stance: delays are not merely administrative inconveniences; they can prolong exposure pathways, extend fish consumption advisories and other protective behaviors, delay beneficial reuse, and increase uncertainty and distrust. At the same time, some delay is a structural feature of the program's commitment to procedural fairness (public rulemaking), scientific defensibility (RI/FS and remedy selection), and enforceable liability allocation to polluters (PRP process). Efficiency, therefore, must be evaluated against Superfund's legal and ethical goals, not solely against speed. (40 C.F.R. pt. 300 app. A, 2023; 40 C.F.R. § 300.425, 2014).

II. Definitions of efficiency used in this report

Because Superfund sites vary widely in contaminant type, media (soil, groundwater, sediment), land use, and PRP structure, there is no single "cleanup duration" metric that is fair across all sites. This report therefore uses a multi-metric notion of efficiency grounded in regulatory milestones and risk endpoints, emphasizing:

- Time-to-listing: time from initial identification to NPL proposal/final listing, recognizing that some sites are addressed outside the NPL. (40 C.F.R. pt. 300 app. A, 2023; Environmental Protection Agency, 2024).
- Time-to-remedy decision: time from listing to Record of Decision/major decision document. (40 C.F.R. § 300.425, 2014).
- Time-to-risk reduction: time until major exposure pathways (e.g., contaminated fish consumption, contaminated drinking water wells) are brought under control, as measured by public health documentation and remedy completion. (Illinois Department of Public Health, 2012; Environmental Protection Agency, 2017).
- Time-to-construction completion or functional completion: when engineered components are built and operating as intended, even if long-term monitoring continues. (Environmental Protection Agency, 2014).
- Time-to-deletion/partial deletion: date of Federal Register "direct final" deletion/partial deletion, which is a formal administrative endpoint but not necessarily a termination of obligations. (Environmental Protection Agency, 2013; Environmental Protection Agency, 2014; Environmental Protection Agency, 2020).

III. Constraints and evidentiary approach

The user required references up to and including 2024 and prioritized official sources (federal/state agencies), original academic work, and reputable journalism. This report follows that constraint by leaning on: (a) federal regulations and Federal Register notices available via U.S. Government Publishing Office and govinfo; (b) Superfund administrative records and site documentation; and (c) public health assessments/consultations produced under cooperative agreements with parts of ATSDR's Superfund-related work, including Illinois public health partners. (Environmental Protection Agency, 2000; Environmental Protection Agency, 2012; Environmental Protection Agency, 2013; Environmental Protection Agency, 2014; Environmental Protection Agency, 2020; Illinois Department of Public Health, 2004a; Illinois Department of Public Health, 2012).

Where Illinois-wide statistics are not robustly supported by consolidated public datasets within the allowed time horizon, the report marks them as unspecified and instead provides defensible, site-level statistics and cross-site comparisons for selected major Illinois sites. (Environmental Protection Agency, 2014; Environmental Protection Agency, 2020).

IV. Program History and Legal Framework

The National Contingency Plan and the regulatory backbone

Superfund site cleanup is implemented through the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), codified in 40 C.F.R. Part 300. The NCP establishes, among other things, the mechanism for establishing remedial priorities, the linkage between the Hazard Ranking System and the National Priorities List, and the deletion criteria and procedures for taking sites off the NPL. (40 C.F.R. § 300.425, 2014).

The NCP's procedural structure matters for efficiency because it creates a staged pipeline with formal decision points. For example, the deletion subsection of § 300.425 specifies that "releases may be deleted from or recategorized on the NPL where no further response is appropriate," and it requires consultation with the state and publication steps that mirror notice-and-comment expectations. (40 C.F.R. § 300.425, 2014).

The NPL itself is maintained as an appendix (Appendix B) to Part 300, and official compilations are published in the Code of Federal Regulations. The 2020 published edition, for example, lists Illinois NPL sites including DuPage County Landfill/Blackwell Forest and other major Illinois sites. (40 C.F.R. pt. 300 app. B, 2020).

The Hazard Ranking System as the gatekeeper

The Hazard Ranking System (HRS) is published as Appendix A to Part 300. It is described as the principal mechanism used to place sites on the NPL and is designed as

a screening tool to evaluate relative potential for harm rather than "absolute risk." (40 C.F.R. pt. 300 app. A, 2023).

From an efficiency standpoint, HRS design choices have two major implications. First, because the HRS is designed for consistent application across many site types, it may require iterative data collection (preliminary assessment, site inspection, and potentially expanded work) before a score is defensible, which can stretch the pre-listing stage. Second, changes to the HRS—such as the federal rulemaking that added a subsurface intrusion component—alter how sites are evaluated and can introduce transition periods where agencies and consultants adapt to new scoring expectations. (Addition of a Subsurface Intrusion Component to the Hazard Ranking System, 2017; 40 C.F.R. pt. 300 app. A, 2023).

V. Illinois–federal coordination as an operational "layer" of the legal framework

Although Superfund is federal, it often operates through close state–federal coordination. A key illustration is the Superfund Memorandum of Agreement (SMOA) between EPA Region 5 and the Illinois Environmental Protection Agency, which sets expectations for coordination and delineation of roles for remedial and enforcement work. Such agreements matter for efficiency because they affect how quickly decisions are made, how disputes are resolved, how state concurrence is obtained, and how resources are shared. (Environmental Protection Agency, 2015).

Funding and the "capacity constraint" problem

Even when legal authority is clear and technical options are available, cleanup schedules can be constrained by staff and funding capacity. While this report does not rely on post-2024 funding analyses, it is notable that federal budget materials for FY2025 (published in 2024) explicitly treat Superfund as relying on appropriations and trust fund mechanisms, including the relevance of revived excise tax revenues collected in 2024 for later program use. This illustrates an important efficiency mechanism: funding instability can slow remedial design and construction starts, extend procurement timelines, and reduce the pace at which EPA can move multiple sites simultaneously. (Office of Management and Budget, 2024).

The long-run challenge: "cleanups nearing completion" dynamic

Concerns about Superfund timing are long-standing. A GAO testimony from the late 1990s focused on "times to assess and clean up hazardous waste sites," indicating that the issue of lengthy assessment and cleanup cycles has been present for decades. Even though the institutional context has evolved, the persistence of this concern is relevant when evaluating whether Illinois experiences "structural delay" consistent with nationwide patterns. (Government Accountability Office, 1997).

Listing, Remedy Selection, and Delisting Mechanics

Listing mechanics: from site discovery to NPL final rule

The listing pathway can be conceptualized as a sequence: field identification → preliminary assessment/site inspection → HRS scoring → proposal to the NPL → public comment → final listing. The core regulatory basis includes the HRS (Appendix

A), which supports NPL eligibility decisions, and § 300.425, which explains NPL's function in establishing remedial priorities. (40 C.F.R. pt. 300 app. A, 2023; 40 C.F.R. § 300.425, 2014).

The public-law character of listing is underscored by Federal Register NPL update rules. For example, a 2024 final rule adding sites to the NPL describes the NPL as a planning tool intended to guide EPA in determining which sites warrant further investigation and notes that NPL listing does not itself assign liability or mandate that a remedial action must occur. This limitation matters for efficiency analyses because "time on the NPL" may reflect not only cleanup work but also the time required to resolve liability, design enforceable instruments, and secure resources. (Environmental Protection Agency, 2024).

Remedy selection mechanics: why the RI/FS structure can slow progress

Remedy selection typically flows through site characterization and alternatives analysis. Even without reproducing the full NCP remedial investigation framework, the structural point is clear: Superfund remedy selection is designed to be deliberative and documented, so that remedy decisions can withstand technical and legal scrutiny and be enforceable against PRPs. This deliberation is particularly consequential for sediment sites and groundwater sites, where exposure pathways and remedy effectiveness can be uncertain over long horizons. (40 C.F.R. § 300.425, 2014; National Research Council, 2007).

In the contaminated-sediment context, the National Research Council's examination of sediment dredging at "Superfund megasites" emphasizes the complexity of meeting both short-term and long-term goals, including verification of achieved cleanup levels. This connects directly to delay risk in Illinois ports and harbors, where dredging, capping, disposal, and fish-bioaccumulation concerns interact. (National Research Council, 2007).

Delisting and partial deletion mechanics: what it means and what it does not mean

Under § 300.425(e), deletion from the NPL is appropriate where no further response is appropriate, but deletion does not terminate EPA's authority to act in the future if conditions warrant. Federal Register deletion notices repeatedly emphasize that deletion "does not preclude future actions under Superfund," which is crucial for interpreting deletion as an efficiency endpoint. (40 C.F.R. § 300.425, 2014; Environmental Protection Agency, 2013; Environmental Protection Agency, 2014; Environmental Protection Agency, 2020).

Partial deletion adds additional nuance. A partial deletion rule for the Beloit Corporation site in Illinois, for instance, removed the "Research Center Property" portion from the NPL while leaving the remainder on the NPL. This reflects a pragmatic efficiency tactic: where a definable property segment meets criteria, EPA can "bank" progress and reduce regulatory burdens for reuse, while the more contaminated or more complex portions remain under Superfund for continued action. (Environmental Protection Agency, 2018).

VI. Illinois Superfund Portfolio: Status, Timelines, and Costs

Illinois "portfolio" boundaries and what can be stated with confidence
Illinois Superfund work spans sites formally listed on the NPL, sites proposed to the NPL, and sites addressed through other mechanisms or state programs. The official NPL list is published as Appendix B to 40 C.F.R. Part 300, and Illinois sites appear within that appendix. The 2020 published CFR compilation provides an official snapshot of Illinois listings at that time. (40 C.F.R. pt. 300 app. B, 2020).

For changes through 2024, NPL updates published in the Federal Register document additions. A March 2024 final rule adding sites to the NPL provides concrete evidence that NPL composition changes over time and that "Illinois counts" must be tied to a defined snapshot date and definition (final vs proposed vs deleted). (Environmental Protection Agency, 2024).

Because a consolidated statewide dataset (pre-2025 snapshot) containing consistent listing dates, construction completion dates, cost baselines (ROD estimates), actual expenditures, and current statuses for all Illinois sites was not assembled within the constrained source window, statewide aggregates such as "average time to cleanup across all Illinois NPL sites" are unspecified in this report. Instead, the report provides:

- A defensible set of Illinois deletion and partial deletion milestones from Federal Register rules.
- Site-level timeline windows for major remedial actions (e.g., dredging seasons) where official documents provide dates.
- Comparative analysis of structural delay drivers across selected major Illinois sites. (Environmental Protection Agency, 2012; Environmental Protection Agency, 2013; Environmental Protection Agency, 2014; Environmental Protection Agency, 2018; Environmental Protection Agency, 2020).

Verified deletions and what they imply about timeline scale
Federal Register deletion rules provide "effective dates," which can be used as time-stamped endpoints for completed site actions (recognizing continued O&M and future authority). Several Illinois deletions illustrate that many sites remain under Superfund jurisdictional attention for decades:

- Ilada Energy Company Site (East Girardeau, IL): direct final deletion effective January 8, 2001. (Environmental Protection Agency, 2000).
- Kerr-McGee (Reed-Keppler Park) Site (West Chicago, IL): direct final deletion effective February 8, 2010 (unless adverse comments). (Environmental Protection Agency, 2009).
- A & F Material Reclaiming, Inc. (Greenup, IL): direct final deletion effective June 11, 2012 (unless adverse comments). (Environmental Protection Agency, 2012).
- Kerr-McGee (Sewage Treatment Plant) (West Chicago, IL): direct final deletion effective April 22, 2013 (unless adverse comments). (Environmental Protection Agency, 2013).

- Belvidere Municipal Landfill (Belvidere, IL): direct final deletion effective February 9, 2015 (unless adverse comments). (Environmental Protection Agency, 2014).
- DuPage County Landfill/Blackwell Forest (Warrenville, IL): direct final deletion effective September 8, 2020 (unless adverse comments). (Environmental Protection Agency, 2020).

These effective dates suggest that "site lifecycle" is frequently multi-decade, reinforcing that efficiency evaluation should focus on intermediate risk controls rather than expecting rapid "closure" in the business sense. (40 C.F.R. § 300.425, 2014).

Site-level timeline statistics that can be computed from the record
Where documents provide both a listing date and a deletion/partial deletion effective date, a defensible duration can be calculated.

For example, for the Kerr-McGee Sewage Treatment Plant site in West Chicago, the Federal Register deletion notice states the site was proposed to the NPL on October 15, 1984 and finalized on August 30, 1990, and the deletion effective date is April 22, 2013. That implies approximately 22.6 years from final listing to deletion, and about 28.5 years from proposal to deletion. (Environmental Protection Agency, 2013).

For the Beloit Corporation site (Rockton, IL), the partial deletion notice states: proposal to the NPL on June 24, 1988, final listing on August 30, 1990, and partial deletion effective September 14, 2018. That implies approximately 28.0 years from final listing to partial deletion for the Research Center Property portion of the site. (Environmental Protection Agency, 2018).

These two measured examples are not intended to represent the Illinois portfolio average; instead, they demonstrate a key reality for Illinois: even pieces of a site can take nearly three decades from NPL listing to partial deletion in groundwater-driven cases. (Environmental Protection Agency, 2018; Environmental Protection Agency, 2013).

Costs and overruns: what can and cannot be stated here
The user requested cost overruns and cleanup costs. Federal Register deletion rules and many public health consultations are not designed as cost accounting documents; they often emphasize procedural criteria and protectiveness rather than spending. In the pre-2025 source set used here, site-specific cost baselines and actual expenditures for Illinois sites were frequently unspecified.

However, two important, defensible points can still be made.

- Delays can increase costs and prolong exposure as an operational matter. A 2024 memorandum from the EPA Office of Inspector General (while focused on a non-Illinois site) explicitly links construction delays to increased taxpayer costs and prolonged community exposure, supporting the general proposition that schedule slippage has both fiscal and health consequences. (EPA Office of Inspector General, 2024).

- For sediment megasites, the National Research Council's analysis illustrates the complexity and scale of dredging and monitoring, which implies higher uncertainty in cost and schedule compared with simpler soil remedies, even when specific Illinois cost data are not provided in the selected sources. (National Research Council, 2007).
- Because cost metrics are central to "efficiency," this report recommends improved public reporting of schedule and cost baselines and variance for Illinois sites (see Recommendations), noting the limitation that robust portfolio-wide cost overrun statistics are unspecified here.

VII. Case Studies of Major Illinois Sites

This section presents five Illinois case studies chosen to capture different delay archetypes: Great Lakes contaminated sediments, industrial corridor groundwater control, radiological legacy contamination, and landfill closure/deletion pathways. Each case includes timeline markers, drivers of delay, health/environmental implications, community involvement signals, and remediation outcomes, with explicit notation where data are unavailable.

Outboard Marine Corp. Superfund Site and Waukegan Harbor

Why this site is a "delay and danger" archetype
The Waukegan Harbor context is a classic Great Lakes legacy contamination problem: polychlorinated biphenyls (PCBs) released from industrial activity contaminate sediments and biota, and the primary human exposure pathway is fish consumption. This produces a risk profile where the "danger" persists via bioaccumulation even when direct sediment contact is limited. (Illinois Department of Public Health, 2012).

Key timeline markers
Available sources support the following timeline anchors (not exhaustive):

- PCBs discovered near the facility in the 1970s (reported in official narrative sources). (U.S. Environmental Protection Agency, 1984/NEPIS record; Illinois Department of Public Health, 2012).
- Public health assessment activity: Illinois public health partners prepared an initial public health assessment in 1989 and a final assessment in 1994 under cooperative arrangements. (Illinois Department of Public Health, 2014).
- Sediment dredging (major modern phase): Environmental dredging began September 26, 2012; environmental dredging completed July 8, 2013, followed by navigational dredging leveraging Great Lakes funding on a Superfund contract; dredged sediments were processed and placed in an on-site consolidation facility. (U.S. Environmental Protection Agency, 2014; U.S. Environmental Protection Agency, 2017).

These markers show that Waukegan's most consequential remedy actions span decades, with a modern intensive construction window (~285 days for the 2012–2013

environmental dredging phase) nested within a far longer lifecycle of assessment, remedy evolution, and monitoring. (U.S. Environmental Protection Agency, 2014).

VIII. Causes of delay

The Waukegan case exhibits several delay mechanisms typical of sediment sites:

- Technical complexity and remedy verification: Sediment dredging must meet cleanup targets while managing resuspension, disposal, and long-term recovery. National Academies work on dredging megasites emphasizes the challenge of meeting both short-term and long-term goals, suggesting why sediment sites can require remedy adjustments and extended monitoring. (National Research Council, 2007).
- Multiple agencies and missions: The dredging narrative in EPA materials distinguishes "environmental dredging" from "navigational dredging" and references Great Lakes program funding, implying coordination across Superfund, navigation, and Great Lakes restoration priorities. (U.S. Environmental Protection Agency, 2014).
- Evolving understanding of exposure pathway: Public health documents focus on fish consumption as the only significant human exposure pathway, which means long-term fish monitoring and advisories become a chronic management task, not a one-time event. (Illinois Department of Public Health, 2012).

Health and environmental impacts
The 2012 health consultation prepared by Illinois public health partners emphasizes that contaminated sediments in Waukegan Harbor generally do not pose a direct contact hazard because they are covered by substantial water depth, but PCBs in fish remain the central public health concern. The document states the public health hazard conclusion for the site historically was tied to PCB exposure from consuming fish at concentrations that may cause adverse health effects, illustrating the "danger" persistence even when sediments are not directly accessed. (Illinois Department of Public Health, 2012).

Other consultations within the site complex discuss PCB movement and address specific site subareas, and note continued monitoring and fish advisory evaluation by Illinois programs—highlighting a long-term burden of risk management and community guidance. (Illinois Department of Public Health, 2007; Illinois Department of Public Health, 2014).

Community responses and public participation signals
While this report is not built on a comprehensive corpus of community meeting transcripts for Waukegan, the existence of recurring health consultations and references to fish advisories indicate sustained public-health communication needs. Federal Register deletion rules elsewhere show that EPA routinely uses public comment periods and local information repositories; in Waukegan's case, the persistence of fish advisories implies an enduring relationship between remedy performance and

community behavior (what fish to eat, how much, how to prepare). (Illinois Department of Public Health, 2012; 40 C.F.R. § 300.425, 2014).

Remediation outcomes
EPA documents describe dredging and capping strategies targeting PCB concentration thresholds and describe the physical handling and consolidation of dredged sediments. The reported completion of environmental dredging in July 2013 is a major milestone, but the structure of the problem implies continued monitoring and institutional controls. (U.S. Environmental Protection Agency, 2014; U.S. Environmental Protection Agency, 2017).

Sauget Area 2 Superfund Site

Why this site is a "delay and danger" archetype
The Sauget industrial corridor represents the multi-landfill, multi-operable-unit archetype: complex mixtures of contaminants, multiple disposal areas, groundwater migration to major rivers, and multi-party enforcement and engineering solutions such as barrier walls and extraction wells. These sites are delay-prone because remedy design must integrate hydrology, industrial legacy infrastructure, and PRP negotiations/enforcement.

Documented timeline markers and actions
A DOJ-published appendix describing the Sauget Area 2 context provides a timeline of investigations and remedy actions:

- 1999–2000: PRPs conducted extensive investigations of disposal areas and multiple media (groundwater, surface water, air, soil) under an administrative order with EPA and Illinois oversight. (U.S. Department of Justice, 2013).
- September 2002: EPA signed a Record of Decision for the groundwater operable unit (OU2), selecting an interim groundwater remedy to address contaminated groundwater release to the Mississippi River. (U.S. Department of Justice, 2013).
- October 2002: EPA issued a unilateral administrative order for remedial design and interim remedial action associated with the interim groundwater remedy, with major components including a barrier wall and groundwater recovery wells. (U.S. Department of Justice, 2013).

Health and environmental impacts
Illinois public health assessments for Sauget-related areas describe contaminant mixtures including VOCs, PCBs, nitrobenzenes, chlorinated solvent wastes, pesticides, PAHs, and metals. Such mixtures complicate exposure assessment and can extend the time needed to establish a stable conceptual site model. (Illinois Department of Public Health, 2004a).

The assessments also note site access characteristics (e.g., fencing, evidence of trespassing) and describe the landfill/industrial land-use context, underscoring pathways beyond worker exposure, including potential ecological exposure and

indirect human exposure through environmental media. (Illinois Department of Public Health, 2004a).

Causes of delay

Across the timeline described in the DOJ appendix, several delay drivers are visible:

- Enforcement and PRP coordination complexity: Extensive investigations conducted by PRPs under EPA/state oversight indicate a PRP-led complex that can be efficient when aligned but can also be slowed by disputes, sequencing constraints, and the need for enforceable instruments. (U.S. Department of Justice, 2013).
- Technical complexity of groundwater–river interaction: Selecting an interim groundwater remedy aimed at preventing contamination from reaching the Mississippi River suggests hydrologic complexity and potentially long performance-monitoring horizons. (U.S. Department of Justice, 2013).
- Multiple media and multiple areas: Public health documentation describing multiple sites/areas and contaminant suites supports the inference that the RI/FS and remedy selection process must address heterogeneous sources, which increases time and uncertainty. (Illinois Department of Public Health, 2004a).

Remediation outcomes

The DOJ appendix reflects progress in selecting an interim groundwater remedy and pursuing engineering controls (barrier wall, recovery wells) intended to limit contaminant migration. However, because the cited document is not a final "site deletion" notice and does not provide a deletion effective date, the "final status" of the site as of 2024 is unspecified in this report. (U.S. Department of Justice, 2013).

Kerr-McGee Sewage Treatment Plant Superfund Site

Why this site is a "delay and danger" archetype

This West Chicago case illustrates a radiological/historic industrial contamination archetype where sediments and floodplain deposits reflect long-term legacy waste handling. Such sites often feature complex land-use constraints, specialized technical standards, and heightened public concern, which can lengthen the assessment and cleanup process.

Key timeline markers from federal rulemaking

The Federal Register deletion materials provide unusually clear listing timeline data:

- Proposed to the NPL: October 15, 1984
- Final NPL listing: August 30, 1990
- Direct final deletion effective: April 22, 2013 (unless adverse comments)

("Deletion of the Kerr-McGee (Sewage Treatment Plant) Superfund Site," Environmental Protection Agency, 2013).

From an efficiency standpoint, the ~22.6-year duration from final listing to deletion underscores how long "closure" can take even when a site is ultimately deleted. It also implies a large "tail" of oversight and monitoring. (Environmental Protection Agency, 2013).

Causes of delay
The deletion notice describes historical operations, transport and deposition of wastes into downstream sediments and floodplain soils, and a long arc of cleanup actions. While the rule is not a full project management narrative, the multi-decade span suggests accumulated delay drivers such as: complex characterization of contamination distribution, multiple decision documents over time, and the need to satisfy deletion criteria including state concurrence and public process steps. (Environmental Protection Agency, 2013; 40 C.F.R. § 300.425, 2014).

Community and governance signals
Federal Register deletion rules consistently describe public comment periods and state concurrence as prerequisites for deletion actions. The Kerr-McGee STP deletion notice fits that pattern, reinforcing that public consultation and state concurrence—themselves essential for legitimacy—are also schedule steps that require time and coordination. (Environmental Protection Agency, 2013; 40 C.F.R. § 300.425, 2014).

Beloit Corporation Superfund Site

Why this site is a "delay and danger" archetype
Beloit illustrates a groundwater contamination case with direct implications for private drinking water wells, making it a strong example of delay risk with immediate human exposure implications. It also illustrates partial deletion as a tool for "incremental closure."

Key timeline markers and exposure signals
The partial deletion rule provides a detailed historical sketch:

- Illinois investigators sampled residential wells in 1986; 16 of 55 sampled wells were contaminated, with the source attributed to the Beloit facility. (Environmental Protection Agency, 2018).
- Proposed to the NPL: June 24, 1988
- Final NPL listing: August 30, 1990
- Partial deletion (Research Center Property) effective: September 14, 2018
- (Environmental Protection Agency, 2018).

This implies a ~28-year span from final listing to partial deletion for one portion of the site, again highlighting the long horizon of groundwater-driven remediation. (Environmental Protection Agency, 2018).

Causes of delay
The rule describes changing solvent use practices across decades, multi-party landownership and redevelopment, and long-term groundwater remedies (including extraction and treatment). Such characteristics are strongly associated with long

cleanup durations in academic literature focused on Superfund cleanup time drivers, including the role of site complexity and neighborhood factors. (Burda & Harding, 2014; Environmental Protection Agency, 2018).

The partial deletion itself reflects an efficiency tactic: separating a property segment that meets criteria from the remaining portion still requiring management. This "segmentation" can improve economic reuse and reduce unnecessary regulatory burden for parts of a site, even while the overall site remains under long-term remedy obligations. (Environmental Protection Agency, 2018).

Health/environmental impacts and community implications
Because the contamination affected private wells, the primary "danger" dimension includes household drinking water exposure concerns and the associated demand for rapid mitigation (alternative water, well closures, plume management). While the partial deletion rule does not function as a health assessment, the narrative of contaminated residential wells signals why time-to-interim-protection is critical for efficiency assessment. (Environmental Protection Agency, 2018).

IX. DuPage County Landfill/Blackwell Forest Superfund Site and Belvidere Municipal Landfill Superfund Site

These two landfill-focused cases are used to illustrate the "deletion pathway" and the role of close-out documentation.

DuPage County Landfill/Blackwell Forest
A 2020 direct final deletion rule states deletion was taken with state concurrence because all appropriate response actions under CERCLA, other than operation and maintenance, monitoring, and five-year reviews, were completed, and sets the deletion effective date as September 8, 2020 absent adverse comments. (Environmental Protection Agency, 2020).

This illustrates an efficiency reality: even after major actions are complete, the remedy may require continuing O&M, monitoring, and five-year review cycles, which continue to consume institutional and financial capacity. (Environmental Protection Agency, 2020; 40 C.F.R. § 300.425, 2014).

Belvidere Municipal Landfill
The 2014 direct final deletion rule explains that a Final Close-Out Report was completed on February 6, 2014 and that the deletion would be effective February 9, 2015 absent adverse comments. (Environmental Protection Agency, 2014).

This case is a useful administrative example of how "paper closure" and deletion timelines can lag behind technical completion, with about a year between the close-out report and deletion effective date. That lag is partly structural, reflecting required public process and effective-date mechanics. (Environmental Protection Agency, 2014).

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X. Delay Drivers and Efficiency Analysis

Comparative site metrics table

The table below consolidates key metrics and delay drivers for the five case studies. Dates are limited to those explicitly supported by the cited sources; where not supported within the allowed timeframe, the entry is marked unspecified.

Site	Contaminant/media focus	Key exposure concern	Major decision/remedy marker(s)	Major construction marker(s)	Deletion/partial deletion status (effective date)	Dominant delay drivers (evidence-informed)
Outboard Marine Corp. / Waukegan Harbor	PCBs; sediment/fish bioaccumulation	Fish consumption pathway; long-term advisories (Illinois Department of Public Health, 2012).	ROD date(s) **unspecified**; ROD amendment referenced in EPA materials (U.S. Environmental Protection Agency, 2017).	Environmental dredging 2012-09-26 to 2013-07-08; consolidation facility disposal (U.S. Environmental Protection Agency, 2014).	NPL deletion status **unspecified** (not supported by deletion rule in sources ≤2024)	Sediment technical complexity; multi-agency coordination; long verification and monitoring horizons (National Research Council, 2007; U.S. Environmental Protection Agency, 2014).
Sauget Area 2	Mixed industrial waste; groundwater and landfill areas	Multi-media exposures; mixture of VOCs/PCBs/PAHs/metals described (Illinois Department of Public	Interim groundwater ROD (OU2) signed Sept 2002; UAO Oct 2002	Barrier wall and recovery wells (interim remedy components) (U.S. Department of	Deletion status **unspecified**	Multiple PRPs/enforcement instruments; groundwater–river technical complexity; multiple disposal

Site	Contaminant/media focus	Key exposure concern	Major decision/remedy marker(s)	Major construction marker(s)	Deletion/partial deletion status (effective date)	Dominant delay drivers (evidence-informed)
		Health, 2004a).	(U.S. Department of Justice, 2013).	Justice, 2013).		areas (U.S. Department of Justice, 2013).
Kerr-McGee (Sewage Treatment Plant), West Chicago	Legacy industrial/radiological deposition in sediments/floodplain	Community concern around legacy contamination (context in rule)	Proposed NPL 1984-10-15; Final NPL 1990-08-30 (Environmental Protection Agency, 2013).	**Unspecified** (not detailed in extracted rule text)	Deleted; effective 2013-04-22 (Environmental Protection Agency, 2013).	Multi-decade cleanup and administrative closure; state concurrence + public process; technical complexity implied by historic contamination narrative (Environmental Protection Agency, 2013; 40 C.F.R. § 300.425, 2014).
Beloit Corporation, Rockton	Groundwater contamination from solvent use	Private wells contamination (16/55 wells in 1986) (Environmental Protection	Proposed NPL 1988-06-24; Final NPL 1990-08-30	Groundwater extraction/treatment system referenced; specifics	Partial deletion of Research Center Property; effecti	Long groundwater remediation horizons; segmented property ownership/redevelopme

Site	Contaminant/media focus	Key exposure concern	Major decision/remedy marker(s)	Major construction marker(s)	Deletion/partial deletion status (effective date)	Dominant delay drivers (evidence-informed)
		Agency, 2018).	(Environmental Protection Agency, 2018).	**unspecified**	ve 2018-09-14 (Environmental Protection Agency, 2018).	nt; institutional control and monitoring needs; multi-decade duration consistent with cleanup duration literature (Burda & Harding, 2014).
DuPage County Landfill /Blackwell Forest, Warrenville	Landfill remedy + long-term monitoring	Exposure control via engineered systems and O&M	**Unspecified**	**Unspecified**	Deleted; effective 2020-09-08 (Environmental Protection Agency, 2020).	Administrative closure steps; continuing O&M/monitoring/five-year reviews; state concurrence and public process (Environmental Protection Agency, 2020; 40 C.F.R. § 300.425, 2014).

XI. Quantitative categorization of delay drivers

Because portfolio-wide Illinois data are incomplete in the pre-2024 public source set used here, the quantitative analysis focuses on categorizing delay drivers across case studies and identifying which drivers are structural (likely to recur) versus site-contingent (unique shocks). The categories below reflect Superfund's regulatory design and are supported by case documentation and the regulatory framework.

Funding and staffing capacity constraints
While detailed Illinois staffing numbers are not provided in the cited site documents, federal budget materials indicate that Superfund program resourcing is an explicit policy concern and that trust-fund revenue and appropriations influence available funds. Capacity constraints create systemic delays via slower contract procurement, fewer simultaneous remedial actions, and longer review cycles for design documents. (Office of Management and Budget, 2025).

Legal and enforcement transaction time
PRP-led investigations and unilateral administrative orders demonstrate the enforcement-heavy path: extensive studies and negotiated or ordered actions can take years, especially in multi-party sites. Sauget documents explicitly show formal instruments and sequencing (investigations → ROD → UAO) and illustrate how enforcing interim remedies and moving to later phases can be transaction-intensive. (U.S. Department of Justice, 2013).

Technical complexity and remedy uncertainty
Sediment sites and groundwater–river interaction sites embed uncertainty in transport, fate, and remedy effectiveness. The NRC's megasite dredging analysis underscores why verifying cleanup achievement can take years, and Waukegan's dredging narrative illustrates the operational complexity of environmental dredging, disposal consolidation, and interface with navigational dredging. (National Research Council, 2007; U.S. Environmental Protection Agency, 2014).

Interagency coordination and overlapping missions
Waukegan's distinction between environmental and navigational dredging, and the reference to Great Lakes program funding, implies that Superfund work can be interdependent with other federal missions (navigation, ecological restoration). Such interdependence can increase coordination time but may also provide co-funding opportunities that improve feasibility. (U.S. Environmental Protection Agency, 2014).

Community involvement and risk communication
Public comment periods, state concurrence requirements, and information repository requirements are embedded in deletion and listing processes. While these mechanisms can extend timelines, they are core to legitimacy and can prevent later litigation-driven delays by creating a defensible administrative record. Additionally, health consultations regarding fish advisories show how risk communication is itself an ongoing "workstream" that the program must support. (40 C.F.R. § 300.425, 2014; Illinois Department of Public Health, 2012).

Interpreting the academic literature on cleanup durations for Illinois relevance
Academic research has examined determinants of Superfund cleanup durations and equity dimensions. For example, Burda and Harding's work on cleanup durations and environmental justice argues that cleanup duration, conditional on site characteristics, should not systematically vary with neighborhood demographics—yet the overall framing highlights that durations are shaped by site characteristics and process features. For Illinois, this supports focusing on site type (sediment, groundwater) and process complexity (PRP structure) rather than treating long durations as anomalous. (Burda & Harding, 2014).

XII. Recommendations and Limitations

Policy and management recommendations
Reorient performance management toward "time-to-risk-reduction"
Illinois case studies show that deletion can lag far behind risk reduction and that some sites (especially sediment sites) continue to require long-term advisories and monitoring even after major construction is complete. EPA and Illinois partners should publish and manage against milestones for: (a) human exposure under control, (b) groundwater migration under control, and (c) completion of principal engineering works, rather than prioritizing deletion alone. This approach fits the NCP's emphasis on protectiveness and acknowledges the structural reality that deletion does not preclude future action. (40 C.F.R. § 300.425, 2014; Environmental Protection Agency, 2020).

Expand front-end scoping to reduce late-stage remedy changes
Complex sites often endure "information surprises" that force remedy amendments. For sediment sites, best practice includes early integration of dredging/capping feasibility with realistic disposal and resuspension management. For groundwater–river systems, early coupling of hydrogeologic models with interim containment decisions can reduce later redesign. Federal technical literature on sediment megasites supports the need for robust pre-design evaluation to avoid downstream delay. (National Research Council, 2007).

Strengthen interagency governance for Great Lakes sediment sites
Where Superfund sediment actions interact with navigational dredging and Great Lakes ecological restoration, Illinois sites would benefit from formal interagency governance structures with clear decision rights, schedule integration, and shared milestones. Waukegan's environmental vs navigational dredging sequencing shows how easily parallel missions can create schedule dependencies. (U.S. Environmental Protection Agency, 2014).

Reduce enforcement transaction costs through dispute-resolution and sequencing tools
Multi-PRP sites like Sauget can be slowed by allocation disputes and enforcement sequencing. EPA and Illinois partners should employ early neutral evaluation and structured dispute-resolution mechanisms for PRP disagreements, and use enforceable "minimum progress" schedules that prevent negotiation deadlocks from stalling necessary interim controls (e.g., groundwater containment). Such tools maintain the polluter-pays principle while reducing idle time. (U.S. Department of Justice, 2013).

Improve public transparency of schedule baselines and variance
A major barrier to rigorous efficiency evaluation is the scarcity of consistent public metrics on planned vs actual schedules and costs for Illinois sites. EPA's 2024 OIG work (though not Illinois-specific) highlights that delays can increase taxpayer costs and prolong exposure when schedules slip. Illinois Superfund reporting should therefore publish baseline schedules for major remedy components (design start, construction start, substantial completion) and periodic variance explanations in a standardized format. (EPA Office of Inspector General, 2024).

Integrate public health partners earlier and sustain risk communication capacity
Waukegan and Sauget health documents show that risk communication—especially regarding fish advisories—is an enduring workload. The program should treat public health consultation and risk messaging as a formal, funded workstream rather than an intermittent output, ensuring that health agencies can rapidly update advisories and communicate changes connected to remedy progress. (Illinois Department of Public Health, 2012; Illinois Department of Public Health, 2004a).

XIII. Limitations and data gaps

- Illinois-wide statistics (counts, averages, and cost overruns) are incomplete in this report. Within the constraint of sources up to 2024 and without a consolidated pre-2025 dataset snapshot providing consistent listing dates, construction completion dates, and cost baselines, several requested statewide metrics are unspecified. The report therefore emphasizes provable Federal Register milestone dates and site-specific action windows. (40 C.F.R. pt. 300 app. B, 2020; Environmental Protection Agency, 2024).
- Deletion and "cleanup complete" are not harmonized concepts. Deletion rules repeatedly clarify that deletion does not preclude future action and often assumes ongoing monitoring and five-year reviews. Therefore, treating "time to deletion" as "time to cleanup" can mislead. (40 C.F.R. § 300.425, 2014; Environmental Protection Agency, 2020).
- Cost accounting is uneven in publicly accessible narrative sources. Many accessible documents emphasize protectiveness rather than cost and schedule baselines. This is itself an efficiency problem because it reduces accountability and the ability of communities to understand tradeoffs. (EPA Office of Inspector General, 2024).
- Community response documentation is incomplete. While public comment and repository structures are documented in Federal Register notices, a comprehensive evaluation of community dynamics would require systematic analysis of meeting transcripts, local journalism, and docket submissions for each site. This report partially addresses community response through health consultation narratives and the structural public participation steps embedded in deletion and listing processes. (40 C.F.R. § 300.425, 2014; Illinois Department of Public Health, 2012).

XIV. Conclusion

The evaluation of the Superfund program in Illinois reveals a system that is not inherently inefficient, but rather structurally complex by design. The program's emphasis on scientific rigor, legal defensibility, and procedural fairness inevitably introduces multiple stages where progress can slow. As demonstrated across Illinois case studies, from sediment intensive sites like Waukegan Harbor to multi party industrial corridors such as Sauget, delays are often not accidental failures, but the predictable outcome of managing technical uncertainty, coordinating multiple stakeholders, and enforcing liability within a highly regulated framework .

However, these delays carry real and measurable consequences. Prolonged timelines extend exposure risks, sustain public health burdens such as fish consumption advisories, and contribute to long term community stress and economic underutilization of contaminated lands. The distinction between administrative milestones, particularly deletion from the National Priorities List, and actual risk reduction is critical. As this report shows, sites can remain hazardous or require ongoing monitoring even after formal completion, underscoring the need to redefine what constitutes meaningful program efficiency .

The Illinois evidence suggests that efficiency should not be judged solely by time to deletion, but rather by time to risk reduction. When viewed through this lens, opportunities for improvement become clearer. Strengthening early stage site characterization, reducing enforcement related transaction delays, improving interagency coordination especially for complex sediment and groundwater systems, and enhancing transparency in cost and schedule reporting can meaningfully shorten timelines without compromising the integrity of the program. Equally important is the sustained integration of public health communication, ensuring that communities are not left managing risk in the absence of clear and timely guidance.

Ultimately, the Superfund program operates at the intersection of environmental science, law, and public trust. Its challenge is not simply to clean up contamination, but to do so in a way that is credible, equitable, and protective over the long term. In Illinois, as elsewhere, the path forward lies in preserving the program's strengths while addressing the operational sources of delay that unnecessarily prolong danger.

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