

## **Research Priorities**

**Inorganic sorbents based on other elements**

**Analytical method for process control**

**Engineering methods for insitu immobilization**

**Hybrid technologies**

**Chelation/Membranes**

**Nanoporous Materials**

**Ion Exchange Membranes**

**Minimizing the effect of other ions (silicate, phosphates, pH, ...)**

**Residual extraction recovery**

**Removing As(III)**

**Anion binding/chelating resins**

**Delivery/scaling/engineering**

**Mobilization of As in groundwater (ASR conditions)**

# **Recommendation**

**RFP should allow exploratory research**

**\* Specify broad area – allow researcher to define approach**

# Research Topics

Arsenic

## Topic #1: Arsenic Residuals

1. **Residual Stabilization:** Investigate methods for stabilizing arsenic in spent media, liquid or solid waste generated during arsenic treatment.
2. **Arsenic Extraction from Residuals:** Investigate methods for removing arsenic from liquid or solid waste generated during arsenic treatment to reduce volume, hazardous characteristics, and potentially generate beneficial use (e.g, extraction of arsenic for commercial use, manufacturing of bricks, pavement material, maximize water recovery from residuals).
3. **Long Term Stabilization of Disposed Residual:** Investigate geochemical transformation that may release or immobilize arsenic in various disposal conditions – landfill, monofill, and deep well injection of brines.
4. **POU Residuals:** Characterize/investigate disposal options for wastes generated from POU systems.

## Topic #2: Non-treatment Alternatives for Arsenic Mitigation

1. **Well Modification and Rehabilitation:** Methods for sampling wells to determine the concentration of arsenic and other co-occurring ions as a function of depth. Methods for testing wells to determine yield as a function of depth. This should also include suggested methods to screen off layers both internal to the wells as wells as outside the well casing to avoid migration of water with higher arsenic concentrations.
2. **Blending for Arsenic Rule Compliance:** Framework and guidelines for blending of waters with higher and lower arsenic concentration waters. Methods for ensuring appropriate blending boundaries are not exceeded should be outlined. Monitoring methods for arsenic and surrogate parameters should be suggested.

## Topic #2: Non-treatment Alternatives for Arsenic Mitigation

- 3. Minimization of Arsenic Mobilization in Distribution System:**  
Investigate arsenic deposition in distribution system pipelines in corrosion byproducts. Develop methods, procedures, and technologies for minimizing release of arsenic from the corrosion byproducts. Investigate the effects of changes in treatment technologies in the fate of deposited arsenic in corrosion byproducts. Develop guidelines for managing release of arsenic.

## Topic #3: In Situ Treatment for Arsenic

- **Aquifer Storage and Recovery:** Benefits of aquifer storage and recovery methods for mitigating arsenic within the aquifer. An understanding of how the characteristics of the aquifer enhance or minimize the benefits of ASR. The yield of low arsenic water from the ASR wells should be characterized.
- **Immobilization of Arsenic in Aquifer:** Investigate physical, chemical biological approaches for reducing aqueous arsenic concentrations in aquifers. Effects of these methods on aquifer's water production capacity need to be addressed (e.g., porosity, permeability). The effect of this method on the mobilization/immobilization of other chemical parameters need to be investigated.