

Agency has determined it is appropriate to propose an additional 0.5 log treatment credit for plants meeting this standard.

The SAB reviewed the proposed additional 0.5 log *Cryptosporidium* removal credit for systems maintaining very low CFE turbidity, as presented in the November 2001 pre-proposal draft of the LT2ESWTR (USEPA 2001g). The SAB also reviewed a potential additional 1.0 log *Cryptosporidium* removal credit for systems achieving very low individual filter effluent (IFE) turbidity, which is addressed in section IV.C.16 of today's proposal.

In written comments from a December 2001 meeting of the Drinking Water Committee, the SAB panel stated that additional credit for lower finished water turbidity is consistent with what is known in both pilot and full-scale operational experiences for *Cryptosporidium* removal. Recognizing that IESWTR requirements for lowering turbidity in the treated water will result in lower concentrations of *Cryptosporidium*, the panel affirmed that even further lowering of turbidity will result in further reductions in *Cryptosporidium* in the filter effluent. However, the SAB concluded that limited data were presented to show the exact removal that can be achieved, and recommended that no additional credit be given to plants that demonstrate CFE

turbidity of 0.15 NTU or less. The SAB recommended that 0.5 log credit be given to plants achieving IFE turbidity in each filter less than 0.15 NTU in 95% of samples each month.

In responding to this recommendation from the SAB, EPA acknowledges the difficulty in precisely quantifying *Cryptosporidium* removal through filtration based on effluent turbidity levels. Nevertheless, EPA finds that available data consistently show that removal of *Cryptosporidium* is increased by 0.5 log or greater when filter effluent turbidity is reduced to levels reflecting compliance with a 0.15 NTU standard, in comparison to compliance with a 0.3 NTU standard. Consequently, EPA has concluded that it is appropriate to propose this 0.5 log presumptive treatment credit for systems achieving very low CFE turbidity.

Measurement of Low Level Turbidity

Another important aspect of proposing to award additional removal credit for lower finished water turbidity is the performance of turbidimeters in measuring turbidity below 0.3 NTU. The following paragraphs summarize results from several studies that evaluated low level measurement of turbidity by different on-line and bench top instruments. Note that because compliance with the CFE turbidity limit

is based on 4-hour readings, either on-line or bench top turbidimeters may be used. EPA believes that results from these studies indicate that currently available turbidity monitoring equipment is capable of reliably assessing turbidity at levels below 0.1 NTU, provided instruments are well calibrated and maintained.

The 1997 NODA for the IESWTR (67 FR 59502, Nov. 3, 1997) (USEPA 1997a) discusses issues relating to the accuracy and precision of low level turbidity measurements. This document cites studies (Hart *et al.* 1992, Sethi *et al.* 1997) suggesting that large tolerances in instrument design criteria have led to turbidimeters that provide different turbidity readings for a given suspension.

At the time of IESWTR NODA, EPA had conducted performance evaluation (PE) studies of turbidity samples above 0.3 NTU. A subsequent PE study (USEPA 1998e), labeled WS041, was carried out to address concern among the Stage 1 M-DBP Federal Advisory Committee regarding the ability to reliably measure lower turbidity levels. The study involved distribution of different types of laboratory prepared standard solutions with reported turbidity values of 0.150 NTU or 0.160 NTU. The results of this study are summarized in Table IV-16.

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Table IV-16.-- Performance Evaluation - WS041 Data for Low Level Turbidity

Analysis (USEPA 1998e)

Type of Instrument	Sample Solution Type	"True" Value (NTU)	No. of Results Available	Mean* (NTU)	Std. Dev* (NTU)	95% Prediction Interval (NTU)
Bench Top	Polystyrene Spheres	0.150	292	0.203	0.0558	0.093-0.313
Portable or IR	Polystyrene Spheres	0.150	340	0.200	0.0439	0.113-0.286
Portable or IR	Formazin	0.160	335	0.176	0.0431	0.091-0.261
On-Line	Polystyrene Spheres	0.150	52	0.228	0.0773	0.072-0.385

*Calculated using biweight transformation

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The data summarized in Table IV-16 indicate a positive bias for all instruments when compared against a reported "true value." On-line

instruments in this study had a larger positive bias and higher standard deviation (RSD approximately 50 percent). The positive bias is consistent

with previous PE studies (USEPA 1998e) and suggests that error in turbidimeter readings may be generally conservative (*i.e.*, systems will operate