

Region 8 SDWA Direct Implementation Policy

Policy #: SWTR 5
Date: 06/30/2003

Subject: Location(s) for Measurement of Filtered Water Turbidity. This policy provides the criteria by which EPA Region 8 determines whether filtered water turbidity is being measured in the appropriate location(s) for determining compliance with the Surface Water Treatment Rules. Turbidity is measured by turbidimeters (which meet the analytical requirements of 40 CFR 141.74(a))

Rule(s): Surface Water Treatment Rules (SWTR, IESWTR, LT1ESWTR)
Citation: 40 CFR 141.2, and 40 CFR Subparts H, P, and T

Applies to: All public water systems that use surface water or groundwater under the direct influence of surface water, and are filtering to comply with the SWTRs.

Background:

The original SWTR at 40 CFR Subpart H had specific turbidity limits for each type of filtration (conventional, direct, slow sand, diatomaceous earth, alternative filtration) which applied to Arepresentative samples of a system=s filtered water.@ Although sampling frequencies were specified, the exact sampling location was not specified in the rule. Often, several filters are utilized in parallel, and effluent from the filters is combined and piped to a clearwell or other type of storage, prior to distribution. Evaluation of current practices indicates that combined or composite finished water turbidity is measured in varying locations between the filter(s) effluent and the entrance to the distribution system. The June 27, 1990 SWTR Implementation Manual had (in Appendix C Questions and Answers, Item II.C), a question regarding whether systems had to measure turbidity at each filter. The answer indicated no, although that was recommended, and that monitoring of the composite filtered water should occur as close as possible to the point following filtration. It indicated that, alternatively, systems could monitor immediately after

each filter and calculate the average of all such measurements to determine the value for evaluating compliance.

The March 1991 SWTR Guidance Manual (section 5.2) had a discussion of turbidity monitoring requirements and addressed the sampling location by stating that the sampling locations could include: (1) combined filter effluent prior to entry into a clearwell; (2) clearwell effluent; (3) plant effluent or immediately prior to entry into the distribution system; or (4) average of measurements from each filter effluent.

The revised SWTRs (IESWTR and LT1ESWTR) provide turbidity requirements for composite or combined filter effluents (CFE) for each of the various types of filtration treatment, as well as for individual filter effluents (IFE) for those systems using conventional or direct filtration. Although it is clear that individual filter effluent must be measured following each filter, prior to the water being combined, it is not clear where the combined filter effluent is to be measured.

EPA Region 8 recognizes that, as the combined filter effluent travels downstream from the filters to a clearwell or other storage tank, possibly through pumping operations, and then to the entrance to the distribution system, the filtered water turbidity may change. When the CFE enters a clearwell or storage tank, its velocity decreases. If the tank has recently been cleaned, additional particle settling may occur and the turbidity may decrease. Alternatively, when the tank has not been cleaned for a period of time, resuspended solids may increase the turbidity. Pumping operations can also disturb accumulated sediments and impart air to the water, causing higher turbidity levels. Turbidity of the water may also vary with location in a large clearwell, so the location of the sampling is important. In any case, conditions such as these may cause the downstream turbidity to not be representative of the filtered water. Because the CFE turbidity limit represents a treatment technique for evaluating the effectiveness of the filtration process, Region 8 believes that the CFE monitoring is most representative of the filtered water turbidity in the pipe where the individual filter effluents are first combined. If this is not possible, it should be measured in the clearwell close to the area where the CFE first enters.

Policy: Implementation for IESWTR and LT1ESWTR

(Note: this policy specifies only the minimum number and locations of turbidity measurements for determining compliance with the SWTRs. To facilitate treatment process control, EPA Region 8 encourages water treatment plants to measure turbidity and other parameters in additional locations beyond those specified in this policy (e.g. raw water prior to filters).

Systems using Conventional or Direct Filtration (please refer to Figures on the following pages):

- § Systems using One Filter: A single turbidimeter may be used; it must be located as close as possible to the filter effluent, prior to storage (i.e. in the effluent pipe leaving the filter, or near the clearwell entrance.) This turbidimeter must measure turbidity continuously, and meet both the IFE treatment technique requirements (e.g. based on turbidity recorded every 15 minutes) and the CFE treatment technique requirements (e.g. based on turbidity typically recorded at 4 hour intervals.)
- § Systems using Two Filters: Two turbidimeters (one per filter) may be installed to measure IFE turbidity continuously at the effluent pipe of each filter, and the two turbidity values may be averaged at the appropriate (typically 4 hour) interval to be reported as CFE turbidity. This eliminates the need to purchase a third turbidimeter for CFE. An alternative available for LT1ESWTR compliance (but not for IESWTR) is to use a single turbidimeter to represent the IFE and CFE for the two filters, but this turbidimeter must be installed in the combined effluent pipe, or near the clearwell entrance, prior to storage. This single turbidimeter must measure turbidity continuously, and meet both the IFE treatment technique requirements (e.g. based on turbidity recorded every 15 minutes) and the CFE treatment technique requirements (e.g. based on turbidity typically recorded at 4 hour intervals.) A third alternative involves installation of 3 turbidimeters (2 for IFE in the effluent pipe of each of 2 filters) and one for CFE, in or near the combined effluent pipe. The CFE turbidimeter would be used to meet the CFE treatment technique requirements (e.g. based on turbidity typically recorded at 4 hour intervals.) If a CFE turbidimeter cannot be installed in the combined effluent pipe, or near the clearwell entrance, prior to storage, and instead is installed downstream of storage, the turbidity being measured by this downstream turbidimeter should be compared to the average of the turbidities from the 2 IFE turbidimeters. A CFE reporting turbidities significantly lower or higher (more than 15% different) than the average of the two IFE values is not representative of the CFE water turbidity, and only averaged IFE values should be reported for the CFE.
- § Systems Using More than 2 Filters: IFE turbidity must be measured separately for the effluent from each filter. Each turbidimeter must measure turbidity continuously, and meet the IFE treatment technique requirements (e.g. based on turbidity recorded every 15 minutes). The multiple IFE turbidity values (values from all filters producing finished water) may be averaged at the appropriate (typically 4 hour) interval to be reported as CFE turbidity. This eliminates the need to purchase an additional turbidimeter for CFE. A preferred alternative is to install a separate CFE turbidimeter in the combined filter

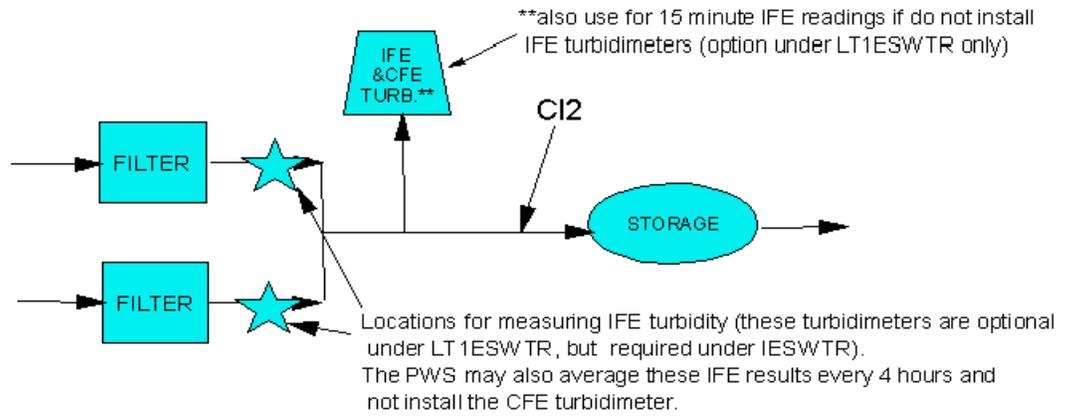
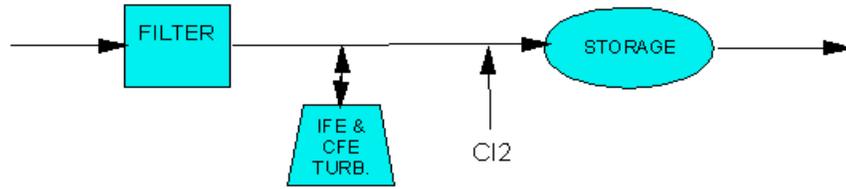
effluent pipe, or near the clearwell entrance. The CFE turbidimeter would be used to meet the CFE treatment technique requirements (e.g. based on turbidity typically recorded at 4 hour intervals.) If a CFE turbidimeter cannot be installed in the combined effluent pipe, or near the clearwell entrance, prior to storage, and is instead installed downstream of storage, the turbidity being measured by this downstream turbidimeter should be compared to the average of the turbidities from the multiple IFE turbidimeters. A CFE reporting turbidities significantly lower or higher (more than 15% different) than the average of the IFE values is not representative of the CFE water turbidity, and only averaged IFE values should be reported for the CFE.

Systems using Other Than Conventional or Direct Filtration

Although these systems are not required to measure IFEs, the preceding principles apply: the composite or combined filter effluent turbidity should be measured as close to the final filter(s) effluent as possible, prior to storage.

Reviewed by: Wyoming and Tribal PWSS DI Teams, R8 M/DBP Rule Manager, 8MO

Examples of Appropriate Turbidimeter Locations
(for conventional/direct filtration systems using 1 or 2 filters)
 [STORAGE = TANK OR CLEARWELL]



Examples of Appropriate Turbidimeter Locations (cont'd.)
(for conventional/direct filtration system using 3 or more filters)
[STORAGE = TANK OR CLEARWELL]

