AWWARF AS Workshop

Utilities with resources (large, medium &small)

Issues & Challenges

- Technological
  - Consider exemption in technology selection process
  - No silver bullets / break through technologies
  - Focus on new research to get market rapidly e.g., media
  - ID technology application domain for specific areas,e.g., source chemistry.
  - On going epid studies on low arsenic effects in popn. (pilot community, cost vs. health effects.)

Issues & Challenges

- Administrative,Policy & Education
  - Education, training will assist regulatory approvals
  - New approach in state / local comfortable with treatment options.
  - Broader approach to meeting MCL, consider cultrural, economical & technical issues.
  - New Tech transfer interactive approach for training, facilitate acceptance.
  - Outreach must recognize limitations on funds availability (travel cultural by communities).
  - BMP or Compendium for all various options already available (performance vs. condition of application)
  - Include NWRA in tech transfer & demos

Technologies

- Non treatment alternatives
- Modification of existing systems (well screens, ASR).
- Broadly include stabilization, fate, long term stability of management of waste and co contaminants.
- Minimize liquid waste.
- Modifications of existing technologies:
  - Hydrodynamics of media (uniformity coefficient)
  - Modified activated carbon
  - Sulfide based media.
  - Extension of life of current media (optimum performance of additives).

Technologies 2

- Promote use of existing water chemistry, I.e., iron.
- Need real time arsenic detector – reliable, easy to use & maintain, simple.
- Consider detectors for As surrogates e.g., silica.
- Develop flexible treatment solutions to be adaptable to emerging technologies.
- Look for easily disposable media / cartridge that is affordable.
- Include pretreatment options such as silica, controlling redox, sand & acid species.

Technologies 3

- Treatment as part of the flow vs. total flow (technology vs. economics).
- ON –off cyclical operations.
- Examine affect of T and aging on technologies
  - Seasonal variances
  - Aging
  - Biogrowth
  - Indoor / outdoor
  - Performance in cold vs. warm.
- Look at series vs. parallel design, consider flexibility of future modifications.

Technology Gaps, Improvement Opportunities & Research

- Modification of surface charge on media.
- Evaluation of old media to design new media.
- Develop test protocol for media for use on-site by utilities.

Quick Wins

- Modification of existing technology and operational approach etc.
- Stabilization of residuals.
- Beneficial use / alternative disposable.
- New catalysts to enhance performance of coagulation etc.
- New solid catalyst to assist in pre-oxidation.
- Look at cross over technologies for small systems.

Group 2

Engineering /operations/automation

Innovative pH Control for Pre and Post Arsenic Treatment

Question: How to optimize performance of sorbent-based systems through pH control while minimizing handling of hazardous acid/base chemicals?

Innovative pH Control - **Objectives**

- Stable pH control
- Idiot proof
- Chemical safety
- Cost-effective
- No residual issues
- Dry chemicals

Innovative pH Control - **Strategies**

- Solid phase acid contactors
- Packaged CO_2/CO_2 stripper technology
- Integrated calcite contactor
- Integrated pH control media

Innovative Process Methods to Reduce Competitive Effects

Competitive Effects :Research Goal

- Develop innovative process methods to reduce competitive effects of groundwater solutes on arsenic removal in small-scale or large-scale treatment systems.

Competitive Effects: Scope

- Requirements of process:
  - Predictable performance, never reduce capacity of As-removal media or system, not complicate waste disposal process (significantly, adversely).
  - Compatible with existing As removal technologies; not appreciable increase costs of As removal process.

Competitive Effects: Strategy

- Describe level of improvement expected using the new process over baseline.
- Demonstrate in bench-scale studies using a natural water source.
- Focus on commonly-occurring competing solute(s) (e.g. silica, phosphate, vanadium, sulfate

Impact of Intermittent Operations on Arsenic Removal Technologies

Impact of Intermittent Operations on Arsenic Removal Technologies

- **Question:** What are the impacts on technology components and water quality when arsenic removal technologies are operated in an intermittent manner (variable on-off cycles, seasonal shut-downs. Etc)

Int. Operations: Objectives

- Groundwater systems often do not operate continuously. Technologies installed at these sites would be likely to experience variable periods of down time
- Research should examine the effects on technology components – resins, media, membranes, chemicalfeed systems, controls – under this operational scenario

Int. Operations: Objectives

- Specific questions about arsnic fate and technology performance response to the “resting” of the treatment system need to be addressed. Therefore, what effect does the extent of the shutdown period have on technology performance at start-up, and what procedures are recommended for utilities in operating the technology under short- (hours to days and longer-term (weeks to months) shut down conditions

Int. Operations: Strategies

- The water quality conditions associated with intermittent or extended shut down of technologies will be examined by the researchers. Specifically, problems with potential biological growth, arsenic release, release of other contaminants associated with the technology components, and the subsequent capacity issues related to media or resin life and performance will be identified. Solutions to these problems will be explored with recommendations provided by the researchers.

Int. Operations: Strategies

- The results will be described for each arsenic removal technology sufficiently matured to be used by utilities currently

Development of a Continuous On-Line Arsenic Monitor

Goal: Development of a low-cost continuous on-line monitor for process control on all types of arsenic removal technology

Scope:

- minimum detection limit of 1 to 2 ppb
- upper detection limit of 100 ppb
- output – electronic feedback to control system; digital readout

Strategy: Vendor-developed hardware