

ARSENIC and LANDFILLS: Protecting Water Quality
October 3-4, 2006
Boston, MA

SESSION IV: Making and Managing Arsenic Bearing
Residuals from Water Supplies.

“Regulatory Management and Impacts on
Existing Waste Disposal Facilities”

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Summary of the Regulatory Management Status of ABRs

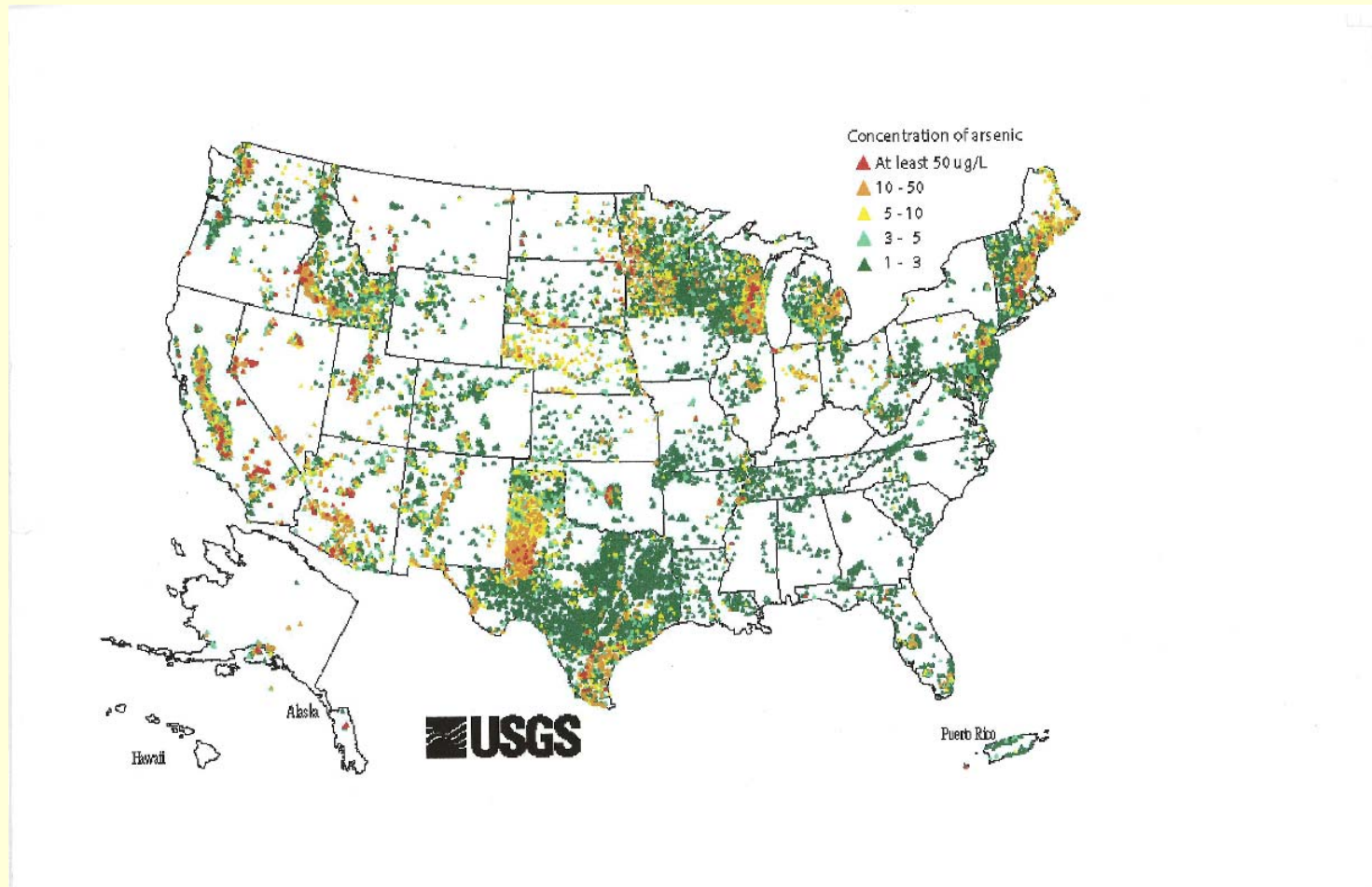
- 1. Implementation (1/23/06) of the Arsenic Drinking Water MCL of 10 ppb will result in generation of high arsenic concentration water treatment residuals.**
- 2. Although most of the MSW landfills in the U.S. will be new secure double lined landfills ABRs may also be disposed of in unlined C&D and industrial solid waste landfills.**
- 3. The landfill leachates discharged to sewers may require additional pretreatment of arsenic at the source and so introduce another residual ABR to the environment.**
- 4. Arsenic contamination from unlined landfills and waste sites, including Superfund NPL sites, will each have site-specific federal and/or state remediation plans.**

Summary of the Regulatory Management Status of ABRs

- 5. Arsenic contamination of the groundwater at unlined waste sites and landfills can occur from the leaching of waste within the landfill and/or geochemical mobilization of naturally occurring arsenic in the native soils and bedrock.**
- 6. The backwash from ion exchange (IX) and reverse osmosis (RO) treatment units will be discharged directly to septic systems and sewers increasing the ABR of these wastewaters.**
- 7. The NPDES surface water discharge limits for arsenic can be very low, depending on the water body, and difficult for the receiving sewage treatment plant to meet.**
- 8. Most septic tank pumpings (septage) and bio-solids, or their composts, are disposed of by agricultural land application. An increase in the arsenic content could preclude such utilization.**

The Distribution of Arsenic in U.S. Groundwater

“How do we Meet the MCL Compliance Level of 10 mg/l ?”



Compliance Strategies

- **TREATMENT AVOIDANCE**

- Blending

- **WELL HEAD TREATMENT (Central Treatment Plants)**

- Full or partial stream

- **POINT-OF-USE TREATMENT (sinks, shower, etc.)**

- **POINT OF ENTRY TREATMENT (home or building)**

“How is Arsenic Removed from Water? What are the Residuals?”

- **Precipitation/Filtration (Solid ABR)**
- **Adsorption (Solid ABR)**
- **Ion Exchange (Varies)**
 - Disposable iron impregnated IX resins
 - Solid ABR
 - Similar to Iron Based Media
 - Regenerable IX resins (anionic)
 - Wastewater ABR
 - Creates small amount of liquid and solid wastes
 - Highly automated
- **Reverse Osmosis (Wastewater ABR)**

Types of Treatment Units

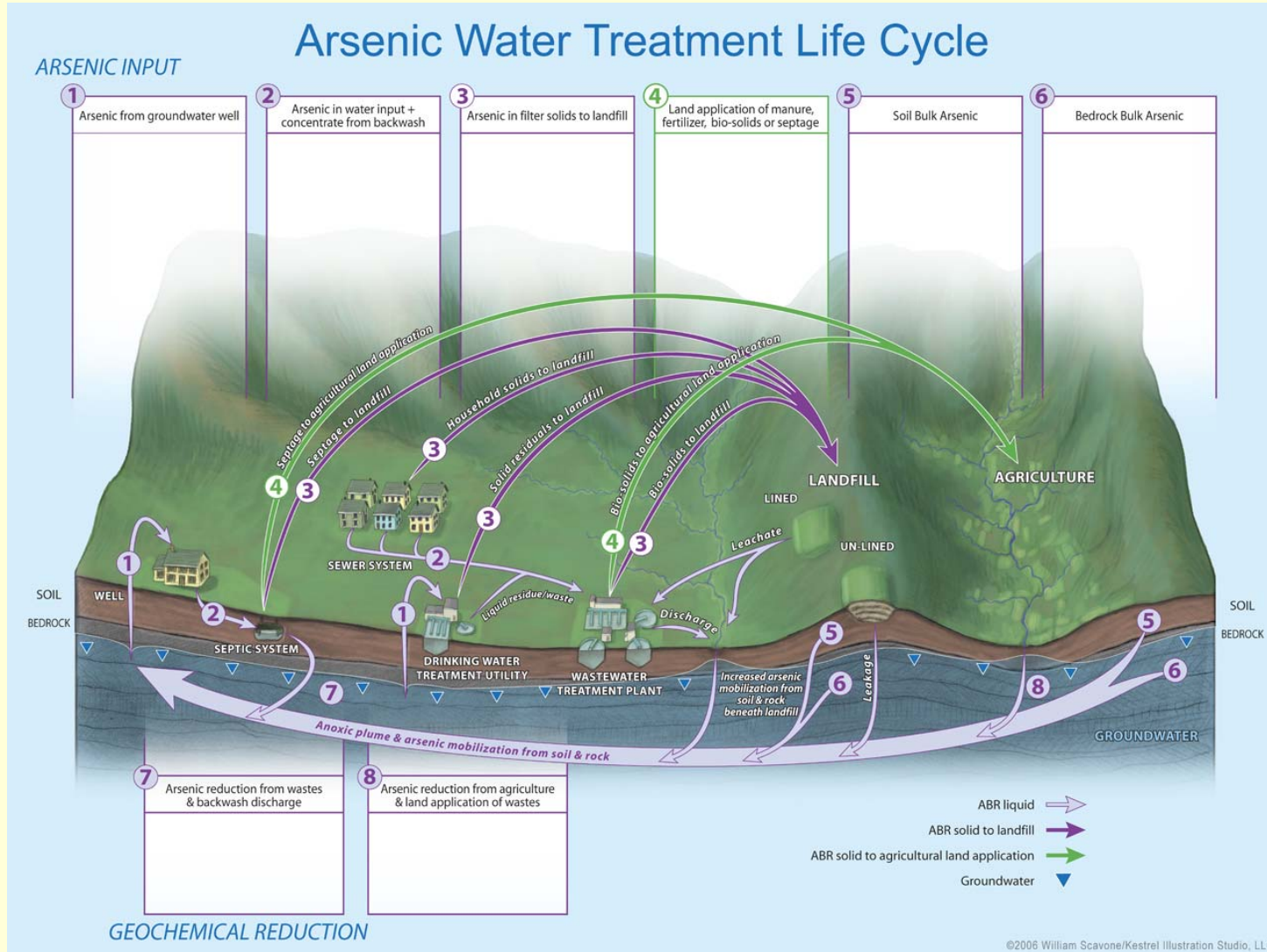


Point-of-Service Unit
Home, school, office, etc.



Central Water Treatment Plant

ARSENIC TREATMENT RESIDUALS LIFE CYCLE



EXISTING REGULATORY CONTROLS FOR THE DISPOAL OF ABR FROM ARSENIC WATER TREATMENT UNITS (WASTE WATERS)

1. Wastewater ABRs

a. GENERATOR OF ABR

- Local Sewer Ordinance
- Local / State Septic Codes

b. RECEIVING FACILITY FOR DISPOSAL OF ABR

(Sewage Treatment Plants and Sludge Handling Facilities)

- Federal NPDES Surface Water Discharge Permit
- Federal Industrial Wastewater Pretreatment Program (40 CFR 403)
- State Surface Water Discharge Permit
- Federal Bio-Solids Rule (40 CFR Part 503) Land Application
- State Bio-solids Rules
- State / Local Septage Rules

EXISTING REGULATORY CONTROLS FOR THE DISPOSAL OF ABR FROM ARSENIC WATER TREATMENT UNITS (SOLIDS)

2. ABR Solids (including bulked liquids)

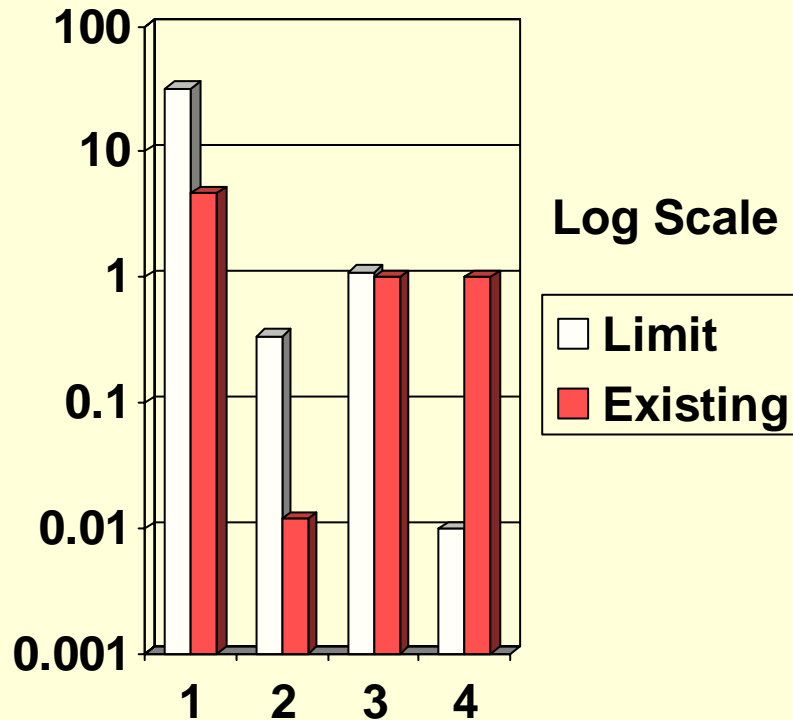
a. GENERATOR OF ABR

- State / Federal Hazardous Waste Rule
- State / Federal Transport Rules
- State Solid Waste Rules

b. RECEIVING FACILITY FOR DISPOSAL OF ABR (Landfills, bulked liquids and Leachate)

- Federal MSW Landfill Rules (40 CFR Part 258)
- Federal General Solid Waste Facility Rules, including Landfills (40 CFR Part 257)
- Federal Industrial Wastewater Pretreatment Programs
- State Groundwater Protection Rules
- Local Sewer Ordinance (Leachate)
- State / Local / Federal Septage, Bio-Solids and Leachate Transporter Rules
- Bulked liquids for direct disposal at a landfill.

Typical Values of Arsenic Assimilative Capacity Limits versus Disposal Options in New Hampshire



1 – Bio-solids and septage applied to agricultural land in New Hampshire. Limit – 32 mg/kg (dry wt); Avg. Bio-solids: 4.3 mg/kg; Avg. Septage: 4.7 mg/kg.

2 – NPDES Surface Water Discharge: varies .018 to 340 ug/l. (New Rule)

3 – Landfill Leachate: typical sewer ordinance limit (proposed): .54 to 1.1 mg/l. Avg. Landfill Leachate: 0.7 to 1.9 mg/l.

4 – Groundwater: Ambient GW Quality Standard - .010 mg/l. Avg Landfill Leachate: 0.7 to 1.0 mg/l/

Summary

- 1. Arsenic Bearing Residuals (ABR) from the removal of arsenic from drinking water will result in a wide array of impacts on disposal facilities and assimilative capacity in the environment.**
- 2. The most significant impacts appear to be on landfill leachate which has low limits for discharge to sewer and even lower limits for NPDES surface water discharges. Arsenic is an EPA Pollutant of Concern for discharge to a sewer system.**
- 3. The direct leakage of leachate from unlined landfills and waste sites to the groundwater far exceeds State ambient groundwater quality standards.**
- 4. Research is needed in the area of ABR arsenic stabilization and fixation to minimize arsenic leaching when in the landfill environment.**
- 5. Studies of existing and simulated landfills are needed to define arsenic mobilization in MSW, C&D and Industrial solid waste landfill environments.**