

PILOT TESTING OF SURFACE WATERS AND GROUNDWATER UNDER
THE DIRECT INFLUENCE OF A SURFACE WATER (GWUDI) FOR
UNAPPROVED ALTERNATIVE FILTRATION TECHNOLOGIES

1. A public water system proposing to use an unapproved alternative filtration technology shall conduct a 60-day pilot study to demonstrate that the alternative filtration technology, in combination with adequate disinfection treatment, consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

2. Previously completed pilot studies, full scale plant studies or EPA/NSF Environmental Technology Verification (ETV) reports can be submitted to the Safe Drinking Water Branch (SDWB) for support or consideration as a substitute for 60-day pilot testing of an alternative filtration technology, provided that the same technology is used; similar or worse raw water qualities can be demonstrated; and microbial removal requirements of Item 1 are already proven. Approval of such submittals will be on a case-by-case basis. The SDWB shall utilize the submitted data in order to set approved operating parameters for the proposed plant.

3. A protocol must be submitted to the SDWB for approval prior to commencing a pilot study for an unapproved alternative filtration technology.

4. The protocol must identify the following:
 - a. 60-day study period. The seasonal worst case (rainy season, etc.) should be used, but can be adjusted following consultation with the SDWB;
 - b. Water quality parameters to be sampled and their frequency. All studies shall provide the following minimum data, sampled simultaneously on both the raw and filtered side of the treatment train, at the designated frequency:

TABLE 1

SAMPLING PARAMETER*	SAMPLING TYPE AND FREQUENCY
Flow (rate and totalizing)	continuous
Turbidity	continuous
Color	grab 2 days/week
Formation potential for TTHM & HAA5	grab 1 day/week
Microscopic Particulate Analysis (MPA) with particle sizing down to 2 μ m	grab in 2 nd and 4 th week
Total and Fecal Coliforms	grab 4 days/week

- The SDWB reserves the right to request that additional water quality parameters be analyzed based on the proposed technology or on water quality-related concerns, e.g. alkalinity, pH and TOC for coagulation-based alternative technologies.

Pertinent rainfall and/or stream gage data at the intake or within the contributing watershed shall be provided to the SDWB as available.

All laboratory analytical work shall be performed by a certified lab using approved State or EPA methods. Field testing shall use approved State or EPA methods.

- a. Detailed description of the pilot plant's process treatment train, including all biological, chemical or physical treatment processes (plans and figures are encouraged);
- b. Description of the pilot plant operations, including startup, filter ripening, backwash, filter to waste, shutdown and emergency procedures. IMPORTANT: any unavoidable deviation of the proposed pilot plant layout/operations from the actual full-scale treatment plant layout/operations (e.g. building a 50 MG pre-sedimentation basin) should be addressed in the pilot plant report in terms of impacts to: plant operations, compliance monitoring/reporting & finish water quality; and
- c. The specific monitoring and recording equipment, and their locations.

6. All raw and finish water data shall be evaluated based on the technology's ability to demonstrate, in combination with adequate disinfection treatment, 99.9 percent removal of *Giardia lamblia* cysts, 99.99 percent removal of viruses and 99 percent removal of *Cryptosporidium* oocysts. Demonstrations can be made through:
 - a. MPA analysis of particle removal;
 - b. *Giardia*/*Crypto* surrogate particle removal evaluations (latex spheres, etc.);
 - c. Particle size analysis demonstration for *Giardia* and *Crypto* removal credit (>2um : 2-5um : 5-15um); or
 - d. Live *Giardia*/*Crypto* challenge studies.

The SDWB requires the use of in-line particle counting on the raw and filtrate ends of the pilot unit to demonstrate 99 percent (2-log) removal of *Cryptosporidium* oocysts, as required under the Interim Enhanced Surface Water Treatment Rule (IESWTR) and the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR).

The system shall notify the SDWB of the intended demonstration method in the submitted protocol, and will be responsible for taking any required additional data.

In addition, analysis of turbidity data during the pilot test must demonstrate finish water turbidities (combined filter effluent) in compliance with requirements for conventional or direct filtration plants under the IESWTR and LT1ESWTR (<0.3 NTU in at least 95% of the measurements taken monthly and 1 NTU max).

7. The final pilot test report shall summarize, as a minimum, the following parameters (as applicable) which must be reflected in the design and operation of the full-scale plant:
 - a. Design treatment train, etc. (presedimentation, disinfection, strainers, chemical addition, filtration, pH adjustment, post-treatment, backwash or waste stream disposal, solids handling, redundancy, emergency power, etc.);
 - b. Design flows (average, max day, peak hour)
 - c. Inlet feed pressure range and source (pumps, gravity head);
 - d. For media filters: media material specifications, bed depths, surface loading, backwash triggers and backwash rates; and
 - e. For membrane filters: array configuration, specs (materials, hollow fine fiber or spiral wound, warranty),

design flux (gpd/sf) using outside surface area or parameter as approved by SDWB, maximum transmembrane pressure, backwash and Clean-In-Place equipment and operating setpoints.

8. The pilot study report shall be prepared and stamped by a licensed professional engineer and submitted in triplicate to the Department of Health, Safe Drinking Water Branch.
9. Once the final pilot study is approved, the State may provide a log removal credit for the proposed alternative filtration technology using the pilot-tested source.
10. Approval to construct a full scale treatment plant cannot be granted until an engineering report meeting the requirements of the Surface Water Treatment Rule Administrative Manual, Chapter 2, section III.A.1 and construction plans and specifications (section 11-20-30, New and modified public water systems and the Surface Water Treatment Rule Administrative Manual) are reviewed and approved by the Department of Health.

Engineering reports proposing to use new, unapproved surface water or GWUDI sources shall analyze the raw and filtered water based on the list of SDWB's "Contaminants To Be Tested In All New Sources of Potable Water".

REFERENCES

1. US Environmental Protection Agency, Implementation Guidance Manual for the Interim Enhanced Surface Water Treatment Rule and the Stage 1 Disinfectants/Disinfection Byproducts Rule, Final electronic files dated August 13, 2001.
2. Texas Natural Resource Conservation Commission, Pilot Study Protocols for Membrane Plants (Enclosures 19, 20 & 21), DRAFT March 2001.
3. Idaho Division of Environmental Quality, Implementation Guidance for the Interim Enhanced Surface Water Treatment Rule, September 2000.
4. California Department of Health Services, Division of Drinking Water and Environmental Management, Drinking Water Program, California Surface Water Treatment Alternative Filtration Technology Demonstration report, November 23, 1998.
5. State of Hawaii Department of Health, Criteria for Considering Alternative Technology for Treating Surface Water, December 6, 1994.
6. Bruce Barrett & Associates (EPA Contract 68-C1-0032), Western States Workgroup Consensus Protocol for Evaluation and Acceptance of Alternate Surface Water Filtration Technologies in Small System Applications, Final Technical Report April 1992.