UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WSG 90
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MEMORANDUM

SUBJECT: Release of Final Alternative Technology Approval Protocol

FROM: Cynthia C. Dougherty
Director
Office of Ground Water
and Drinking Water

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Executive Director
Association of State
Drinking Water Administrators

TO: All Interested Parties

We are pleased to announce completion of the enclosed Stare Alternative Technology Approval Protocol dated June 1996. This protocol has been developed in a cooperative effort among EPA, ASDWA, state drinking water program personnel, industry representatives, and others with a stake in providing streamlined, consistent procedures for use by systems to facilitate stare acceptance of new drinking water treatment technologies.

As mentioned in the document's introduction, the generic protocol establishes a basic framework for approval of technologies. It is not meant to replace current state plan review and approval processes but sets a common protocol for the type of information to be submitted to states in order for new technologies to be considered for approval.

Tne intent of the protocol is to streamline the approval process and to improve the consistency of response across states by establishing minimum criteria required of all applicants. It is expected that the use of the protocol will decrease the need for pilot or demonstration projects over time. A key to this effort will be the development of an appropriate mechanism that states, water systems, and engineers can use to share data and information about treatment approvals and effectiveness.

If you have any questions regarding this document, please contact Vanessa Leiby or Bridget O'Grady of ASDWA at (202) 293-7655, Steve Clark of EPA Headquarters at (202) 260-7575, or Marc Parrotta of EPA Headquarters ac (202) 260-3035.

Enclosure

State Alternative Technology Approval Protocol

Introduction

The purpose of this document is to identify criteria and information required by states to approve alternative technologies for public water system compliance with drinking water regulations. The generic protocol establishes a basic framework for approval of technologies ranging from point-of-use to centralized treatment for water systems. This does not replace the current state plan approval process, nor does compliance with the protocol imply automatic approval of a given technology, but it sets a common protocol for the type of information required by the state to consider approval of alternative technologies (i.e., those that fall outside of the realm of state-identified conventional technologies). More specific criteria will be developed for each drinking water regulation for which alternative technologies may apply.

States typically take a conservative approach to plan review and approval, relying most often on well-proven, accepted technologies to ensure that the rule will be implemented effectively and that public health will be protected. The dilemma is how to obtain approval for new or alternative technologies in a state, and how to ensure that, to the greatest extent possible, approvals transfer from state to state without costly, time consuming, or redundant pilot studies or other requirements.

This protocol, which was developed by representatives from the states, United States Environmental Protection Agency (EPA), manufacturers, third party certifiers, and other interested parties attempts to provide general guidelines that will promote consistency among the states and let manufacturers, suppliers, consulting engineers, and system owners clearly know what kinds of data will be required before a technology can be approved.

Background

States regulate over 186,000 public water systems under the Safe Drinking Water Act (SDWA). Of this total, 56,747 (30%) are community (CWS), 23,639 (13%) are non-transient non-community (NTNC), and 106,438 (57%) are transient non-community (NCWS). Ninety-six percent of these systems are small (serving less than 3,300 persons). Eighty-five percent of these small systems are considered very small, serving less than 500 persons (30% community and NTNC water systems and 55% NCWS systems.[1]) Although these systems serve a relatively small percentage of the total number of persons served by public water systems, they are responsible for over 90 percent of the violations. While the majority of these violations are for failure to monitor, small systems are increasingly faced with the need to install treatment technologies. As more drinking water regulations have been promulgated, the requirements have become much more complex, requiring labor and resource intensive activities in order to comply.

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[1] U.S. Environmental Protection Agency, FY-94 National Compliance Report

Small systems are typically characterized by having poor economies of scale, inadequate training on regulations, lack of certified operators, and a general inability to comply. A relatively recent regulation, the Surface Water Treatment Rule (SWTR), has brought home this problem very clearly. The standard technology for compliance with the SWTR is filtration treatment, including conventional filtration, direct filtration, diatomaceous earth, and slow sand filtration. Most small systems, however, are incapable of designing, constructing, funding, operating and maintainin complex filtration facilities.

States, EPA, and manufacturers have for several years attempted to promote the development and approval of "alternative technologies," particularly for small systems, that will meet the requirements, be affordable to the customers of the system, and be easy to operate and maintain.

Problem Identification

The first step in the approval process is to identify the problem for which a technical solution is sought. It may be a need to meet the SWTR or meet a specific drinking water standard such as arsenic. When evaluating the system's needs, it is important to look not only at the immediate short-term needs, but also at future needs. This would include the ease of adding additional treatment to the current treatment train. It is also important that the state be sure that a technology installed today will not have a negative impact on other current drinking water regulations, permitting requirements, or regulations that will be proposed in the near future including regulations related to waste disposal.

Determination of Available Alternatives

All available alternatives including reconstruction of existing wells, locating new water sources, connection to other existing systems, or treatment should be evaluated. Where alternative treatment is selected as an option, this protocol should be used.

Compatibility with Existing Facilities

The submittal should address the following: source of water (groundwater or surface water); water quality characteristics; pumping capacity of source; backwashing capacity; piping materials; storage facilities (elevated, ground, hydro-pneumatic tank); power availability; existing treatment units; location of facilities (indoors/outdoors, above grade, accessible by foot or vehicle); waste disposal facilities; existing monitoring and reporting; other water quality concerns; and drawings showing existing and proposed facilities.

Determination of Technology Efficacy

Once a system's problems are identified, the state will determine whether a proposed technology could be an alternative solution to the system's problems based on information provided by the applicant. In order for the states to accomplish this task, the water system should supply the following information and data to the state:

1) Objective and verifiable test data that support the treatment system performance claims. The information should be sufficient to determine the pathogen removal credits (i.e., virus, giardia), if applicable, compliance with the SDWA Maximum Contaminant Level(s) of concern, appropriate performance standards, and monitoring frequency for the technology. This information can be obtained from the following sources (in order of preference):

   - Accredited third party verifier or certifier
   - Recognized third party independent test data
   - Pilot study data
   - Approval from other states, countries, or Federal agencies
   - Manufacturers test data

2) Product and Process Technical Information

   Manufacturers' technical information, specifications, and data on equipment/process must be submitted. This includes (but is not limited to):

   - Shop drawings
   - Process schematics and descriptions
   - Power requirements
   - Capacity and dimensional data
   - Required auxiliary equipment
   - Information on conditions for and limitations on process applicability
   - Quality control processes

3) Verification of efficacy under site-specific conditions

   - Source water quality, considering seasonal variation
   - Finished water quality requirements
   - Finished water quality produced, including consistency
   - Design flow rates
   - Useful life of treatment unit
   - External environmental issues
   - Storage requirements, space requirements, accessibility
   - Other treatment needs such as pre or post-treatment
   - Range of field extremes
   - Worst case/best case adaptability to various raw water qualities
   - Differential pressure conditions (i.e., 10 psi v. 100 psi)
   - Reliability of treatment facilities including redundancy of equipment if necessary

- Operational conditions (e.g., stopping and starting)

4) Indication of Availability of Technical Support, such as:

- Water treatment system manufacturer or supplier support
- Water treatment system supplier qualifications
- Operator training mechanism
- Laboratory services
- Independent engineering consultant

Materials Safety

It is important that the components of the product or technology meet basic materials safety standards to ensure that they do not introduce harmful chemicals or leachates into the finished water. This may be accomplished in the following manner:

1) Materials safety verification (in order of preference):

- Compliance with ANSI/NSF standards
- Compliance with appropriate Food and Drug Administration Title 21 Code of Federal Regulations for Food Additives

Operational Efficacy And Cost-Effectiveness

The state and the supplier will want to know if operational and maintenance requirements meet the needs and expertise of the system operator or owner and if the technology is cost-effective. While overall costs of the technology and its impact on the water supplier and the consumer are important, affordability may or may not be a prerequisite to approving the technology or issuing permits. In some cases, a more expensive technology may be more appropriate in the long run if it is easier to operate and has a longer life expectancy or lower operation and maintenance (O&M) costs. The following information will be submitted:

1) Operation and maintenance requirements

- What control systems does the technology have to eliminate operator error, especially if the system is highly automated? Is system operator-friendly?
- Reliability features including unit alarms, automatic shutdown, manual operation in the event of automated system failure, etc.
- Operator expertise required
- Waste disposal needs
- Pretreatment requirements
- Cherilical feed requirements
- Basic O&M needs - chemicals, spare parts, labor, instrumentation, energy requirements, ongoing monitoring

- Replacement and maintenance schedule and availability and cost of parts and servicing instrumentation and controls
- Periodic cleaning/down time
- Backwashing (frequency, disposal, storage, filter to waste capability)
- Auxiliary needs (e.g., buildings, roads, re-generate media)
- Manuals needed (e.g., operation and/or equipment repair)
- Process flexibility (24 hr/day operation, 8 hr/day, intermittent, seasonal?)
- Level of oversight - how often will system need to be inspected
- Monitoring of raw water quality, pretreatment effluent water quality, and finished water quality to verify and ensure assumptions for the design of the treatment equipment are met
- Finished water storage
- Response time of equipment supplier, their designee, or other qualified firm, to non-routine service calls
- Provisions for storage, auxiliary treatment, or bypassing in case of equipment problems.

2) Costs

- Life cycle costs of the system. This may include facilities and appurtenances as well as component parts that must routinely be replaced such as membranes, filters, cartridges, power consumption, etc.
- Total system costs. This may include cost per service connection per month or year, including amortization of initial capital equipment costs and ongoing O&M costs. *Capital costs may include consultant costs, studies, planning, design, permits, land and easements, construction, additional taxes, insurance, environmental impact studieslreview (community acceptance public meetings)*
- *Training costs*
- *Administrative costs*
- *Certification costs*
- *Monitoring costs*
- *Regulatory agency fees for technical assistance oversight, operating permits*
- *Service labor costs*

Costs presented in italics may be obtained from the engineering consultant, the manufacturer, the equipment supplier, the water system, or other professional organizations, or, in some cases, the state.

Technology Approval

While states would prefer information and data from full scale operational facilities, they may reduce or eliminate extensive piloting for some technologies if they have credible third party test data that provides information over a range of source water quality conditions or information from full scale operation of the technology in other applications. Pilot plants or laboratory data may be adequate to determine the potential capability of the treatment technology, but are no guarantee that the technology will perform under real world conditions or be cost-effective for the water system. Acceptance of a technology based only on a performance guarantee may or may not be sufficient.

Upon receipt and review of the information discussed previously (source water characteristics, unique system operating conditions, treatment alternatives, pertinent past treatment performance assessments/verification of the recommended process option, specifications and technical data of the process, and capital and O&M costs) the state regulatory agency will make one of the following determination(s):

1) The technology application can be accepted without site-specific piloting; or

2) The technology application is acceptable, but with conditional approval for an established timeframe (i.e. one year, one month, etc.) during which the treatment performance can be evaluated through monitoring and operational data; or

3) Additional information and data are needed; or

4) Qn-site piloting is still needed due to source water quality or performance uncertainties; or

5) The technology application is not appropriate for this particular application.

Prior to installation or construction of any proposed alternative technology, final plans and specifications covering the entire project (not just the alternative technology facilities) must be submitted by a registered professional engineer (if required by the state) to the reviewing authority for final approval with or without conditions. This final submittal should address all aspects of the project (e.g. piping, materials, power, chemical feeds, valving, controls, building requirements, etc.).

After the period of operation specified by a conditional approval, the monitoring results and the results of operational data will be reviewed by the state and a determination will be made as to whether to: 1) grant final approval; 2) grant final approval with conditions; 3) continue conditional approval for another specified time period; or 4) disapprove the technology pending futher development by the applicant. The state will supply its rationale for any decision to the applicant.

A performance bond, or other guarantee, or lease arrangement may be required to ensure that if the installed technology fails, the manufacturer will remove or modify the installed technology and any ancillary equipment at their own cost, and the water system will be reftmded any funds that it put up for purchase, or installation of the technology, consistent with the contractual agreement between the parties.

Technology Transfer

In order to ensure that information about the approval and implementation of alternative technologies receives the widest possible dissemination, states are encouraged to share information about their experiences with alternative technologies. One method for accomplishing this would be to provide information to the database maintained by the National Drinking Water Clearinghouse, located at West Virginia University. Other methods for sharing information are encouraged as well.