PILOT SCALE DEMONSTRATION TECHNOLOGY
SELECTION CRITERIA
OCTOBER 2004

Overview:

Pilot scale evaluation of the treatment performance and cost of selected drinking water treatment technologies directed at meeting the new (effective January 2006) arsenic maximum contaminant level (MCL) of 10 ppb (0.01 mg/l). Pilot scale testing provides a cost effective method to optimize a water treatment methodology prior to full-scale implementation. The data collected from pilot scale demonstrations should allow for comparison of various treatment alternatives side by side to provide the water treatment decision makers information regarding cost and performance. Communities will be able to choose the optimum technology based on their own priorities and constraints.

Technologies will be selected based on information supplied by the vendor, third party evaluation data, and the results of independent bench-scale studies carried out by Sandia National Laboratories.

Pilot tests will run for approximately 3 – 12 months depending on site-specific conditions. Nominal flow rates will range from 1 – 5 gallons per minute (gpm). Up to four technologies will be tested side-by-side at each site.

Pilot Demonstration Technology Selection Criteria:

There are four areas of interest for selecting a technology for demonstration:

1. Performance;
2. Cost
3. Degree of complexity, and
4. Level of maturity of the technology (or Development Status)

1. Performance is a summary of the technology effectiveness as measured by the following items:
   - Arsenic levels in the treated effluent
   - Site-specific arsenic treatment capacity
   - Robustness of performance with respect to possible changes in:
     - pH of feed water;
     - presence of foulants such as Fe, Mn, silica, and organics;
     - levels of TDS;
     - levels of competing ions such as sulfate, fluoride, nitrate;
     - concentration of various metals and/or radionuclides;
   - Ability to scale-up
     - Provide full-scale quantities of material
     - waste handling issues
   - Residuals production & characteristics
     - Mass & volume of residuals
     - Characteristics of residuals that affect handling & disposal (TCLP, dewaterability, salt content, total As concentration, radioactivity, etc.)
   - Water consumption
   - Pre-/post-treatment requirements (e.g. pre-oxidation step)

- Intellectual property/patent issues
- Technology breadth (applicability to other sites)

2. Cost is measured by comparing the following cost items to a baseline:
   - Design/engineering
   - Initial Capital
     - Construction/installation
     - Land requirements
     - Infrastructure requirements (power, water, sewer)
   - Operation & Maintenance
     - Energy requirements
     - Chemical(s) usage
     - Monitoring requirements (frequent sampling vs. no sampling)
     - Predicted waste generation, treatment, and disposal
     - Water consumption
   - Any pre-/post- treatment requirements

3. Technology complexity
   - Operation & maintenance requirements
     - Level of automation
   - Skill level required by O & M personnel
     - Level of training
   - ES&H concerns
     - Materials handling
     - Safety (such as pressure, electrical, hydraulic, moving parts, etc.)
   - Treatment system size
     - Packaged system vs. new construction vs. add-on technology
     - Adaptability to existing systems

4. Level of Maturity of the Technology
   - How many plants have been installed?
     - How big?
     - What variations in water chemistry have been successfully treated?
   - Is the equipment mass-produced or custom designed/fabricated for each installation?
     - What is the lead-time for treatment system delivery?
   - What is the operational and performance record at different sites?