

# *EPA's Perspective on Groundwater Cleanup*

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# Presentation Outline

- Importance of Groundwater
- Challenge of Groundwater Contamination
- Progress in Groundwater Cleanup
- Overview of Draft Groundwater Remedy Completion Strategy
- Next Steps

# Importance of Groundwater

- According to the National Ground Water Association approximately 44% of US residents depend on GW as source for drinking water and over 13 M households have a private wells
- Essential for municipal water supplies, agriculture, industry – the US economy
- Also recharges streams, lakes, estuaries and wetlands

# Importance of Groundwater: EPA's Perspective

- Protection of water, including groundwater, is one of Administrator McCarthy's 7 Priorities
- Agency's history includes 1984 Ground-Water Protection Strategy, 1989 NCP and 1991 Report demarking the EPA Ground Water Strategy for the 1990s
- 1991 Agency Ground Water Report Summary:
  - The overall goal of EPA's Ground-Water Policy is to prevent adverse effects to human health and the environment and to protect the environmental integrity of the nation's groundwater resources; **in determining appropriate prevention and protection strategies, EPA will also consider the use, value, and vulnerability of the resource, as well as social and economic values.**

# Superfund & Groundwater Cleanup Policy

- EPA's Superfund GW Cleanup Approach (simplified)
  - Prevention first
  - Prevent unacceptable exposures to humans and ecological receptors
  - Define and contain the plume – stop the migration
  - Restore the GW to beneficial use
  - If not technically practicable – Technical Impracticability Waiver
  - Adaptive Management – iterative approach

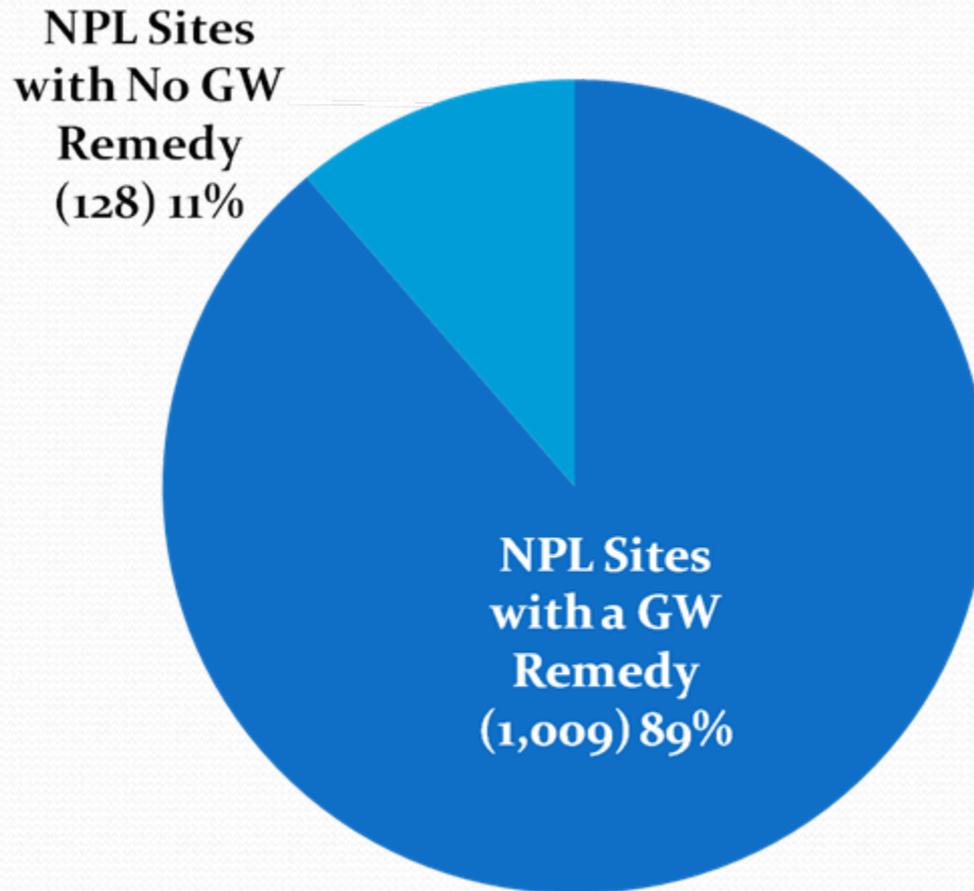
# Challenges of Groundwater Cleanup

- Technically challenging
  - Complex hydrogeologic setting
  - Fractured bedrock
  - Subsurface interactions, flow, direction
  - Climate impacts (droughts, floods, extraction)
- Long timeframes
- Costly to build and operate remediation systems

# Progress in Superfund Groundwater Cleanup

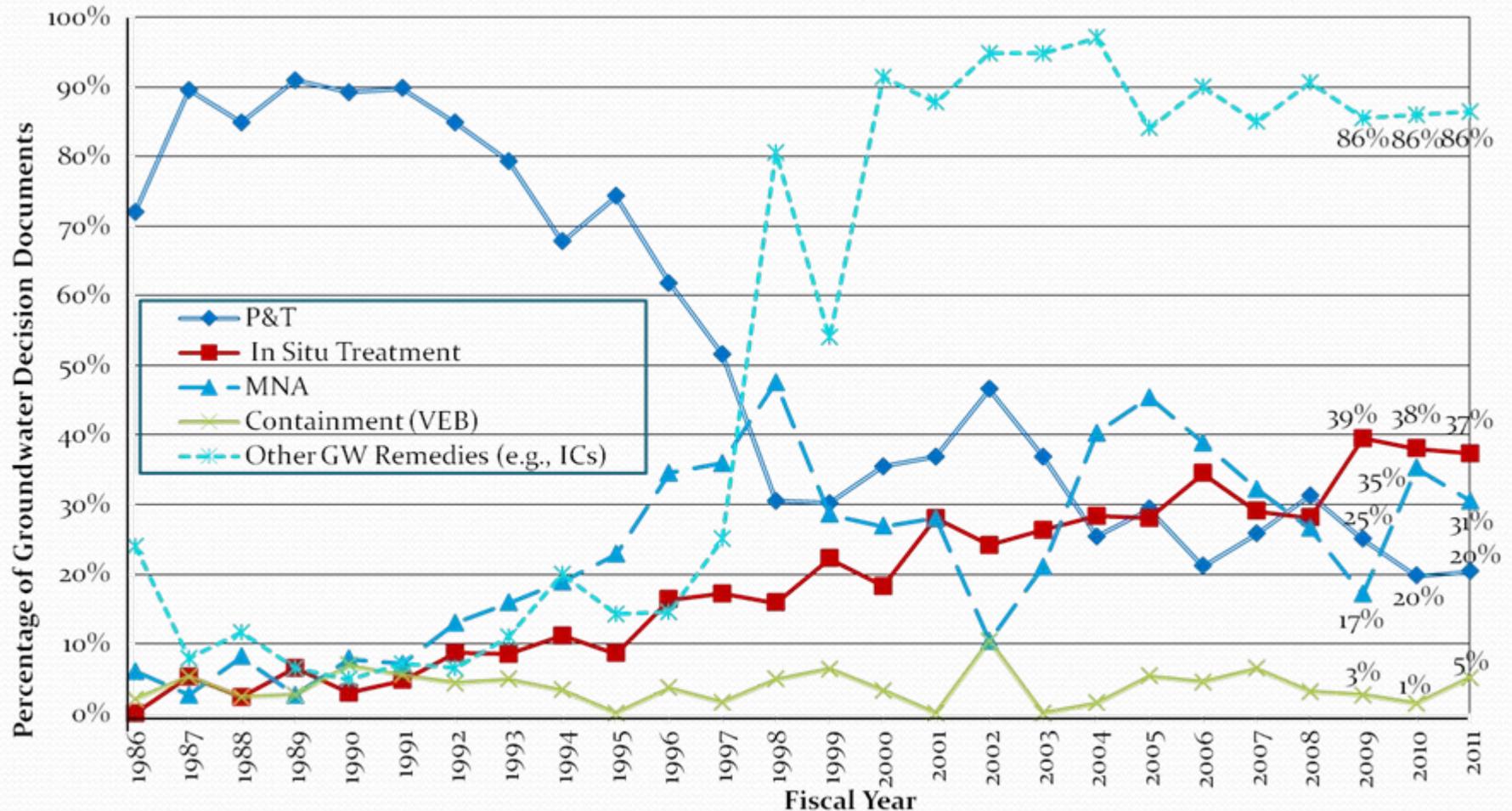
- While challenging, over the 3 decades of Superfund cleanups, progress has been made in cleaning up and restoring contaminated GW (see other slides)
- 90% of Superfund NPL sites have at least 1 GW remedy
- Mix of technical approaches have changed over time, but recently more stable
- More likely to see multiple technical approaches applied
- Many types of Superfund sites with GW remedies have been remediated to RAOs
- Where remedies have not achieved RAOs, significant reductions in concentrations have occurred

Fig. 1: Percentage of Final NPL Sites with Groundwater Remedies\*



\*Includes 1,137 NPL sites with at least one decision document. CERCLIS data as of December 2012. Some FY12 decision documents not included.

# Fig. 2: Trends in Superfund Groundwater Remedies Selection (1986–11)\*



\*Total Groundwater Decision Documents = 1,919

One or more remedy type may be selected for an operable unit or site

Draft Superfund Remedy Report; do not cite or quote: Final planned for 11/13 at [clu.in.org/asr](http://clu.in.org/asr)

## Fig. 3: Groundwater Remedy Types Recently Selected in Superfund\*

- ◆ Groundwater pump and treat still common, but we see more in situ treatment remedies
- ◆ Monitored natural attenuation is used either alone or in combination
- ◆ Concept of “adaptive management” gaining ground: Actively monitoring operating systems to determine optimal transition time and place between remedy components

Remedy Type and Technologies	Total (FY09–11)	Percent (FY09–11)
<b>Groundwater Pump and Treat</b>	<b>44</b>	<b>21%</b>
<b>In Situ Treatment of Groundwater</b>	<b>79</b>	<b>38%</b>
Bioremediation	49	24%
Chemical Treatment	28	14%
Air Sparging	12	6%
Permeable Reactive Barrier	8	4%
In-Well Air Stripping	2	1%
Multi-Phase Extraction	2	1%
<b>MNA of Groundwater</b>	<b>56</b>	<b>27%</b>
<b>Groundwater Containment</b>	<b>6</b>	<b>3%</b>
<b>Engineered (Constructed) Wetland</b>	<b>4</b>	<b>2%</b>
<b>Other Groundwater</b>	<b>177</b>	<b>86%</b>
Institutional Controls	173	84%
Alternative Water Supply	13	6%
Engineering Controls	2	1%

\*One or more remedy types may be selected for a site or operable unit

# 2011-2012 Optimization Observations and Needs

## • Technical

- Access to technical expertise to **regularly evaluate performance**
- **Maintain accurate, updated conceptual site models, understanding of data gaps**
- **Absence of clear objectives for performance monitoring and remedy outcome**
- **Improve data management; consistency**
- **Ensure clear articulation of remedial action objectives, exit strategies; revisit/ review throughout project life cycle**

## • Programmatic

- Better tracking of recommendations, cost savings
- Assess/address contractor incentives to reduce costs; improve competition
- **Incorporate more regular technical reviews throughout project life cycle**
- Maintain emphasis on independent third party perspective

# Overview of Draft Superfund Groundwater Remedy Completion Strategy

- Recognizes that federal agencies, states, and PRPs spend hundreds of millions of dollars annually on groundwater remedies
- Helps focus tight resources toward efficient and effective completion of groundwater remedies
- Flexible structure for development of site-specific completion strategy
- Useful at sites with a selected remedy, in RD/RA or long-term operation

# Overview of Draft GW Completion Strategy (cont.)

- Promotes stakeholder consensus on metrics to evaluate progress and plan for moving forward with groundwater remedies
- Does **not**
  - alter the Agency approach for setting remedial objectives or cleanup levels
  - change existing guidance or policy
  - address groundwater classifications or groundwater use designations
  - request state/tribes alter existing groundwater classification or use designation

# Next Steps

- Distribute the Draft Strategy to:
  - States
  - Tribes
  - Other Federal Agencies
  - PRPs
  - Environmental NGOs
  - Other Superfund Stakeholders
- Comments due December 20, 2013
- Finalize in 3-4 months
- **The documents are available at:**  
<http://epa.gov/superfund/gwcompletionstrategy>
- **Please send input via email to**  
[gwcompletionstrategy@epa.gov](mailto:gwcompletionstrategy@epa.gov) **by December 20, 2013**

# Some EPA Resources

- Key EPA Superfund Groundwater Policies at:  
<http://www.epa.gov/superfund/policy/remedy/pdfs/21z-1020-s.pdf>
- *Protecting the Nationals Ground Water: EPA's Strategy for the 1990, Publication 2 1Z-1020, office of the Administrator, July 1991.*  
<http://www.epa.gov/superfund/policy/remedy/pdfs/21z-1020-s.pdf>
- Remedy optimization:  
<http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm>  
<http://www.cluin.org/optimization/>

# Appendix

# *Protecting the Nation's Ground Water*

(sic)(pp. 6-7)

## **WITH RESPECT TO REMEDIATION:**

- **◆ Groundwater remediation activities must be prioritized to limit the risk of adverse effects to human health first and then to restore currently used and reasonably expected sources of drinking water and groundwater closely hydrologically connected to surface waters, whenever such restorations are practicable and attainable.**
- **Given the costs and technical limitations associated with ground-water cleanup, a framework should be established that ensures the environmental and public health benefit of each dollar spent is maximized. Thus, in making remediation decisions, EPA must take a realistic approach to restoration based upon actual and reasonably expected uses of the resource as well as social and economic values.**

# 1991 Groundwater Report (cont.)

- In an ideal world of unlimited funds, prioritization would be unnecessary. However, because resources do not permit all contamination to be addressed at once, the **need for prioritization must be recognized**.
- Moreover, given the expense and technical difficulties associated with ground-water remediation, EPA is emphasizing **early detection** and **monitoring** so that it can address the **appropriate steps to control** and **remediate** the risk of adverse effects to human health and the environment.

# 1991 Groundwater Report (cont.)

## **WITH RESPECT TO FEDERAL, STATE, AND LOCAL RESPONSIBILITIES :**

- ♦ The **primary responsibility** for coordinating and implementing groundwater protection programs has always been and **should continue to be vested with the States**. An effective groundwater protection program should link Federal, State, and local activities into a coherent and coordinated plan of action.
- EPA should continue to **improve coordination** of groundwater protection efforts within the Agency and with **other Federal agencies with groundwater responsibilities**.

# 1991 Groundwater Report (cont.)

- Since groundwater in any given area may be subject to contamination from a wide variety of point and non-point source activities, **coherence and coordination in any plan of action are vitally important.** EPA must ensure that the groundwater protection programs it implements under the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), the Safe Drinking Water Act (SDWA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the research programs that it funds under these Acts, are directed toward achieving the principles outlined above. In the design and timing of regulatory initiatives, **EPA will address the highest risks. In addition, the authority of each State to allocate water within its jurisdiction should not be abrogated.**

# 1991 Groundwater Report (cont.)

- Given the **uniquely local nature of ground-water pollution and use**, the States and localities must have **primary responsibility for assessing and prioritizing risks to the resource and for implementing programs to protect the resource** within each state so that it is available for various uses. However, where specific Federal responsibilities are provided for under the law, the requirements of the law must prevail.
- Not only must Federal, State, and local activities be linked to form a coherent plan of action; but air, water, and land practices, to the extent practicable, must also be examined in an integrated fashion to ensure protection of the ground-water resource.