Arizona Arsenic Master Plan (AMP)

Safe Drinking Water Program

Arizona Department of Environmental Quality

Purpose of the AMP

- Now that the arsenic MCL has been settled, regulatory agencies are shifting their focus to implementation
- The AMP is:
  - Specifically targeted to small water systems
  - Focused on providing as much assistance as possible
  - Allowing compliance with the arsenic MCL to be affordable and attainable
- Format can be adapted to any contaminant of concern for a state or region

Characteristics of small water systems

- Small systems tend to be distribution only
- Operators in small systems have many jobs in addition to system operations
- Small systems do not have staff dedicated to:
  - Regulatory compliance
  - Rate structures and accounting
- Many have antiquated infrastucture
- Some may need assistance from the state

How the new MCL will impact small water systems

- Systems will need help from outside engineers or consultants
- Distribution systems will have to add treatment technologies for arsenic
  - New technology will cost $$
  - Operators will need treatment certification
  - Systems and operators will need training to implement new technology
- Infrastructure upgrades will be necessary
- Many do not have access to new technologies, process control information or technical advice
- Many systems face financial concerns

AMP Table of Contents

- Section I – Overview
- Section II – Compliance Options
- Section III – Funding
- Section IV – Technical Assistance

Section I – Overview

- Rule Summary
- Occurrence & Data Analysis
- Affected Water Systems
- ADEQ Implementation Strategy and Related Time Frames
  - Rapid Information Provider team
  - Mentoring program

Section I – Overview
Rule Summary

- An easy to understand summary of what is required of water systems and when
- A matrix for easy reference to requirements
- A listing of all CCR and PN requirements including applicability dates and required language

Section I – Overview
Occurrence & Data Analysis

- Master list of affected systems from the ADEQ database including:
  - System Id #, community served, sample date, results, county, population, EPDS
  - Median household income
  - Competing and driver data from ADEQ, USGS and State Land Department including pH, silica, phosphorus, sulfate, arsenic, nitrate
  - GIS analysis of affected system locations

Section II – Compliance Options

- Decision Tree of Options
- Pros/Cons of Options
- Development of general water quality profiles to reduce pilot testing costs and aide treatment selection
- Estimate of Options Cost
- Development of general design guidelines
- Discussion of Point of Use options

Section II – Compliance Options Regulatory Processes

- An analysis of existing regulatory processes
- Identification of modifications will allow greater ease of transactions for systems
  - Plan approval
  - Rate case approval
  - Surrogate approach to regulatory/financing requirements (e.g. NEPA, EIS, etc.)

Master Plan Output

Table 5.4: Summary of Lowest Cost and Second Lowest Cost for Impacted Small Water Systems Serving <10,000 Persons

System ID	Avg. Pop.	POE ID	Lowest Annualized Cost	Technology with Lowest Annualized Cost	Capital Cost for Lowest Cost Option	Annual O&M Costs for Lowest Cost Option	Second Lowest Annualized Cost	Technology with Second Lowest Annualized Cost	Capital Cost for Second Lowest Cost Option
01001	1000	001	$23,757	3a	$151,031	$10,590	$30,314	4a	$156,131
01004	4500	542	$41,009	3a	$190,362	$24,412	$56,637	4a*	$188,135
01004		755	$73,953	2a*	$232,116	$53,716	$73,953	2a*	$232,116
02005	3824	001	$29,799	1a	$188,221	$13,389	$32,538	2a	$139,918
02005		002	$33,948	3a	$213,767	$15,311	$43,592	4a	$207,181
02005		003	$35,340	3a	$213,767	$16,703	$45,913	4a	$207,181
02005		004	$39,052	3a	$213,767	$20,414	$52,102	4a	$207,181
02005		005	$47,403	3a	$213,767	$28,766	$66,027	4a	$207,181
02005		008	$29,799	1a	$188,221	$13,389	$32,538	2a	$139,918
02007	175		$20,612	1a	$145,410	$7,935	$20,661	2a	$110,534
02012	567	001	$61,499	3a	$282,005	$36,912	$85,490	4a	$262,708
02012		002	$38,050	3a	$190,362	$21,453	$51,760	4a	$188,135
02012		003	$52,958	3a	$259,094	$30,369	$72,565	4a	$244,065
02032	120	001	$23,953	3a	$145,176	$11,296	$30,777	4a	$151,367
02033	2500	002	$35,537	1b	$201,491	$17,971	$42,026	2b	$147,778

Technologies and Design

Technology with Lowest Annualized Cost
3a
3a
2a*
1a
3a
3a
3a
3a
1a

List of Treatment Options Evaluated

1a - Fe-AA adsorption with single column and direct pumping into the distribution system

1b - Fe-AA adsorption with single column, pumping into a storage tank and re-pumping into the distribution system

2a - Granular iron media adsorption with single column and direct pumping into the distribution system

2b - Granular iron media adsorption with single column, pumping into a storage tank and re-pumping into the distribution system

3a - Fe-AA adsorption with two columns in series, full-flow is treated, direct pumping into the distribution system

3b - Fe-AA adsorption with two columns in series, full flow is treated, pumping into existing storage tank and re-pumping into the distribution system

3c - Fe-AA adsorption with two columns in series, partial stream is treated, pumping into existing storage tank and re-pumping into the distribution system

3d - Fe-AA adsorption with two columns in series, partial stream is treated, pumping into new storage tank and re-pumping into the distribution system

Facility Layout and Criteria

1a - Direct pumping into the system under pressure without a storage tank at the POE site (adsorption media design criteria - 15 ppb influent and 5 ppb average effluent arsenic levels)

1b - Pumping into an existing on-site storage tank for subsequent repumping into the system (adsorption media design criteria - 15 ppb influent and 5 ppb average effluent arsenic levels). A lower pressure rating is used for this treatment system.

3a - For wells with >20 ppb arsenic, the full flow is treated as the well directly pumps into the system under pressure without storage at the POE site (adsorption media design criteria - 25 ppb influent and 10 ppb average effluent arsenic levels).

3b - For wells with >20 ppb arsenic, the full flow is treated as the well pumps into an existing on-site storage tank for subsequent repumping into the system (adsorption media design criteria - 25 ppb influent and 10 ppb average effluent arsenic levels).

3c - Partial stream treatment, where feasible (As <20 ppb), for wells pumping into an existing on-site storage tank for subsequent repumping into the system (adsorption media design criteria - 15 ppb influent and 5 ppb average effluent arsenic levels).

Section III – Funding

- Identification of all available funding sources
- Association of water systems and available funding sources
- Methodologies for determining debt service/revenues needed
- Funding gap analysis
- Analysis of feasibility for economies of scale approach for small systems

Section IV – Technical Assistance Providers

- Develop a matrix of all available technical assistance providers
- This will facilitate leveraging by listing:
  - Step-by-step instructions
  - Description of Non-treatment vs. Treatment options
  - Areas of expertise of each provider (e.g. design, operation, etc.)

Arsenic Master Plan Stakeholders

- The AMP stakeholder group is unique
  - Government
  - Environmental engineering & consulting firms
  - Consumer advocacy groups
  - Financial assistance providers
  - Non-profit water organizations
  - Water system owners and operators
- All have come together and lent their expertise to develop the AMP to ensure Arizona water systems have the best chance to comply with the arsenic regulation

AMP Schedule of final publication

- The AMP will be published in January 2003
- Final AMP will then be:
  - Mailed to targeted systems
  - Posted on ADEQ Web site