Formal Comments by the American Water Works Association on the National Primary Drinking Water Regulations: Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Rule; Proposed Rule

April 10, 2000, 65 Federal Register 19045

Filter Backwash Recycle Provisions

TABLE OF CONTENTS

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1.0 Introduction

The American Water Works Association (AWWA) is an international, nonprofit, scientific and educational society dedicated to the improvement of drinking water quality and supply. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our 56,000 plus members represent the full spectrum of the drinking water community: treatment plant operators and managers, environmentalists, scientists, academicians, and others who hold an interest in water supply and public health. Our membership includes approximately 4,200 water systems that supply water to roughly 80 percent of the people in the nation.

The following comments reflect issues raised by AWWA's members with regard to the proposed Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Rule's (LT1FBR) Filter Backwash Recycle (FBR) provisions.

2.0 Executive Summary

If any drinking water treatment plant recycles at the proper point for its treatment process, stays within the state approved plant operating capacity, and meets finished water quality standards, particularly finished water turbidity standards, then recycle is a operational issue for that facility and does not merit additional regulatory scrutiny.

Recycling water streams within a drinking water treatment plant is a sound drinking water treatment practice. Some facilities report beneficial effects on their main treatment processes resulting from recycling. Recycled streams become problematic when they prevent individual facilities from operating effectively. Therefore, major recycle stream management changes required by regulations should be linked to impacts on finished water quality, not source water quality.

Section 1412(b)(14) of the 1996 SDWA Amendments requires the U.S. EPA to promulgate a regulation on the recycling of filter backwash water, but it also clearly provides the Agency with statutory direction in the event that *"recycling has been addressed by the Administrator's Enhanced Surface Water Treatment Rule prior to such date."* The control of *Cryptosporidium* oocysts passage through a drinking water treatment plant is provided under the Interim Enhanced Surface Water Treatment Rule (IESWTR) and Long-Term 1 Enhanced Surface Water Treatment Rule (LT1) provisions.

In 1997 the M/DBP FACA agreed to include tighter turbidity performance criteria and individual filter monitoring requirements as part of the IESWTR and *thereby "enable systems to demonstrate that they meet the proposed 2 log requirement"* (62 FR 59499). It is clear from U.S. EPA's IESWTR and LT1 regulatory language, that if a drinking water treatment plant meets the new turbidity provisions, the plant meets the *Cryptosporidium* removal requirements necessary to protect public health. It is also apparent from the LT1FBR preamble and associated Regulatory Impact Analysis (RIA) that the Agency has not developed a sound technical rational for taking additional measures to control recycle processes beyond the IESWTR and LT1 provisions.

The available information leads AWWA to believe that the best course of action for the Agency is to determine that the current IESWTR and parallel LT1 provisions represent a sound strategy for ensuring that recycle practices at drinking water treatment plants are adequately "controlled" and managed to ensure that finished water quality is protected. Unfortunately, in proposing the FBR provisions, U.S. EPA is indicating that it believes a separate regulatory standard is necessary to meet the Agency's statutory obligations. While AWWA is not surprised that the Agency feels that it must develop additional standards with which to regulate; AWWA is concerned that the Agency did not elect to employ a sound premise for the FBR provisions by drawing on the regulatory provisions provided by the IESWTR. The IESWTR includes individual filter exceedance reporting requirements. If the Agency believes it can substantiate additional regulatory measures, it would be more appropriate to develop a targeted regulatory approach that would use these exceedance reports to trigger evaluation of recycle practice at facilities that employ recycle of *"filter backwash, thickener supernatant, and liquids from dewatering processes."* Such an approach would be consistent with advice provided by the Science Advisory Board to the Agency earlier this month. While AWWA continues to believe that such a provision is unnecessary, if the Agency promulgates a final FBRR based on an evaluation process requirement triggered by the existing IESWTR individual filter exceedance criteria there is greater opportunity to benefit public health while targeting scarce state and local resources, than is possible under the current proposal.

AWWA is very concerned that the Agency will seek to pursue the current regulatory option despite the lack of demonstrated statutory need or potential benefit to public health. Therefore, AWWA has offered comments identifying specific technical flaws in the basis for the Agency's proposal and the resulting projected costs and benefits. AWWA has also considered the proposed rule structure and believes that if the Agency, continues on its current course, it could simplify the rule structure.

This simplified rule would not discriminate between Subpart H facilities based on system size or treatment design. It would focus primarily on ensuring that plants maintain control of their coagulation-clarification-filtration unit processes by providing a check on hydraulic loading of the filtration process. This approach could be based on an expansion of the standard monthly reports which utilities already submit to the States. The monthly reports would be expanded to include the sum of flows through the individual filters or combined filter flow (monitored prior to the clearwell). Alternately, these flows or alternative data if post-filter, pre-clearwell metering is not available, could be used by the utility and State to to evaluate process hydraulic loading rates and determine if the plant's rated plant capacity is being exceeded during recycle events. If required, the process flow monitoring and hydraulic assessment could also be included in a special study, as described in the proposed FBR provisions.

AWWA strongly believes that any restrictions placed on the return point for recycle streams should focus on filter backwash, thickener supernatant, and liquids from dewatering processes not minor streams, and allow return to be prior to or simultaneous with the first point of primary coagulant addition. The Agency should recognize that numerous exceptions to this provision will necessarily exist. Exceptions include: return of softening process solids, return of recycle streams from which *Cryptosporidium* has been adequately removed / inactivated, return of process solids to the contactor in contact clarification systems, and return of recycle stream at individual plant designs as approved by the State.

In summary, AWWA believes that the prospect for improving finished water quality and public health through implementation of a FBR is negligible and is not required at this time as a matter of law. If the Agency proceeds to promulgate a final FBR AWWA has provided the substance and justification in these comments for its preferred option and alternatively a more concise, clear, and technically sound revision of the Agency's current approach. Prior to proposal of the final rule U.S. EPA must still meet its obligations to provide for public review and comment on the complete set of regulatory provisions. Any FBRR will by necessity be dependent on detailed guidance to States and utilities. As the entities responsible for complying with the FBR provisions cannot reasonably determine the impact of the rule until there has been an adequate opportunity to review this guidance. The Agency has an obligation to provide such guidance for review / comment and incorporate appropriate corrections prior to finalizing the rule.

3.0 Legal Issues

The following section is meant to identify the legal issues associated with the technical issues raised in AWWA's comments and the legal setting under which the Filter Backwash Recycle provisions are being developed.

3.1 Proposal Not Supported by Substantial Evidence

The Agency has failed to provide substantial evidence for the need to promulgate the FBR provisions or that the proposed provisions would provide discernable benefits beyond those achieved by Interim Enhanced Surface Water Treatment Rule and Long-Term 1 Enhanced Surface Water Treatment Rule, for the reasons set forth in these comments including the following specific reasons.

Characterization of Recycle Impact on Treatment

The Agency asserts that filter backwash recycle disrupts drinking water treatment so significantly as to allow *"high concentrations of potentially viable, infectious oocysts may pass through the plant into finished water"* (§ II.E., 65 FR 19059) implying a cause and effect beyond any available data. Beyond its characterization of oocyst concentrations in spent filter backwash recycle, the Agency's technical rational is not consistent with a fundamental understanding of drinking water treatment plant design and operation. Sections 3.3 and 3.4 in AWWA's comments explain why these two criteria are technically unsound.

Limitation on Point-of Recycle-Return

The actual impact of recycle return is a site-specific combination of the water quality of the recycle stream, the quality of the water stream to which recycle is added (usually raw water), the relative flow contribution of the recycle stream, the point of recycle return, and the actual hydraulic and coagulant dosing controls exercised by treatment plant operators. The outcome of this combination of factors is best controlled by current regulations governing filtered water quality, not by attempts to prescribe practice for some subset of these factors (i.e., point of recycle alone). Inadequacies in U.S. EPA's technical explanation substantiating the proposed point-of-recycle-return provisions are described in section 4.3.

Direct Filtration

U.S. EPA raised the potential concern that direct filtration plants do not have a solids removal process for their recycle stream. and proposes specific requirements for direct filtration facilities based on that concern. The Drinking Water Committee of the U.S. EPA Science Advisory Board has informed that Agency that this concern is technically unfounded. AWWA includes information in these comments in Section 4.5 that should alleviate any concern originating from over-interpretation of an AWWA sponsored survey of recycle practice in the United States.

3.2 Arbitrary and Capricious

The Agency's proposal if finalized would be arbitrary and capricious for the reasons set forth in these comments including the following specific reasons.

Proposed Rule Provisions in §141.76 (c)

The Agency proposes that "self assessments" be performed at conventional surface water plants that: (1) employ 20 or fewer filters to meet production during the highest production month, and (2) recycle spent filter backwash water without first flowing through a structure with a volume equal to or greater than the volume of spent filter backwash water produced by one filter backwash event. These two criteria lack sound technical basis; Sections 3.5, 4.2 and 4.4 in AWWA's comments explain why these two criteria are technically unsound. Regulatory decisions stemming from these two criteria result in an arbitrary and capricious application of regulatory requirements.

Health Risk Reduction Cost Analysis Required

Section VI., Economic Analysis, does not meet the letter or spirit of the §1412(b)(4)(C) which specifies not only that the Agency estimate the costs and estimate the benefits but that the Agency relate the two. Section VI.C.2.a. (65 FR 19123) of the LT1FBR states: *"The benefits associated with the filter backwash provision are unquantified because of data limitations."* Without quantified benefits the Agency cannot meet the requirements of §1412(b)(4)(C) which require a substantive benefit cost analysis. The lack of a robust benefit cost analysis prior to the final regulation would render regulatory action by the Agency arbitrary and capricious and an abuse of discretion.

Use of Science in Decisionmaking

The Agency has a responsibility under the 1996 Safe Drinking Water Act (§1412(b)(3)(A)) to employ the peer reviewed science and when peer reviewed science is not available, information drawn from the best available sources.

> *"USE OF SCIENCE IN DECISIONMAKING. – In carrying out this section and, to the degree that an Agency action s based on science, the Administrator shall use –*

(i) *the best available, peer-reviewed science and supporting studies conducted in accordance with sound and objective scientific practices; and*
(ii) *data collected by accepted methods or best available methods (if the reliability of the method and nature of the decision justifies use of the data).*

The preamble draws on data from the Information Collection Rule (ICR) to describe recycle practices but fails to utilize the ICR data in its estimate of benefits in the RIA. Employing a reasoned analysis of the ICR data would significantly reduce the assumed source water oocyst concentrations and therefore reduce the effluent concentrations and resulting estimates of disease with its associated costs. In fact the mean viable oocyst concentrations assumed in the RIA to be present in finished water are higher than ICR data would suggest are present in source water, <u>prior to treatment</u>. Not using the ICR data is particularly egregious as the data was specifically collected to ascertain the level of treatment needed to remove *Cryptosporidium* by microbial – disinfection by-product cluster rules.

3.3 Contrary to Law

The Agency's actions are contrary to specific provisions of the Safe Drinking Water Act and recent Federal Appeals Court rulings for the reasons set forth in these comments including the following specific reasons.

Section 1412(b)14 of the 1996 Safe Drinking Water Act

Section 1412(b)(14) requires the U.S. EPA to promulgate a regulation on the recycling of filter backwash water, but it also clearly provides the Agency with statutory direction in the event that *"recycling has been addressed by the Administrator's Enhanced Surface Water Treatment Rule prior to such date."* The control of *Cryptosporidium* oocysts passage through a drinking water treatment plant is provided under the Interim Enhanced Surface Water Treatment Rule (IESWTR) and Long-Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). Hence the FBR provisions proposed are contrary to statutory direction provided in SDWA. Section 4.2 of AWWA's comments describe the control afforded by these enhancements of the SWTR.

3.4 Appalachian Power Company v. Environmental Protection Agency

U.S. EPA cannot propose a requirement through a guidance document that in effect substitutes for a rule, *Appalachian Power Company v. Environmental Protection Agency*: D.C. Cir., April, 2000. U.S. EPA issues guidance documents in connection with administration of its rules. The U.S. Court of Appeals held that guidance under the Clean Air Act was improper because it expanded the underlying U.S. EPA rule without complying with formal rulemaking procedures. In proposing the FBR provisions the U.S. EPA has failed to provide central components of the rule. Thus if the final rule and guidance are developed on the current schedule the result will be the promulgation of a federal requirement without meeting statutory requirements of notice and opportunity to comment. Section 4.5 discusses the relevance of guidance in the FBR provisions in more detail.

3.5 Abuse of Discretion

There is no legal or technical justification for the FBR provisions. Promulgation of the FBR provisions would be an abuse of discretion.

AWWA does not believe that U.S. EPA has provided a sound rationale necessary to support and provide a logical structure for the filter backwash recycle provisions of the LT1FBR. The primary focus of the proposed filter backwash recycle rule provisions is reduction of *Cryptosporidium* oocyst passage through drinking water treatment facilities. *Cryptosporidium* oocysts (and *Giardia* cysts) are regulated elsewhere primarily by filter effluent turbidity, therefore any negative impacts of filter backwash recycle (and recycle of other streams) are effectively controlled, so there is no need for a technology or treatment practice specific rule addressing recycle practices specifically.

Statute Provides Authority for Agency Not to Promulgate New Regulation of Filter Backwash if Addressed Elsewhere

In directing U.S. EPA to evaluate the need for regulation of filter backwash recycle, §1412(b)14 of the 1996 Safe Drinking Water Act (SDWA) Amendments clearly provides the Agency with the opportunity to recognize the control of *Cryptosporidium* oocysts passage through a drinking water treatment plant provided under the Interim Enhanced Surface Water Treatment Rule (IESWTR). The IESWTR contains a treatment technique for control of

Cryptosporidium oocysts in finished water and required individual filter performance monitoring. In large part the premise for the 10 April 2000 LT1FBR recycle management requirements lies in the presumption that significant numbers of oocysts are breaking through the filtration unit operation and relevant data does not show breakthrough that requires additional regulation.

Rules Already Address Recycle Practice

U.S. EPA should recognize that the premise of the IESWTR is to control *Cryptosporidium* oocysts levels in finished water and seriously consider the SDWA's intent that drinking water regulations be based on sound science. The 1996 SDWA Amendments require that drinking water regulations under SDWA use the best available science and science presumes the availability of relevant data. Once ample data is available to discern the risk posed by filter backwash recycle (and other recycle practices) post-IESWTR compliance, then additional scientifically sound FBR provisions can be developed. It is likely that development of adequate, sound data will require substantial additional research, and evaluation of existing data sets like that available from the Information Collection Rule (ICR) data evaluation, etc..

<u>Cryptosporidium Oocysts Are Not a Unique Challenge</u> (§ IV.D.1.vi.b, 65 <u>FR</u> 19100)
In establishing the logical framework for focusing on the contaminants and recycle streams targeted by the proposed rule, the Agency identifies three reasons why other contaminants beyond Cryptosporidium oocysts are not relevant for this rulemaking. The three reasons stated are:

1. *"EPA does not currently have data to indicate these constituents occur in recycle streams at levels which threaten treatment plant performance, finished water quality, or public health."*
2. *"...current regulations may largely control any minor risk these constituents may present."*
3. *"The recycle stream concentrations will be significantly diluted by mixing with source water."*

Each of these reasons apply equally well to *Cryptosporidium* oocysts. The basic premise of this argument is that contaminants other than *Cryptosporidium* are present in lesser concentrations or risk levels than is *Cryptosporidium* and that regulations already exist to control these other contaminants.

The first premise is that other contaminants are at lower relative levels. Cornwell and Lee (1993) reported that manganese, TOC, AOC, and TTHM can be at high levels in spent filter backwash water. Manganese for example, was found in spent filter backwash water at 200 times raw water levels, and AOC at about 10 times raw water levels. TTHMFP was found at a multiple of about five (5). Cornwell and LeChevallier (2000) collected and analyzed spent filter backwash water at 25 water treatment plants. The average increase in THM from raw to spent filter backwash water was a multiple factor of 92, HAA6 was 24, aluminum 20, and manganese 13. By comparison, as outlined below, that multiple of *Cryptosporidium* from raw to spent filter backwash water in a conventional plant is about five (5) (Cornwell and LeChevallier, 2000). Therefore, the argument that contaminants other than *Cryptosporidium* are found at lower relative levels than *Cryptosporidium* is not supported in published research.

The second premise of the argument for not regulating other contaminants is that those contaminants are sufficiently controlled by current regulations. Those current regulations cover other contaminants by placing a requirement (primary or secondary) on finished water quality. The IESWTR and LT1ESWTR do the exact same thing for *Cryptosporidium*, through establishing finished water requirements for turbidity. The IESWTR <u>Summary of the Final Rule</u> clearly states:

> *"The primary purposes of the IESWTR are (1)* ***to improve control of microbial pathogens in drinking water, particularly for the protozoan Cryptosporidium,*** *and (2) to guard against significant increases in microbial risk that might otherwise occur when systems implement the Stage 1 Disinfectants/Disinfection Byproducts Rule."* (64 <u>FR</u> 69483) [emphasis added]

In the LT1 (65 <u>FR</u> 19063, 2nd Col., 2nd Para.) U.S. EPA quotes in-house studies (Dugan 1999) as *"In all cases where 2-log removal was not achieved, the plant did not comply with the IESWTR's CFE requirement."* Two-log *Cryptosporidium* removal is required by U.S. EPA in the IESWTR and LT1. On page 19065 of LT1 (65 <u>FR</u> 19065, 3rd col., 2nd para.) , U.S. EPA states:

"Compliance with the combined filter effluent turbidity requirements, ***ensures*** *compliance with the 2-log removal requirement."* [emphasis added]

This statement can be substantiated by drawing on data summarized in the November 3, 1997, Interim Enhanced Surface Water Treatment Rule Notice of Data Availability (IESWTR NODA). The IESWTR NODA lists eight (8) studies available at that time; Table 1 from the IESWTR NODA is replicated below. In reviewing the M/DBP FACA's evaluation of this data the following key points were identified in the IESWTR NODA:

"...

- *As turbidity performance improves for treatment of a particular water, there tends to be greater removal of Cryptosporidium.*
- *Pilot plant study data in particular indicated high likelihood of achieving at least 2 log removal when plant operation is optimized to achieve low turbidity levels. Moreover, pilot studies represented in the table tend to be for low-turbidity waters, which are considered to be the most difficult to treat regarding particulate removal and associated protozoan removal ... it is likely that similar or higher removal rates would be achieved for higher turbidity source waters*
- *The evaluation of Cryptosporidium removal in full-scale plants can be difficult in that this data includes many non-detects in the finished water, ... values assigned at the detection limit will likely result in over-estimation of oocysts in the finished waters. This in turn means that removal levels will tend to be under-estimated.*
- *Another factor that contributes to differences among the data is that some of the full-scale plant data comes from plants that are not optimized*

... " (62 FR 59497, col. 2, para. 3)

Table 1.—Cryptosporidium And Giardia Lamblia Removal Efficiencies By Rapid Granular Filtration

Type of Treatment Plant	Log Removal	Experimental Design	Researcher
Conventional filtration plants	Crypt 2.7–5.9	Pilot Plants	Patania et al. 95.
Do	Giardia 3.4–5.8	do	Do.
Do	Crypt 2.3–3.0	Pilot scale plant	Nieminski/Ongerth 95.
Do	Giardia 3.3–3.4	+full scale plant with seeded cysts/oocysts.	Do.
Do	Crypt 2.7–3.1	Pilot Plants	Ongerth/Pecaroro 95.
Do	Giardia 3.1–3.5	do	Do.
Do	Crypt 2–2.5	Full scale plants	LeChevallier et al. 91b.
Do	Giardia 2–2.5	Full scale plants	LeChevallier et al. 91b.
Do	Crypt 2.3–2.5	Full scale plants	LeChevallier/Norton 92.
Do	Giardia 2.2–2.8	do	Do.
Do	Crypt 2–3	Pilot scale plant	Foundation for Water. Research 94.
Do	Giardia and	Full scale plant	Kelley et al. 95.
Do	Crypt 1.5–2	operation considered not optimized).	
Direct filtration plants	Crypt 1.5–4.0	Pilot Plants	Patania et al. 1995.
Do	Giardia 1.5–4.8	do	Do.
Do	Crypt 2.8–3.0	do	Nieminski/Ongerth 95.
Do	Giardia 3.3–3.9	do	Do.
Do	Crypt 2–3	do	West et al. 1994.

Source: Table 1, National Primary Drinking Water Regulations: Interim Enhanced Surface Water Treatment Rule Notice of Data Availability, 62 FR 59493

Taking the key points drawn from the available data in construction of the IESWTR and LT1 provisions, the Agency must recognize that the provisions of the IESWTR, which are meant to ensure 2 log removal of *Cryptosporidium* and drive water treatment facilities to optimize their clarification and filtration unit operations for particle removal, directly address *Cryptosporidium* removal. In 1997 the M/DBP FACA agreed to include tighter turbidity performance criteria and individual filter monitoring requirements as part of the IESWTR and *thereby "enable systems to demonstrate that they meet the proposed 2 log requirement"* (62 FR 59499). Therefore, it is clear from EPA's regulatory language, that if a drinking water treatment plant meets the IESWTR and LT1 turbidity provisions, it meets the *Cryptosporidium* removal requirements.

Given that *Cryptosporidium* is at the same or lower relative concentration in spent filter backwash water compared to raw water as other contaminants U.S. EPA should choose not to regulate, and given that U.S. EPA has already established a rule for *Cryptosporidium* that **ensures** compliance with *Cryptosporidium* removal, there is not a documented need supported for this recycle regulation.

In drafting the FBRR provisions the Agency was aware that the IESWTR and LT1 provisions would be ratcheting clarification and filtration treatment to tighter standards ensuring a 2 log removal barrier, but elected to set additional requirements that fail to build from those requirements. Equally importantly, the Agency is pressing forward to propose substantive FBRR provisions that will have a national impact on water treatment plant design and operation without waiting for information that would confirm the level of success achieved by the IESWTR and LT1 provisions. Additional management steps may be appropriate, but at this time the Agency lacks a sound technical basis to describe the benefits of the proposed FBRR provisions – post-IESWTR / LT1 provision implementation..

Concentrations in Spent Filter Backwash Water Do Not Support Statement in Rule

Concentration in Influent Water v Recycle (§ II.E., 65 FR 19057)
As pointed out in the preamble text, *"Pathogenic microorganisms are removed during the sedimentation and / or filtration processes in the water treatment plant"* (Col. 2, Para. 1), that is to say, the level of oocysts observed in recycle streams is a function of the influent concentration. If the influent concentration is "high," then untreated recycle will contain oocysts. The question of relevance to this rule is whether the recycle of any oocysts is significant when

1. Recycle streams are almost always a minor percentage of treated water volume, in the range of ≈ 0 to 10 % of flow.
2. The concentration of oocysts in the recycle is unlikely to produce a marginal impact on influent water quality since oocysts must be present in the source water for the recycle oocyst concentration to accumulate.

The preamble (§ II.E., 65 FR 19059) states that: *"Therefore, the recycling of such process streams ... re-introduces **high concentrations*** [emphasis added] *to the drinking water treatment train."* To conclude that the oocysts concentration in recycle streams may be "overwhelming" a water treatment plant's filtration capacity with "large concentrations of pathogens" is speculation, not a documented phenomena.

To further assert that filter backwash recycle disrupts drinking water treatment so significantly as to allow *"high concentrations of potentially viable, infectious oocysts may pass through the plant into finished water"* (§ II.E., 65 FR 19059) implies a cause and effect beyond any available data and is not consistent with a fundamental understanding of drinking water treatment plant design and operation. The preamble states that *"Therefore, the recycling of such process streams...re-introduces high concentrations to the drinking water treatment train."* (65 FR 19058, 3rd column, Last para.). AWWA acknowledges that limited historical data are in the literature that show the limited possibility of high concentrations of oocysts in spent filter backwash water. However, collection and analysis procedures were very limited at the time of those measurements, and the potential impacts to finished water are not documented**.**

Citation of High Range Oocyst Counts
U.S. EPA correctly points out the difficulties in performing *Cryptosporidium* analyses for filter backwash samples on page 19059 (65 FR 19059). Where recovery data are provided (this information should be added to Table II.7), the rates have been typically very low. It is also important to point out that volumes analyzed have been very small due to high turbidity in the samples. It is not uncommon for spent filter backwash samples to have equivalent

volumes analyzed of much less than one liter. Therefore, the focus on highlighting the high outlier levels of oocysts reported (the citation of Cornwell and Lee, 1993; States *et al.* 1997; Rose *et al.*, 1986; and Colbourne, 1989) is unjustified. U.S. EPA is clearly aware of the uncertainties of individual protozoan measurements and citing these outlier values violates the sound statistics that has been developed by U.S. EPA and others over the past several years to better understand protozoan data.

The Possibility of False Positive Results

Spent filter backwash samples are extremely dirty and previous flotation methods were not very effective in removing background debris. Therefore, the possibility that high oocyst counts might result from false positive tests is a reality. Moreover, the addition of coagulants (in particular Cat Floc T) can cause the fluorescent antibody to non-specifically stick to particle surfaces. The fact that the highest spent filter backwash *Cryptosporidium* values are from the 1989 Colbourne study, and that these levels were never subsequently reported by other investigators, raises the very real possibility that these very high data may be false positive results and may not represent the best available science.

Lack of a Reality Check

Water systems typically use 2 to 10 percent of produced water to backwash filters. If all of the raw water oocysts were resuspended in this backwash volume (i.e., no removal from sedimentation in the tank), then *Cryptosporidium* levels would be expected to be 10 to 50 times the raw water level. These levels would be reduced because sedimentation eliminated oocysts prior to their collection by the water treatment filters. Clearly, sedimentation has an impact as the multiplier for raw to spent filter backwash water is about five (5) (Cornwell and LeChevallier, 2000, Attachment 1). The discussion of the spent filter backwash literature would be more realistic if interpretation of *Cryptosporidium* levels were made within the context of this simple reality check.

For example, Cornwell and Lee (1993) developed a theoretical mass balance on the build-up of oocysts in spent filter backwash water. If a conventional treatment plant achieves 1-log removal in clarification (for which ample data exists), then the model shows an approximate increase in oocysts from raw to spent filter backwash water of 3 to 5 fold. The resulting levels of oocysts in spent filter backwash water would therefore be well within the range of influent oocyst occurrence contributing to the initial loading.

Table II.7

Table II.7 contains many errors in format and content and is difficult to read because of extraneous information and data placed in wrong columns. For example, the number of samples column contains information on which round of sampling was conducted. The column on number of treatment plants sampled contains oocyst data. The reference column contains extraneous information. These are critical errors in the presentation and interpretation of the data.

Cornwell and LeChevallier (2000) collected and analyzed raw and spent filter backwash water at 25 sites, six times each for *Cryptosporidium*. Eighteen of the sites were river sites. Samples were analyzed using immunofluorescence assay (IFA) procedures as well as separation by immunomagnetic separation (IMS) followed by cell culture PCR. Since IFA recovery efficiencies were different for the raw and spent filter backwash water, the observed detection of *Cryptosporidium* was adjusted for the efficiencies. **The spent filter backwash *Cryptosporidium* levels for the positive samples were approximately seven (7) times higher than the raw water levels after adjusting for recovery.**

Survey results based on 150 spent filter backwash water samples, coupled with a theoretical basis, support an increase of oocysts in the spent filter backwash water compared to raw water in the 5 to 10 range. Further, as stated by, *"these recycle stream concentrations will be significantly diluted by mixing with source water"* U.S. EPA (65 FR 19100, 3rd column, 2nd para.). Data do not support the hypothesis that spent filter backwash water contains high concentrations of *Cryptosporidium* that can *"overwhelm a water treatment plants filtration capacity."*

Ability of Plant to Treat Recycled *Cryptosporidium*

An underlying theme of the regulation is that a plant's ability to remove *Cryptosporidium* will be impaired by recycle. Limited data exist on the possible impacts of recycling oocysts in spent filter backwash water on treatment performance and therefore finished water quality. However, indirect evidence would suggest that treatment performance is not impacted**.**

Cornwell *et al.* (2000) (Attachment 2) conducted pilot studies investigating impacts of recycling spent filter backwash water on *Cryptosporidium* and particle removal during conventional clarification and dual media filtration at the Erie County Water Authority (ECWA) in Tonawanda, NY. This project was funded by AWWA, ECWA, and Environmental Engineering and Technology (EE&T) in order to show further insights into the impacts that recycle can have on removal of *Cryptosporidium*. The pilot plant was equipped with conventional coagulation / flocculation / clarification / filtration unit process, plus spent filter backwash holding tanks with recycle capability. The pilot plant also had capabilities to seed the process with *Cryptosporidium* oocysts, which could be sampled at multiple locations throughout the treatment process. The pilot plant was operated as a closed system with complete recycle of spent filter backwash water and no overflows or inflows other than raw water at any other location.

Recycle flow rates investigated included 0 (no recycle), 4.3, 10, and 20 percent of the sedimentation basin influent flow rate. The volume of spent filter backwash water produced was always equal to 4.3 percent of plant flow. Consequently, spent filter backwash water was recycled continuously using 4.3 percent recycle and spent filter backwash water was recycled intermittently using 10 and 20 percent recycle flows.

Pilot study results demonstrated that additional *Cryptosporidium* oocyst loading due to spent filter backwash water recycle did not reduce effectiveness of conventional clarification or dual media filters for *Cryptosporidium* removal during studies using elevated (i.e., spiked) levels of *Cryptosporidium* oocysts (>100,000 oocysts/100 L in raw water before recycle) (Figure 1). Results also indicated that the measured settled water *Cryptosporidium* concentrations were as low or lower during use of any of the spent filter backwash water recycle configurations (3,000 to 19,000 oocysts/100 L) as when no recycle was used (6,000 to 22,000 oocysts/100 L). Consequently, log removal in clarification was actually as high or higher using recycle (0.9 to 1.6 log) than without recycle (0.7 to 1.3 log) (Figure 2).

Filtered water *Cryptosporidium* concentrations were also similar during treatment with recycle versus treatment without recycle, typically with filtered water oocyst concentrations below the detection limit of 1 oocyst per 120 gal (~0.25 counts/100 L). Consequently, process efficiency for *Cryptosporidium* removal using the conditions tested was about the same using either recycle or no recycle. Overall process removal was about 5 log without recycle and about 5.7 log for each of the recycle scenarios.

Benefits Reported Are Not Supported

Combined Rulemaking Obscures Cost-Benefit Determination

AWWA was surprised to see these two rules integrated into one draft preamble. This is the first time the Filter Backwash Recycle Rule (FBRR) and the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) have been officially referenced as the Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Rule (LT1FBR). Combining these two regulations actually decreases regulatory efficiency as detailed below. AWWA strongly recommends that these two rules be developed separately and as such, split into two separate preamble and regulatory language rule packages.

These two rules have completely different backgrounds and are applicable to two different groups (with some overlap) of public water supplies. The LTIESWTR is a simple extension of the IESWTR requirements down to systems serving <10,000 people. Some minor monitoring changes were proposed to accommodate the small systems, but the basic regulatory requirements of the IESWTR will remain the same. The compliance dates for these systems with the Stage 1 Disinfectants/Disinfection By-Products Rule (D/DBPR) were set to match up with the compliance dates for the LT1ESWTR.

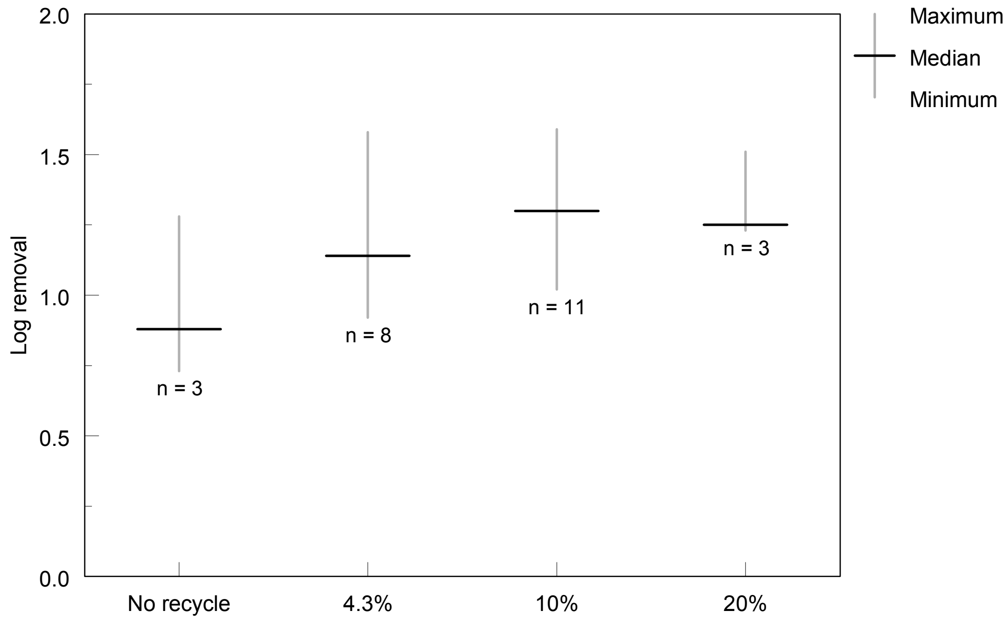


Figure 1. Impact of Spent Filter Backwash Water Recycle on *Cryptosporidium* Log Removal during Sedimentation

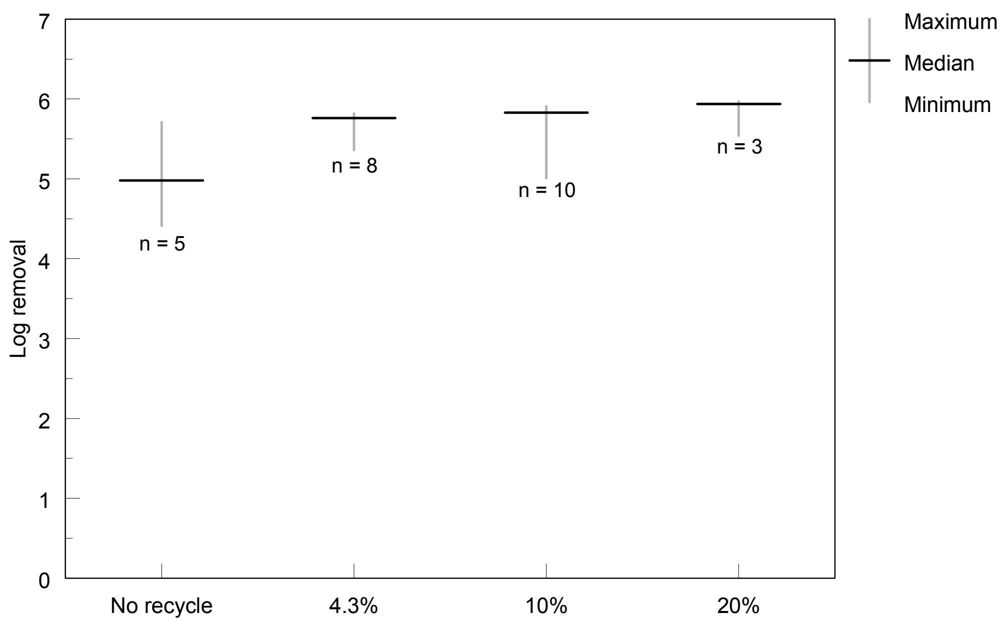


Figure 2. Impact of SFBW Recycle on Process Log Removal for *Cryptosporidium* (raw+recycle to filters)

However, the FBRR is an independent rule with its own separate section in the 1996 SDWA Amendments (§1412(b)(14)). Additionally, the FBRR will affect all systems using surface water or groundwater-under-the-direct-influence (GWUDI), not just systems serving <10,000 people.

The FBRR poses a unique regulatory challenge due to the lack of data. U.S. EPA should not use this lack of data as the reasoning to combine these two rules. Each rule should have their own Health Risk Reduction and Cost Analysis (HRRCA), as mandated by the 1996 SDWA Amendments, that can stand on its own. Both the costs and benefits should be presented as totally separate comparisons for each regulation. If the data is lacking to quantify the benefits from the FBRR, then U.S. EPA needs to clearly state the assumptions and make an attempt to quantify the FBRR benefits. These benefits would be compared to the costs as part the FBRR HRRCA and the Regulatory Impact Analysis (RIA).

Quantifying Benefits of FBR Provisions (§ VI.C.1.b., 65 FR 19122)
When conducting a sensitivity analysis one must begin with a sound premise or baseline condition. Since the IESWTR ratcheted treatment upward and the LT1 provisions of LT1FBR will do the same, then an appropriate premise is that at least 2 log *Cryptosporidium* reduction is provided by compliance with existing rules. Any associated benefit of FBR provisions must be above-and-beyond the benefit provided by IESWTR and LT1 requirements. The current analysis presumes that water treatment plants are out of compliance with the IESWTR or LT1 requirements in order to accrue benefits for the FBR provisions.

Safe Drinking Water Act - §1412(b)(3)(C)
Congress's clear intent in the 1996 Safe Drinking Water Act Amendments was that each new rule's projected benefits be articulated separately and distinctly from other existing and proposed rules. The following language is from SDWA with respect to cost – benefit analysis of MCLs

> *Quantifiable and nonquantifiable health risk reduction benefits for which there is a factual basis in the rulemaking record to conclude that such benefits are likely to occur from reductions in co-occurring contaminants that may be attributed solely to compliance with the maximum contaminant level,* ***excluding benefits resulting from compliance with other proposed or promulgated regulations****.* [emphasis added] §1412(b)(3)(C)(i)(II)

Section 1412(b)(3)(C)(ii) of SDWA sets the same standard by reference for treatment techniques, like that proposed in the FBR provisions of LT1FBR. In preparing the LT1FBR the Agency drafted a RIA, but it did not prepare a HRRCA electing to interpret §1412(b)(6)(C) of the 1996 SDWA Amendments to preclude the necessity for a HRRCA for the FBR provisions.

> *"The Administrator may not use the authority of this paragraph to establish ... to establish a maximum contaminant level or treatment technique requirement for the control of Cryptosporidium."*

Section VI.C.2.a. (65 FR 19123) of the LT1FBR states: *"The benefits associated with the filter backwash provision are unquantified because of data limitations."* Without quantified benefits the Agency does not meet the requirements of §1412(b)(4)(C). The sensitivity analysis which is offered as an estimate of benefits is inappropriate for the reasons articulated in the next section of these comments and as the Agency recognized, inadequate to estimate benefits quantitatively. Under SDWA a rigorous benefit cost analysis is required. That analysis must demonstrate that communities taking action under an SDWA regulatory provision obtain a commiserate benefit for their investment.

No Quantitative Basis in Literature
The proposed rule benefits assessment for FBR provisions preamble discussion begins with the following premise:

> *"... the literature does not quantify the extent to which performance can be lowered and, more specifically, does not quantify the log reduction in Cryptosporidium removal that may be experienced during direct recycle events.*

From this premise (i.e., that we do not know what benefit is possible) the analysis goes on to assume a range of possible benefits from 0.05 to 0.5 log *Cryptosporidium* reduction without any quantitative basis that any benefit is possible. Making the unsupported assumption that an range of log *Cryptosporidium* reduction could be lost to recycle is inappropriate to include in the basis for the FBR provisions. This assumption not only results in inaccurate cost-benefit estimates, but more importantly it misleads State primacy agencies to believe that their technical review of drinking water treatment plant recycle practices must account for as much as 0.5 log decrease in conventional treatment's *Cryptosporidium* removal.

Qualitative Benefit Adequate Basis for FBR Provisions (§ VI.I., 65 FR 19122)

While SDWA §1412(b)(3)(C) provides latitude for inclusion of non-quantifiable benefits within proposed rule cost-benefit analysis, basing an entire rule on non-quantifiable benefits is clearly an exaggeration of the Congressional language's intent. More importantly for the U.S. EPA in basing a rule on perceived, qualitative improvements in public health, it leaves the common measures of cost-benefit decision making behind and enters a very subjective arena. In doing so, the Agency decisions are open to description as "arbitrary and capricious."

As AWWA's comments on previous sections have pointed out, there are substantial flaws in the Agency's understanding of recycle practice in drinking water treatment plants. This lack of understanding combined with inadequate information on *Cryptosporidium* oocyst abundance severely limits the Agency's ability to make a sound quantitative or qualitative decision regarding recycle process management, at this time. The one point summarized in this section with sufficient merit to warrant pursuit is the potential for individual water treatment plants to be operating beyond their operating capacity, and therefore, while on average performing within the regulatory envelope, under some flow regimes operating under conditions that have the potential to impair treatment effectiveness.

The conclusion of Section I (Page 19125, Col. 3, Para. 2) is incorrect. This section and sections 4.0, 5.0, 6.0, and 7.0 of AWWA's comments identify a number of errors in the Agency's understanding of recycle practice, its potential to impair drinking water treatment performance, and the likely consequences of the rule construct proposed. AWWA strongly urges the Agency to reconsider the necessity (e.g., benefit) of regulating recycle practice as proposed.

Guidance Absent

There is a clear need to provide detailed guidance and technical assistance to assist both utilities and primacy agencies in complying with the final regulation. It is difficult for a utility to based on the proposal to really know what they have to do to comply. The recently released Draft *Implementation Guidance for the Filter Backwash Rule* is a starting point for technical assistance, however, this guidance is geared toward state and EPA Region staff, rather than drinking water utilities.

Guidance needs to be in a clear and understandable format for all users (utilities and primacy agencies). U.S. EPA needs to improve its procedures on developing guidance, based on the results from the Stage 1 Disinfectants / Disinfection By-Products Regulation (Stage 1 D/DBPR) and IESWTR. The eight guidance manuals developed for those rules were never integrated into one document that made sense out of the whole package. The technical review of these guidance manuals during their development was very inconsistent, and most importantly, the Agency expanded through the wording of the guidance the requirements of the IESWTR.

U.S. EPA recognizes that states need clarity on how to address the point of recycle return, noting *"EPA will develop detailed guidance and make it available to States and PWSs"* (65 FR 19111, 3rd col., 2nd para.). As the Agency notes, contact clarification, softening, and other WTP designs will necessitate treatment of this requirement in greater detail. Likewise, guidance will be needed for State evaluation of risk from recycled streams at direct filtration facilities: similar guidance will be needed regarding recycle practice at conventional facilities which will need to make changes as a result of the self assessment component of the rule. The proposed rule itself does not provide a meaningful basis for evaluating the full impact of the rule provisions without this guidance.

At this time, AWWA understands that these guidance manuals have not been written. Since this guidance is fundamental to assessing the impact of this rule, it is not apparent how the RIA or HRRCA can be completed until such a document has be developed and thoroughly vetted. From a broader perspective on U.S. EPA's regulatory process, the preamble, regulatory language, and guidance need to be developed and proposed as an integrated regulatory package. Unfortunately, this has not been the case with U.S. EPA's recent regulatory actions. For example, for the radon regulation, the critical guidances necessary for potential implementation of the multimedia mitigation program have not yet been developed at this time. Additionally, without the review of the guidance in conjunction with the proposed regulation, one cannot assess whether the guidance explains and interprets the regulation, or expands the regulation. This distinction is critical, as expansion of the regulation through guidance without public participation and comment was found to be improper in a recent Court decision (*Appalachian Power Company v. Environmental Protection Agency*, 200WL 336911, D.C. Cir. 2000).

Burden on State Primacy Agencies

AWWA strongly believes that understanding how recycle stream management may affect finished drinking water involves understanding the specifics of individual treatment plant source water, treatment design, operation, and recycle practice. Therefore any regulatory actions meant to address finished water impacts from recycle stream management must contend with the site specific nature of recycle processes. During typical periods of regulatory activity this would place a significant burden on State primacy agencies. In the current post-1996 SDWA Amendment implementation timeframe, the burden posed by large numbers of state-drinking water treatment utility interactions is perhaps beyond the capacity of many State primacy programs.

The FBR provisions will affect all water treatment plants, regardless of their size. Smaller plants, arbitrarily defined by U.S. EPA in this regulation as those having less than 20 filters, will be affected more than the larger ones. The State regulatory agencies will be required to respond to utility actions required in this Rule: characterization of filter backwash practices, flows, and treatment. Since each individual plant is unique, each response from the State agency will be unique. Currently, the State agencies do not have the manpower or the expertise to evaluate and comment on individual nuances in filter backwash practices.

For the reasons set forth above promulgation of the FBR provisions would clearly be an abuse of discretion.

4.0 Specific Rule Provisions

AWWA continues to believe that FBR provisions are unnecessary. However, if the Agency promulgates a final FBRR based on an evaluation process requirement triggered by the existing IESWTR individual filter exceedance criteria there is greater opportunity to benefit public health while targeting scarce state and local resources, than is possible under the current proposal.

AWWA is very concerned that the Agency will seek to pursue the current regulatory option despite the lack of demonstrated statutory need or potential benefit to public health. Therefore, AWWA has offered comments identifying specific technical flaws in the basis for the Agency's proposal and the resulting projected costs and benefits. AWWA has also considered the proposed rule structure and believes that if the Agency, continues on its current course, it could simplify the rule structure.

4.1 Alternative Solution.

If the objective for the rule provisions (§ IV.D.3.b.i., 65 FR 19112) is to "*identify those direct recycle plants that exceed their State approved operating capacity, on an instantaneous basis, during recycle events,"* (65 FR 19112, Col. 2, Para. 1) then the current approach is not effective. The requirement should be to simply require that the WTP does not exceed its rated capacity during a recycle event. The requirement should apply to all plants that recycle.

Given the fact that the individual States formally approve plant operating capacity and determining the hydraulic loading of critical treatment processes is a simple assessment, the States should be empowered to perform this hydraulic capacity evaluation. The sum of flows through the individual filters or combined filter flow (monitored prior to the clearwell) represents the best measure of process flow through a treatment plant. This process monitoring point also links directly to the Agency's stated interest in the filtration unit process. Standard monthly reports that utilities already submit to the States can be used to determine if the rated plant capacity is being exceeded. These reports can be easily expanded to report a single instantaneous maximum filtration flow for the day, which can be used to evaluate process hydraulic loading rates. If required, the process flow monitoring and hydraulic assessment could also be included in a special study, as described in the proposed FBR provisions.

While most States rate treatment plant capacity based on filtration rate, the Agency should be aware that the filtration unit process is not always the limiting unit process for determining the rated plant operating capacity. There are instances where disinfection CT or clarification processes are a more stringent constraint on plant operation. Monitoring total combined filter flow may not always allow proper hydraulic evaluation of other processes which may constrain the rated plant operating capacity. However, other readily available flow data, such as raw or finished water flow, should allow a hydraulic evaluation of all critical unit processes. The Agency must either continue to focus exclusively on the filtration barrier or (1) have the monthly State reports include the instantaneous process hydraulic loading rates for all critical process components of a treatment plant (eg. clarification, filtration, clearwell) that will dictate rated plant capacity or (2) have plants perform a special study or engineering report to monitor and evaluate these hydraulic conditions which impact rated plant capacity.

4.2 Definitions (§141.2)

Direct recycle

The FBR provisions of the proposed rule define "direct recycle" as,

> *... the return of recycle flow within the treatment process of a public water system without first passing the recycle flow through a treatment process designed to remove solids, a raw water storage reservoir, or some other structure with a volume equal to or greater than the volume of spent filter backwash water produced by one filter backwash event.* (§141.2, 65 FR 19141)

Volume versus Flow

The definition does not address the flow rate (volume/time) of recycle, which from the proposed rule provisions, appears to be the key issue being addressed. While volume is an important characteristic of the path through which recycle streams are returned to the treatment process, the more critical criteria is volume per unit time. This issue also affects the definition of "equalization" later in this same section (§141.2, 65 FR 19141). The Agency should instead use the term "equalization" in the "direct recycle" definition and then provide a technically sound definition of "equalization".

Recycle flow treatment process

To have a technically adequate definition, the Agency must make a technical judgement as to what constitutes *"a treatment process designed to remove solids"*. If the focus of the proposed rule is only on *Cryptosporidium* issues, then given the current *Cryptosporidium* occurrence information and analytical techniques, such judgement quickly becomes a subjective assessment rather than a technical analysis.

"Return of Recycle Flow"

The proposed definition does not discriminate which recycle streams are relevant to the definition. As currently written, any plant, employing any recycle practice, including minor stream recycling, is subject to the provisions stemming from being a "direct recycle." The definition of direct recycling should be clearly bounded by the recycle streams of interest (presumably spent filter backwash, thickener supernatant and liquids from dewatering processes).

Bounding the "treatment process"

The direct recycle definition also relies on the definition of the *"treatment process of a public water supply system"* for which a definition is not specified. However, based on information provided by U.S. EPA staff, "direct recycle" would not include water treatment plants returning recycle streams upstream of their raw water intake. Essentially, returning streams to raw water supply should be treated as taking the stream out of the drinking water treatment process. This distinction should be clarified as the current "direct recycle" definition only addresses raw water reservoir returns.

Equalization

As in the case of the proposed "direct recycle" definition, the "equalization" definition is incorrectly based on volume, not flow rate, and does not limit the recycle streams being addressed. The definition of "equalization" impacts the number of water treatment plants captured by the self-assessment provisions as the same language is used in the definition of "direct recycle." The term "equalization" is also used in the requirements for data to be submitted to states by direct filtration facilities.

By including only volume, the current definition does not address hydraulic surge issues as both detention volume and flow rate control are required components of equalization. In practice, equalization involves changing the flow rate and/or solids concentration characteristics of a recycle stream, typically by passage through a structure with sufficient volume to achieve desired objectives in conjunction with control of the rate of recycle flow leaving the structure to a level significantly lower than the rate at which it was produced during filter backwashing. The Agency should propose a definition that is consistent with industry meaning if such practices are to be regulated.

Recycle

The definition of "Recycle" in this section is very broad and generic but not particularly useful as the proposed rule does not address all "recycle" but is apparently limited to *"spent filter backwash, thickener supernatant, or liquids from dewatering processes"*. The proposed definition of recycle includes recycle streams that are not proposed to be regulated. Thus, a separate definition of regulated recycle streams may be appropriate and more useful. Also, the specific recycle streams of concern for direct filtration facilities are not described.

Problem with any Definition

The inadequacies noted above with respect to the proposed definitions highlight the inherent problem the Agency must face in trying to regulate a sub-component of the drinking water process that is so specific to each drinking water treatment facility. The Agency should not attempt to define such terms as direct recycle or equalization. As for all treatment plants, facilities that recycle must comply with filtered water turbidity requirements and not exceed State approved treatment capacity. These controls effectively *"govern the practice of filter backwash recycle"* without any need for definitions of new terms.

4.3 Point of Return (§ IV.D.3.b.iii., 65 FR 19111)

U.S. EPA has made important, positive changes to the proposed rule language since the initial draft preamble was circulated. AWWA supports the Agency's finding that recycle streams should typically not be returned to the clarification process or directly onto the filter, but finds serious flaws in the technical basis for eliminating return simultaneous with primary coagulant addition. For the major process streams targeted in this rule, the return point should be prior to or simultaneous with the first point of primary coagulant addition. This definition should be included in the final rule with specific caveats that address the return of the targeted recycle streams treated for particle removal and those returned post-inactivation for *Cryptosporidium* .

The Science Advisory Board, Drinking Water Committee also identified the current definition as problematic, noting that appropriate coagulant dosing and mixing were the controlling factors, not the exact point of recycle return. There is concern among AWWA members that State discretion afforded in section §142.16(b)(2)(v) may not be utilized in practice, thereby increasing the financial impact of the rule without a corresponding increase in improved drinking water treatment.

Rational Basis: Sound Treatment Practice

The recycle return location should be based on a sound understanding of the water treatment plant and not impair water treatment performance by recycle flow return. The recycle should be introduced at a return location appropriate for maintaining control of coagulant application for the water quality and quantity entering the coagulation-flocculation-clarification-filtration process. For the major process streams targeted here, the return point should be prior to or simultaneous with the first point of primary coagulant addition. AWWA recommends that this definition should be included in the final rule.

The actual impact of recycle return is a site-specific combination of the water quality of the recycle stream, the quality of the water stream to which recycle is added (usually raw water), the relative flow contribution of the recycle stream, the point of recycle return, and the actual hydraulic and coagulant dosing controls exercised by treatment plant operators. The outcome of this combination of factors is best controlled by current regulations governing filtered water quality, not by attempts to prescribe practice for some subset of these factors (i.e., point of recycle alone).

The effectiveness and efficiency of treating surface water is not impacted by whether the recycle flow is returned prior to or concurrent with the point of primary coagulant feed. The critical elements needed to ensure that proper particle destabilization and coagulation is achieved are proper chemical dose and mixing. Both of these elements can be successfully achieved regardless of the relationship between the point of chemical (primary coagulant) addition and recycle. In the treatment process, chemical dose is controlled and optimized by a combination of flow pacing (manual or automatic) and on-line coagulation control (eg. Streaming Current Detector) or manual monitoring of particle destabilization. A homogenous mixture, containing the raw water, recycle and chemicals, is produced during the mixing process. The sample point for either on-line coagulation control or manual process monitoring is always downstream of the primary coagulant feed and mixing. Therefore, as long as the point of recycle is before or simultaneous with the primary coagulant feed and the coagulant control sample point, proper treatment can be maintained.

Coagulant dose is maintained to optimize treatment. Following sound water treatment practice and complying with the IESWTR and LT1 provisions of the LT1FBR, water treatment plants manage the coagulation-clarification-filtration unit operations primarily to remove particulate matter. A subset of that particulate matter, *Cryptosporidium* oocysts, is the contaminant targeted by the FBR provisions of LT1FBR. Water treatment plant operations are evaluated based on the provision of finished water quality that is compliant with the turbidity requirements (1) $\leq$ 0.3 NTU in 95 percent of observations, (2) never exceed 1 NTU, and (3) turbidity from individual filters remains below established set points. Consistently maintaining these finished water objectives are the clearest demonstration that coagulation is appropriate and that the coagulation-clarification-filtration unit operations are appropriately designed and operated.

The Agency's Rational are Not Technically Sound (§ IV.D.3.b.ii., 65 FR 19111)

The Agency articulates three reasons for requiring recycle return prior to the point of primary coagulant addition. The Agency's first point refers to potential problems if recycle is added after coagulant addition. In general, AWWA agrees with the Agency, although in specific cases, the recycle flow may exert no coagulant demand (i.e., highly treated recycle or recycle of already destabilized particles with the same characteristics of particles produced in the treatment process). In this situation addition, even after coagulant addition, may be proper. In most instances, return prior to or simultaneous with mixing of raw water and primary coagulant allows for good mixing and appropriate, recycle condition specific, coagulant dosing. Therefore, recycle return simultaneous with primary coagulant addition should be allowed.

The Agency also states (here and elsewhere) that recycle streams *"can contain residual coagulant and other treatment chemicals…"*. This wording is inaccurate and misleading, and could apply to any water stream, including finished water. In proper drinking water treatment, added coagulants either undergo chemical reactions and precipitate as solids or are adsorbed to solids. True "residual coagulant" only occurs in improper operation such as a synthetic polymer overdose or in the case of extreme changes in pH. The recycle stream water (if untreated) contains constituents removed during filter backwash, constituents not removed by thickeners or dewatering (if part of recycle) as well as any treatment chemicals added subsequent to filtration but prior to the clean backwash water source (i.e., disinfectant, corrosion control, pH control, fluoride, etc,). Thus in some cases, recycle contains already destabilized particles in water at the same pH as desired for coagulation and flocculation; recycle may then improve subsequent flocculation and clarification processes. In other cases, the recycle characteristics may be such that altered coagulant dosing is needed which can be accomplished by coagulant addition simultaneous to or after the point of recycle.

The Agency's second and third points refer to recycle addition after coagulation, so do not impact simultaneous addition. The third point regarding addition to clarification does not seem appropriate as it suggests that possibly all flows do not experience sufficient residence time for solids removal. This condition should not occur as long as plants operate at all times within State approved capacity, including during recycle. If the Agency's concerns were valid, the primary impact would actually be increased cost of additional coagulant, as compliance with finished water standards and treatment techniques require consistent finished water quality despite fluctuations in raw water characteristics.

The preamble on page 19111 (65 FR 19111) includes nine study references to buttress the three rationales provided for the proposed requirement. None of the studies present data that suggests that return of recycle streams simultaneous with coagulant addition does not work. AWWA supports the Agency's finding that recycle streams should typically not be returned to the clarification process or directly onto the filter, but finds serious flaws in the technical basis for eliminating return simultaneous with primary coagulant addition.

AWWSC: A review of the point of recycle relative to the point of primary coagulant addition at 38 surface water treatment plants, practicing recycle, within the American Water System found that of the 38 surface water treatment plants, 33 recycle prior to the point of primary coagulant addition, 3 have concurrent recycle / coagulant feed (all small, older plants in West Virginia), and 2 recycle post-clarification (St. Louis County). While the review recognized the issues with the two plants recycling post clarification, no difference was recognized in finished water quality or process control between "coagulant post recycle" and "coagulant concurrent with recycle" plants. Based on this information, AWWA would support the FBR provision allow the point of recycle to be prior to or concurrent with the point of primary coagulant feed, unless adequate mixing or process control cannot be maintained.

Managing Treated Recycle Flows

The proposed filter backwash recycle provisions premise includes the assumption that advanced disinfectants (e.g., ozone, chlorine dioxide, and UV) are not in use prior to clarification and / or filtration (see § IV.D., 65 FR 19098). There are some plants that currently employ advanced disinfectants; one example is Milwaukee, WI. These water treatment plants are subjected to the same recycle management requirements as facilities currently providing less treatment. These plants have increased the number of barriers in their multiple-barrier treatment strategy, but are not receiving credit for providing this additional measure of protection from *Cryptosporidium*.

The point-of-recycle-return is being applied very generally. As drafted, §141.73 (b) specifies that affected recycle streams in all subpart H systems employing conventional or direct filtration must return recycle flows to a point prior to the point of primary coagulant addition (1st column, 4th paragraph, 65 FR 19142). This regulatory construct does not exclude water treatment plants that treat their recycle streams. Treatment options exist to reduce solids loading in recycle streams and disinfect these streams (e.g., ozone, chlorine dioxide, and UV have all been proposed as disinfectants for *Cryptosporidium*). While State discretion may reduce the impact of this provision, the blanket, default assumption lacks a technical basis and results in a misallocation of scarce resources at the local level. If systems have invested in removal or inactivation, then restraints on the point-of-recycle return should be much more flexible. As an example, New York City has researched the application of membrane treatment to its backwash streams anticipating direct discharge of the treated stream to the finished water clear well. If the federal regulation does not recognize these kinds of considerations it is likely that subsequent interpretation by the States and Regions will assume that its absence is deliberate.

Responding to Point-of-Recycle Return Request for Comment (§ IV.D.3.a.iv., 65 FR 19111)

The above discussion provides information relevant to the following specific requests for comment raised by the Agency with respect to point-of-recycle return:

> *2. What treatment processes or treatment configurations may need an alternative recycle location to maintain optimal treatment?... 3. What alternative recycle locations are appropriate for such treatment configurations and what location may be inappropriate?... 4. Are there other reasons, beyond maintaining optimal treatment efficiency, to justify granting alternate recycle locations to plants? What are they?... 5. What criteria, operating practices, or other parameters should be evaluated to determine whether an alternative recycle return location should be granted?... 6. Does recycling at the point of primary coagulant addition, instead of prior to it, provide assurance that an appropriate dose of treatment chemicals will be consistently applied during recycle events? Is it necessary to mix the recycle and raw water prior to chemical addition to ensure a consistent water chemistry for chemical dosing?... 7. Are there circumstances where it would be appropriate to allow systems to recycle at the point of primary coagulant addition?* (65 FR 19111)

Flow pacing of coagulant will be addressed in a response later in these comments.

To summarize, the recycle return location at any given drinking water treatment facility should be based on a sound understanding of the water treatment plant and not impair water treatment performance by recycle flow return. The recycle should be introduced at a return location appropriate for maintaining control of coagulant application for the water quality and quantity entering the coagulation-flocculation-clarification-filtration process. For the major process streams targeted here, the return point should be prior to or simultaneous with the first point of primary coagulant addition. Recycle streams treated for particle removal and those derived post-inactivation (*Cryptosporidium* oocysts inactivation) are clear examples of recycle stream returns for which there is no technical merit for any restriction of the point-of-return as proposed in the rule.

4.4 Twenty Filter Cut-Off

The Agency proposes that self assessments be performed at conventional surface water plants that:

1. Employ 20 or fewer filters to meet production during the highest production month, and
2. Recycle spent filter backwash water without first flowing through a structure with a volume equal to or greater than the volume of spent filter backwash water produced by one filter backwash event.

The Agency states on page 19112 of the LTIFBR preamble:

> *"The goal of the self assessment is to identify those direct recycle plants that exceed their states approved operating capacity, on an instantaneous basis, during recycle events"* (65 FR 19112, 2nd col., 2nd para.).

And further on page 19113:

> *The Agency believes that 20 filters is an appropriate number for specifying which plants are required to perform a self assessment due to the results in Table IV.20..."* (65 FR 19113, 1st col., 2nd para.)

AWWA does not dispute the stated goal, *"that plants should not exceed their State approved operating capacity on an instantaneous basis."* However, the requirements do not meet the goal.

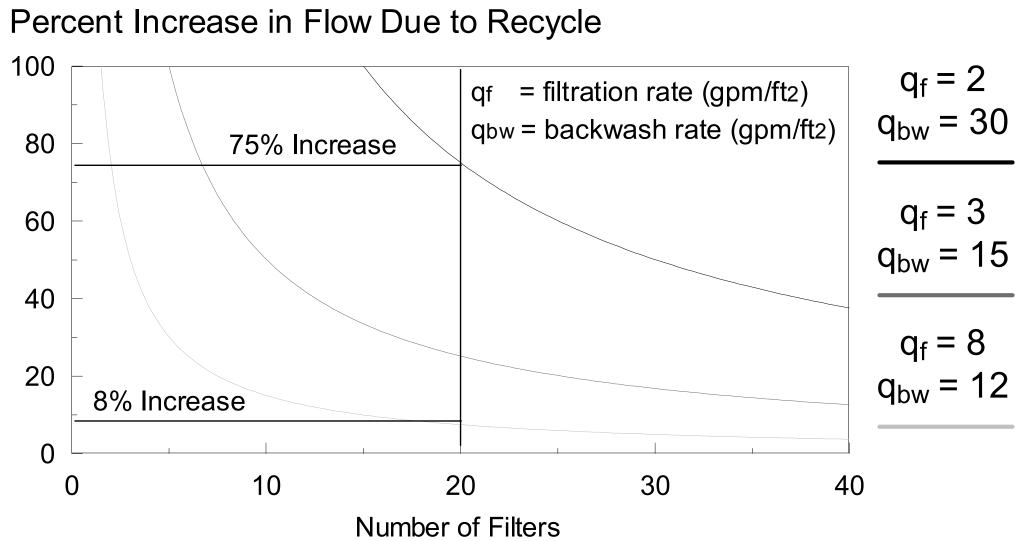
The 20 filter requirement is apparently primarily arrived at from a calculation that tends to show that the percent recycle is greater than about 25 percent when plants have less than 20 filters and below about 25 percent when the plants have over 20 filters. Several assumptions are necessary to perform this calculation, namely a maximum filter size of 700 ft^2 and a backwash rate of 15 gpm/ft^2. By back calculating, U.S. EPA has used a design filter loading rate of about 2.3 gpm/ft^2. In reality, many plants now are designed at rates much higher than this, and the 700 ft^2 maximum filter size limitation is often exceeded in modern designs. Further, the backwash rates of 15 gpm/ft^2 can vary greatly by type of media, type of backwash system, and water temperature. A more appropriate set of conditions that reflect current operating ranges would be:

Filter loading rate	=	2 to 8 gpm / ft^2
Backwash rate	=	12 to 30 gpm / ft^2

Given these ranges, it is possible to calculate recycle percentages as done similarly to Table IV.20 and as shown in Figure 3. This figure shows that a plant with 20 filters could be recycling anywhere from 8 percent of influent flow to 75 percent of influent flow depending upon its operating conditions. Using the proposed requirement, plants with less than 20 filters must do an assessment, and the implied goal of less than 25 percent recycle, plants could clearly be forced into an assessment they would not need to do. On the other hand, plants could have over 20 filters and be exempted, when they could have very high direct recycle rates.

The 20 filter cut off point is arbitrary and falsely includes and falsely excludes plants from conducting a self assessment, and does not directly relate to the stated goal.

Figure 3. Impact Of Filter Loading Rate And Backwash Rate On Water Treatment Plant Flow During Direct Recycle



The second criteria required to conduct a self assessment is that, in essence, flow equalization volume must be less than one backwash volume. If a plant has over one backwash volume it is presumed to not be "direct recycle". Recycle percentage, and thereby hydraulic impacts, are a function of flow rate not storage volume. In fact, the attached figure would meet the requirement of having a volume equal to one backwash and would still be returning recycle at the rate that spent filter backwash water is produced. To illustrate, if a plant backwashes for 15 minutes, has storage equal to one backwash volume, and backwashes a filter every 30 minutes, than the storage tank is pumped out over a 15-minute period; the same as the production time. The "equalization" tank has served no purpose in equalizing flow. The key for equalization is the rate of return to the plant. Three illustratory examples (Table 2) of percent recycle show this:

Table 2. Rate of Return is Key to "Equalization"
(Storage volume = 1 backwash, Number of filters = 20)

Filter rate (gpm/ft^2)	Backwash rate (gpm/ft^2)	Percent recycle		
		Backwashes per hour		
		2	1	0.5
2	30	75%	25%	9%
3	15	25%	10%	5%
8	12	8%	3%	1%

So for one backwash volume of storage and 20 filters, the range of percent recycle can be anywhere from 1 percent to 75 percent. The 20-filter criteria and the direct recycle definition as proposed are subject to too wide of fluctuations in industry practice to be useful.

4.5 Direct Filtration

Direct filtration should not be called out specifically in the rule framework. Rather water treatment plants employing direct filtration should be addressing recycle issues just as water treatment plants employing a conventional treatment process. The goal of this rule should not be to dictate specific water treatment processes but ensure finished water quality.

The FBR provisions should address granular media filtration plants, both conventional and direct, under the same construct. As U.S. EPA points out,

> *"...a fundamental tenant of water treatment is multiple treatment barriers should be promoted to prevent microbial pathogens from entering finished waters."* (65 FR 19111, 2nd column, 4th paragraph).

Direct filtration plants depend on a watershed control barrier (i.e., high source water quality) in place of clarification. U.S. EPA recognizes source water quality as a factor that influences the level of treatment to control recycle event induced hydraulic disruption

> *"A uniform national equalization standard may not be appropriate because it would not allow consideration of site-specific factors such as plant treatment efficiency, loading capacity of clarification and filtration units, source water quality, and other site-specific factors that influence the level of equalization a plant may need to control recycle event indicted hydraulic disruption."* (65 FR 19115, 2nd col. 1st para.)

U.S. EPA raised the potential concern that direct filtration plants do not have a solids removal process for their recycle stream. While the EE&T Survey documents that almost all direct filtration plants have a solids removal process for their recycle stream, it did not definitively determine that solids removal was taking place at about 7% of direct filtration plants surveyed. A subsequent re-survey (May, 2000) found that all of the direct filtration plants surveyed in the EE&T Survey did indeed treat their recycle stream for solids removal. If there are any direct filtration plants without solids removal (AWWA is not aware of any), then it would be appropriate under State review to determine if any plant modifications are necessary. States would not require any additional authority beyond their present powers to conduct such a review.

Survey Responses Flawed

Concern was raised during the initial data compilation phase of the FBR provision development, when an AWWA survey included responses from public water systems with water treatment plants employing direct filtration, where the respondent indicated that recycle was practiced but that this stream was not treated to remove particles. AWWA and U.S. EPA staff questioned this initial response and in the subsequent preparation of the Background Papers on Potential Recycle Streams in Drinking Water Treatment Plants. The Drinking Water Committee of the Science Advisory Board also questioned the accuracy of these survey responses. In preparation for submittal of AWWA's comments on the FBR provisions, EE&T re-surveyed each of the direct filtration facilities which had previously indicated that recycle streams were returned without particle removal and found that each was employing some type of solids removal process, typically clarification.

4.6 Self Assessments

Monitored Flows (§ IV.D.3.b.iii., 65 FR 19114)

The proposed FBR provisions do not reflect that there may be multiple points of recycle return and that there may be multiple recycle streams returning simultaneously and independently of recycle return. The proposal also fails to complete the mass balance on flow by capturing the filtered water flow. Capturing the appropriate "plug" of water (assuming plug flow) as it moves through the water treatment plant will make completing the mass balance difficult, as the appropriate filtered water flow would not be captured simultaneously with the recycle and source water flows. The complicated nature of a technically sound monitoring scheme significantly burdens the proposed regulatory approach.

Sampling Regime (§ IV.D.3.b.iii., 65 FR 19114)

The proposed rule requirements as described in the preamble reflect an 8 hour workday when water treatment is a 24 hour, 7 day per week operation. While some small systems employ an 8 hour workday, specifying a monitoring regime based on an 8 hour workday is not appropriate and will lead to erroneous information by:

1. Requiring an atypical backwash cycle
   - Backwash frequency,
   - Backwash timing, and
   - Indirectly, backwash volume.

2. Specifying a data acquisition frequency based on assumptions about backwash practice that may not be true at individual plants.

Alternative Wording (§ IV.D.3.b.iii., 65 FR 19114)
If this requirement remains in the final rule it should be significantly revised to achieve the stated aim in the preamble. Alternative wording for §141.76(c)(2)(i)(C) (complete replacement) would be:

> *During the month identified in paragraph (c)(2)(i)(A) of this section, separately monitor source water influent flow, recycle flows before their convergence, and filtered water flow during 30 filter backwash recycle events, at three (3) equally spaced readings over the duration of the backwash period. No more than 5 backwash events may be monitored and reported from any single calendar day. Record the time filter backwash was initiated, the time when influent and recycled flow were monitored, and the time filter backwash recycle event ended. Record the number of filters in use when the filter backwash recycle event is monitored. State may allow monitoring period to extend to longer period in order to facilitate monitoring the desired thirty (30) independent backwash events.*

The costs and logistical difficulties associated with a technically sound monitoring strategy using U.S. EPA's model are higher than that reflected in the RIA. The incremental benefit of the Agency approach over the approach recommended by AWWA in the above section are minor.

Request for Comment- Operating Capacity (§ IV.D.3.b.iv., 65 FR 19116)
Comments above with respect to Self Assessments and Twenty Filter Cut-Off directly address comment requests made in this section of the preamble. AWWA proposes alternative monitoring parameters, alternative monitoring frequency options, and criteria for applicability of the self-assessment requirement.

4.7 Appropriate Treatment

Current Data Limitations – Recycle Flow Treatment (§ IV.D.3.b.iii., 65 FR 19115)

In the proposed rule preamble, U.S. EPA identifies specific data which U.S. EPA notes are not available, but are necessary to determine if recycle flow treatment is required at drinking water treatment plants. The data identified include:

1. Oocysts concentrations and plant characterization;
2. Data correlating oocyst concentrations in recycle streams and finished water; and
3. Data on ability of full-scale sedimentation basins to remove oocysts during normal operation and during recycle events.

AWWA concurs with the Agency that inadequate information exists on the concentration of live, infectious oocysts in source, recycle stream, and finished water. Moreover, a sound *Cryptosporidium* analytical method for monitoring of source, finished, and backwash water is not available, and a robust analytical method that identifies viable oocysts is not likely in the near future. AWWA is concerned that, the establishment of a recycle flow treatment requirement in the face of (1) the current uncertainties surrounding influent oocyst concentrations and (2) the limited tools available to demonstrate treatment efficacy, would result in extensive capital investment at drinking water utilities which with better information we may find to be unnecessary or identify more cost-effective means of addressing.

In the proposed rule the Agency does not determine that recycle flow treatment is necessary, but it does set a process in motion, that when implemented, will force individual States to make plant-by-plant determinations if recycle flow treatment is necessary. These State decisions will be subject to the same limitations that currently limit national decisions. Unfortunately, States will have a condition of primacy, the requirement to complete their reviews within the designated compliance period, and may, as a result, reach hastily drawn conclusions in face of short time lines and incomplete data sets. This unsatisfactory result could be compounded by the recommendations made in the U.S. EPA's FBR provision guidance. This guidance is not available, and likely will not be available until after the FBR provisions are published as a final rule. Therefore, AWWA is very concerned that the actual impacts of the proposed FBR provisions will be underestimated by the Agency.

Request for Pilot and Full-Scale Data (§ IV.D.3.b.iii., 65 FR 19115)

On page 19115 (2nd col. 2nd para.) of the proposed rule preamble U.S. EPA submission of pilot and full-scale data sets that will inform the Agency with respect to recycle flow equalization. The following studies are attached in response to this request for data:

1. Cornwell and LeChevallier, AWWARF, 2000 (Attachment 1)
2. Levesque *et al.*, Water Quality Technology Conference paper, 1999 (see Attachment 3)
3. Tobiason *et al.*, Water Quality Technology Conference paper, 1999. (see Attachment 4)
4. Cornwell *et al.*, AWWA Mass Balance Study, 2000 (see Attachment 2) and

4.8 Compliance Timeline

Table 3 summarizes the FBRR Provisions as outlined in the *Implementation Guidance for the Filter Backwash Rule* (U.S. EPA, Draft, April, 2000). The proposed rule timeline contains three significant flaws:

- Most FBRR actions will be completed prior to State Primacy approval,
- Does not reflect linkage in capital improvements needed to address point of recycle return, operating capacity, and recycling practice changes, and
- Emphasis on State generating reports for U.S. EPA rather than technical evaluation of information provided by systems.

Gaining Primacy

In order to implement the FBR provisions on the timeline proposed, States will have to instruct and guide system compliance without having received authority from their respective legislators. The role of the legislator's approval is not only key to ensuring appropriate authorities are available to the Primacy Agency it is essential to obtaining adequate resources to adequately staff the implementation of the FBR provisions.

The FBRR provisions require that States make technical evaluations regarding sound treatment practice. U.S. EPA will not provide guidance to the States until 2001; States will need to evaluate their current design standards and determine how the Agency's approach under FBRR is different from their current approach and then adopt polices and procedures to guide technical review within the State. The State's engineering staff will then need to be trained in the resulting decision making process. Some States may also need to hire appropriately skilled staff to conduct these reviews or obtain contract support for this review process. Once adequately trained staff is in place, the State will be charged with reviewing every Subpart H system under its management. To complete the review process on the schedule proposed the States will have to begin allocating funds two years or more prior to U.S. EPA granting the program primacy. This investment of resources will be at risk until primacy is granted and the U.S. EPA acknowledges that the State's approach is adequate. This situation is inappropriate, and the rule implementation timeline should be adjusted to reflect the start-up period provided States in §1413(a)(1) (e.g., 2 years with a possible 2 year extension), a reasonable period for technical interaction between the State and utility, and an appropriate construction period for utilities.

Capital Improvement Planning

The draft *Implementation Guidance for the Filter Backwash Rule* treats each of the FBR provisions separately, when in fact any of the three rule components (i.e., point-of-recycle-return, recycle practice, operating capacity) could result in significant and inter-related capital improvements at impacted drinking water treatment plants. In order to manage construction costs and ensure that a cohesive response to the rule provisions, effected utilities making changes will not design and implement changes until the State review of the self assessment and the State's final expectations for recycle practice at the plant are clear. Utilities will not have this information until some time after November, 2004.

Therefore, if State technical review takes one quarter, utilities will have less than 5 months to draft design and operational changes, obtain State review and approval, procure materials and construction contracts, construct improvements, and obtain State review / approval of as-built improvements.

In the event that based on historic information a utility does move forward to just make changes to the point-of-recycle-return, the period to obtain State review and approval, procure materials and construction contracts, construct improvements, and obtain State review / approval of as-built improvements is 20 months. While 20 months will allow simple changes in yard piping, some systems will encounter site-specific and design-specific limitations that will require longer performance periods and may need to obtain an extension under §1412(b)(10) for major capital improvements.

Any utility that installs treatment of the recycle streams targeted in the FBR provisions will be making significant capital improvements and will likely require an additional 2 year extension under §1412(b)(10) for major capital improvements.

Reporting versus Technical Evaluation

The rule provisions and draft *Implementation Guidance for the Filter Backwash Rule* emphasize reporting schedules. The core of the rule is plant-by-plant evaluation of recycle practices and associated interaction between the utility and the State. The time afforded by the proposed compliance dates in the rule do not adequately reflect either the number of evaluations taking place or the level of technical information involved in these evaluations. The Agency like commenters on the proposed rule provisions may have found this aspect of the rule hard to reflect due to the lack of technical guidance.

5.0 Review of the Regulatory Impact Analysis

5.1 FBRR Health Risk Reduction and Cost Analysis

The Regulatory Impact Analysis (RIA) does not include a Health Risk Reduction and Cost Analysis (HRRCA) for the FBR provisions. The FBR provisions are being proposed by separate and unique language within the SDWA Amendments and deserving of separate and complete analysis per §1412(b)(3)(C) and §1412(b)(3)(C) – (D). The LTIFBR RIA analysis and subsequent text in the rule preamble do not meet the scope or intent of the requirements for a HRRCA as stated in the SDWA.

5.2 General Comments on the RIA

The LT1FBR RIA is an important document in not only its implications for the affected rulemakings but as one of the first post-1996 SDWA Amendment RIA’s it will set precedents for future rulemakings. There are numerous, critical inconsistencies outlined in the approach and methodologies of the RIA and the *Cost and Technology* support document. It is very difficult to comprehend exactly what U.S. EPA did to generate the benefit and cost numbers that are reported. It is often not clear what data are used, or how they are manipulated as part of he analysis. These problems severely handicap stakeholders in their efforts to provide informed input to U.S. EPA in the development of the final regulation.

This lack of transparency, reproducibility, and internal consistency, coupled with questionable assumptions has resulted in calculated costs and benefits attributed to the LT1FBR and particularly the FBR provisions that appear to be seriously flawed.

5.3 Chapter-by-Chapter Review

The following is a chapter-by-chapter review of the RIA accompanying the proposed LT1FBR, focusing on issues particularly relevant to the filter backwash recycle rule components. Significant limitations in the RIA exist because of the following limitations in the RIA approach.

- The AWWA Fax Survey provides an informative snapshot of recycle practices, but it does not represent a statistically valid result that could be used by U.S. EPA to develop the FBR.

- Individual States will ultimately determine the actual impact of the FBR on the water utilities. However, U.S. EPA did not appear to consider the impact of existing recycle guidelines/rules employed by individual States (i.e. allowable percent recycle).

- The estimated costs provided by U.S. EPA contain numerous invalid assumptions and the actual costs incurred by utilities could be significantly higher.

- There is insufficient scientific data to estimate benefits associated with the FBR.

Chapter 3 – Consideration of Regulatory Alternatives

Alternative R1 – page 3-8, the point of recycle return should include a location at the point of primary coagulant addition, provided that the recycle flow passes through all unit processes without exceeding the plant's rated capacity of each unit process. The reasons provided by U.S. EPA in the proposed rule for only allowing a recycle point ahead of the primary coagulant addition do not validate eliminating recycle addition at the point of primary coagulant addition from consideration.

Alternative R2- page 3-8, the selection of performing a self assessment for plants with 20 or less filters does not meet EPA's objective of identifying those plants that exceed the plant's rated design capacity. For example, plants with equalization and/or treatment could still potentially exceed their rated capacity, even though per the proposed rule, these plants do not have to perform a self assessment.

On page 3-9, item 1, it states that the self assessment report must include *"all source and recycle flow measurements…"*. The term *"all source"* should be further clarified whether this is raw water flow or the individual sources that produce the total recycle stream.

Chapter 4 – Baseline Analysis

Exhibit 4-19 indicates the recycle practices based on population served. It is indicated that this information was obtained from the AWWA Fax Survey. However, the values shown in Exhibit 4-19 do not match the values previously reported in the FBR preamble, Table IV.15. No clarification is provided why the values changed.

On page 4-16 states that the Fax Survey provide a *"good representation of plants serving population of less than 10,000 people"*. However, it should be noted that only 43 plants (0.37 %) serving less than 10,000 people responded to the survey, out of a total of 11,593 systems serving less than 10,000 people (ref. page 4-3). While the Fax Survey does provide an informative snapshot of recycle practices, it does not represent, nor was it intended to produce, a statistically valid result that should be used by U.S. EPA to establish a nationwide rule and associated cost benefit analyses to justify the rule. The same issue holds true for plants serving more than 10,000 people. Based on the information provided in Exhibit 4-19, the responses to the Fax Survey ranged from 5 % to 25 % of the total plants in population category ranging from 10,000 to >100,000, respectively.

In Exhibit 4-21, the number of systems affected by each practice does not equate properly at all times when the percent of system is applied to the total number of plants. For example, the number of systems affected by the percent of conventional systems with direct recycle do not equate. Since the data in Exhibit 4-21 form the basis for all subsequent cost calculations, the overall accuracy of the costing would be in question.

Chapter 5 – Benefits Analysis

Health surveillance data does not demonstrate a need for additional treatment requirements beyond the steps already being implemented under IESWTR and LT1 provisions. May 26, 2000, the Centers for Disease Control published *Surveillance for Waterborne-Disease Outbreaks – United States, 1997 – 1998*. Ninety percent of outbreaks attributed to parasites in 1997 – 1998 *"were associated with recreational use of treated water in venues such as swimming pools and fountains, and human fecal accidents were suspected in most of these outbreaks"* (MMWR, Page 16, Para. 2). This pattern is particularly strong when contrasted with outbreaks of bacterial origin, which decreased over the reporting period and observed instances were attributed to inadequate disinfection. In total community water system (CWS) employing filtration to treat surface water or GWUDI accounted for none of the cryptosporidiosis outbreaks observed in 1997-1998, and the single acute gastrointestinal illness of unidentified etiology outbreak associated with a community with a surface supply related to a distribution system deficiency (MMWR, Table 3, page 24). Since 1980, waterborne-disease attributable to drinking water has demonstrated a declining trend to less than 10 observed outbreaks do to all causes each year in 1996, 1997, and 1998. Over the last decade recreational water use has routinely resulted in 15 or more outbreaks each year and shown an increasing trend in gastroenteritis outbreaks. In 1998, gastrointestinal illness outbreaks from recreational exposure accounted for more outbreaks than all outbreaks due to drinking water.

The reported benefits of the FBR provisions are entirely based on the assumption that improving the recycle practices will prevent the accumulation of *Cryptosporidium* within the treatment plant and minimize the risk of oocysts entering into the finished water. The benefits, however, cannot be quantified with valid scientific data.

On page 5-39, U.S. EPA states that the number of systems affected by the self assessment is uncertain because the States will determine whether systems are required to modify recycle practices to address public health risk. Since the States will utilize EPA's guidance manual to assess the recycle practices for each affected system, it is difficult to understand why U.S. EPA cannot produce a reasonably accurate estimate of the number of systems that will be affected and the associated costs.

On page 5-40, U.S. EPA assumed that installing equalization to eliminate exceedences of State approved operating capacity or moving the recycle return location from the sedimentation basin to prior to the point of primary coagulant addition will result in a health benefit by returning the system to a 2.0 log removal of *Cryptosporidium* and thereby improving finished water quality. There are, however, no scientific data to quantify and/or substantiate any finished water quality impacts directly attributable to recycle practices.

Exhibit 5-20, shows potential cost benefits for moving the recycle return for systems serving 1,900 and 25,108 people. The annualized costs for moving the recycle location are based on the costs shown in the C&T document. As discussed under Chapter 6, item 3 below, there are serious flaws in the assumptions and technical data utilized in the costing of moving the point of recycle.

Fundamentally the RIA's benefits analysis rests on the assumed distribution of source water oocysts and the resulting projected distribution of oocysts in finished water. U.S. EPA failed to use the best available data in that the current benefits analysis was not informed by the ICR *Cryptosporidium* occurrence information. Use of the ICR data would alter the assumed distribution of source water oocysts and subsequent estimates of endemic disease substantially. Section 7.3 of AWWA's comments offers some insights in to the ICR *Cryptosporidium* oocyst data.

Chapter 6 – Cost Analysis

Install Recycle Flow Equalization

The volume of the equalization basins for system sizes above 0.24 mgd is unrealistically low and ignores plant operation requirements (Page 6-6). For example, it is assumed that a plant with 12 filters would only require a basin volume equal to two backwashes. The assumptions made in the cost analysis (see C&T Appendix E-1) is that recycle flow is equalized over 23 hours. Therefore, the equalization volume of two backwashes would restrict the 12-filter plant to backwashing no more than two filters in a 4-hour time period. This is a significant restriction on plant operation that would not allow the plant to backwash filters as needed to maintain finished water quality.

Install Piping for NPDES

Piping alone is not sufficient to obtain an NPDES permit. Solids removal and generally dechlorination is required (see Page 6-9).

On page 6-27, Recycle to New Return Location, the RIA indicates that 791 systems will need to move their recycle point. It is unclear how this value was determined, and the value does not match the values in Exhibit 4-21 for the percent of systems that recycle after rapid mix (total of 1,066 plants).

On page 6-29, Exhibit 6-19, it is unclear how the number of systems affected by the new return location were obtained. Also, the system start up and reporting costs state that 50 hours are estimated for plants serving less than 1,000 people, while 36 hours are estimated for plants serving more than 10,000 people. These hours appear very optimistic, since most plants that recycle after the rapid mix usually have inherent physical or technical difficulties why the recycle could not be returned originally ahead of the rapid mix. Consequently, a system's time to investigate this and plan potential solutions would require vastly more time than estimated by EPA.

On page 6-30, Exhibit 6-21, the capital costs for the recycle to a new return location described in the *Cost and Technology Document* (page E-1) are all based on recycling backwash water over a 23 hour cycle (i.e. use of equalization) without accounting for the cost of equalization. This assumption makes the capital costs for the cost components (pipes, valves, pumps, etc) substantially lower than what would be incurred under actual conditions. The assumption that all plants currently recycle over 23 hours is not valid per Exhibit 4-21, which shows that only 10% of the plants employ equalization.

In Exhibit 6-21, the operations and maintenance (O&M) costs for general maintenance (pipe painting, pump/motor serving) as reported in the *Cost and Technology Document* (page E-1) was $2,555 per year for all plants ranging in size from 0.02 mgd to 83.59 mgd. This would be a very low estimate of O&M costs, particularly as the plant size increases. This is further affected by the assumption that all plants practice equalization, as discussed above.

In Exhibit 6-22, the system start up and self-assessment costs would appear to be very optimistic. The number of hours (46 to 54 hours) do not include a system's evaluation how to accurately quantify and report the recycle flow streams covered by the proposed rule from particular flow streams (such as filter to waste and post filter granular activated carbon (GAC) wash water) that are not covered by the proposed rule. Also, the number of hours do not account for investigating and planning for appropriate flow measuring devices for the recycle pipeline for those plants that currently do not have a flow meter. It is believed, based on experience, that the majority of the plants do not currently have flow meters on their existing recycle pipelines. Furthermore, the proposed rule does not allow for any other flow measuring methods (e.g. use the rated capacity of the recycle pump). Consequently, the number of hours estimated by U.S. EPA for monitoring and implementing the self assessment plan are very optimistic for an issue as important as this to generate valid and accurate data.

In Exhibit 6-24, Alternative R2, U.S. EPA estimated that 40% of the systems serving less than 10,000 people and 17% of the systems serving more than 100,000 people have to change the recycle point of application based upon the AWWA Survey (ref. page 6-33). U.S. EPA states that this method may have over estimated the costs, because State determinations may lead to fewer changes in recycle practices. However, U.S. EPA does not point out that some States may apply criteria other than the plant's rated capacity to the self assessment results. This could require systems to change their recycle method, even though the plant is in compliance with the self assessment objectives (e.g. the percent recycle is considered too high by some States, but the rated capacity is not exceeded, even though there are no data to support percent recycle on impacting finished water quality). Furthermore, EPA's assumption on the cost range (the low end of the cost would be $0) assumes that State determinations do not require any system to alter their recycle practice. This would be an unrealistic assumption, given the fact that U.S. EPA determined that there is a need to develop a rule to better manage filter backwash water.

In Exhibit 6-24, Alternative R2, U.S. EPA considered eight modifications to the direct recycle practice for plants to become in compliance. These modification are listed in the *Cost and Technology Document* page 6-1, and form the basis for the cost range in Exhibit 6-24, Alternative R2 (the preferred Alternative). The validity and associated costs for some of these modifications is highly questionable. For example:

One potential modification is to install variable speed raw water intake pumps to adjust the raw water flow during periods of recycle. The normal practice to accomplish this is to install variable frequency drives on the pump motors. U.S. EPA estimated the raw water pump horsepower ranges from 1 Hp to 3,258 Hp for pump capacities of 15 gpm to 58,046 gpm, respectively. The capital costs associated with installing variable frequency drives and associated electrical and pump changes would be substantially higher than the $8,800 to $275,500 shown by U.S. EPA in Table 6-3 of the *Cost and Technology Document*.

Another potential alternative considered by U.S. EPA is for plants to turn off the raw water pumps during recycle events, which would be a no cost change to achieve compliance. The practicality of this alternative is very questionable. This alternative would more than likely cause greater treatment impacts than the potential concerns U.S. EPA is trying to address by this proposed rule. It is unlikely that utilities would employ this approach and it is also questionable whether individual States would allow plants to treat 100% recycle water and constantly switch back and forth between treating recycle and raw water.

Another potential alternative cited by U.S. EPA is revising the plant's filter loading rate. U.S. EPA estimated that this can be accomplished for $4,000 to $10,000 for plants ranging from 0.02 mgd to 83.59 mgd. Actual experience by individual systems, however, is that performing a pilot filter study and generating a report for States to properly evaluate higher filter loading rates would cost $100,000 to $200,000 per study. These costs do not even account for actual plant changes such as new filter media, piping changes, control changes, etc. to accommodate higher filter loading rates. Additionally, these studies can take up to 2 years to complete factoring in planning, piloting, and report generating.

Page 6-34, Alternative R-3

U.S. EPA states that costs may be high because some plants may choose the lower cost of direct discharge. NPDES does not allow direct discharge without sedimentation. The cost in Section 6.7 of the *Cost and Technology Document* only includes a pipeline, and in fact states that *Adirect discharge can be a viable alternative."* Other than on a few very large rivers in the U.S., direct discharge is not allowed by any states.

Appendix E-5, Lagoon Costing

Note 1 states: *"these lagoons are sized for only two backwash volumes. The actual capacity of the lagoon and hence costs would have to be several fold higher."* In this U.S. EPA seems to recognize that two backwash volumes is insufficient but proceeds to use it in costing anyway.

Direct Recycle Costs:

As stated in our comments on Page 6-1 of the *Cost and Technology Document*, all costs for this section are low due to the lack of including equalization in each option.

Household Costs

The FBR provisions will have significant cost impacts, and that impact will vary as a function of community size and site-specific conditions. In the 577 page RIA less than 14 full pages of analysis touch on household impact and the impact of community size on rule burden is not addressed in the RIA findings – there is some limited discussion on limitations of the analysis. LT1 and FBR provisions cannot be distinguished at the household cost level in the preamble and must be extracted by reanalysis of RIA appendix tables. The tables provided are significantly impacted by the technical issues noted earlier in these comments. As the Agency prepares to finalize the FBR provisions, it should correct the technical and transparency issues identified above and prepare an analysis of household costs impacts at various community sizes for FBR and LT1 provisions separately. In combination with more accurately capturing the benefits of the FBR provisions a sound community level, household cost analysis is necessary to support a sound, final rule determination by the Administrator.

Chapter 8 – Benefits and Costs

In Exhibit 8-2, the recycle annual costs range from $20.4 to $24.5 million. The accuracy and validity of these costs is questionable, however. The potential cost estimated by U.S. EPA for a new recycle location ($13.91 to $16.88 million per Exhibit 6-29) is approximately 68 percent of the total recycle cost. However, as previously described in comment no. 3 under Chapter 6, the assumptions made by U.S. EPA (i.e. all plants use equalization) are not valid, and significantly under estimated the actual costs that could be incurred by utilities. Furthermore, there are also concerns about the accuracy of the self assessment cost estimates (see comment no. 5 and no. 7 under Chapter 6). Based on these cost issues, the cost range presented by U.S. EPA in Exhibit 8-2 is inaccurate and invalid for use in breakeven benefit analyses.

Exhibit 8-4, indicates that financial benefits cannot be estimated for the recycle provisions due to a lack of scientific data. This validates that the FBR cannot be justified on a cost benefit basis by itself. Because of the concerns with the cost estimates, the breakeven analysis shown in Exhibit 8-5 should be reevaluated by EPA.

Section 8.5 of the *Regulatory Impact Analysis for the Proposed Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Rule* asserts that multiple rule costs are not cumulative:

"... Adding costs across rules may over state the social costs of regulatory activities because actions to satisfy one rule may reduce the costs of subsequent rules that have related public health goals." (Page 8-9)

In some instances utilities will be able to meet multiple rule objectives at reduced cost, but the Agency's statutory time table based, rule-by-rule management of water quality regulations reduces the drinking water community's ability to achieve significant cost savings. The current process is unpredictable and results in short timeframes for utilities to pursue compliance with individual rules. Since the water quality decisions now facing the drinking water industry have reached significant cost walls, utilities have little choice but to wait until the Agency selects national priorities for scaling those cost walls – this national prioritization is only realized through the rule promulgation process.

In recognizeing that drinking water utilities must address a complex suite of regulatory requirements and must balance individual rule treatment objectives to maximize cost-effective provision of drinking water, the Agency points to a disparity between implementation and rule development. The RIA and the Agency's approach to this rulemaking lacks a similar perspective with respect to attributing benefits to the FBR provisions and fails to recognize that the implementation of IESWTR and LT1ESWTR significantly reduce the potential benefit attributable to the FBR provisions.

6.0 Request for Comment on Recycle Ban

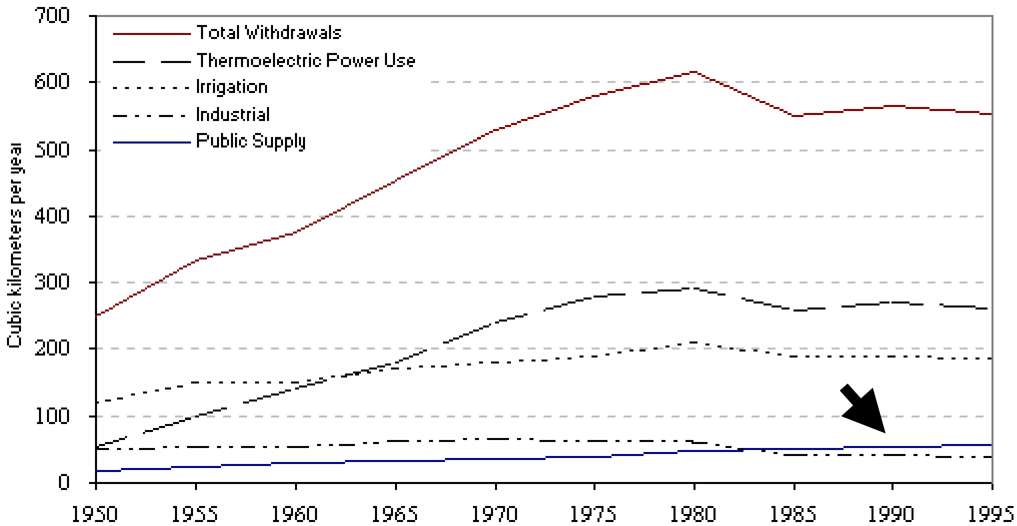
AWWA is strongly opposed to the imposition of an across the board ban on recycle either by direct federal action, state action, or indirect regulatory pressure. As has been stated elsewhere in these comments U.S. EPA lacks sufficient technical basis to further regulate recycle practice, at all (see AWWA comment sections 3, 4, 5, and 7); to impose a ban on recycle is entirely inappropriate. Across the United States available drinking water supplies are severely limited and demand for potable water continues to grow despite efforts to increase conservation (see Figure 4). To waste as much as 10 percent of plant flow without substantial linkage of recycle practices to public health impacts would be irresponsible public policy.

The U.S. National Assessment *Draft Report of the Water Sector of the National Assessment of the Potential Consequences of Climate Variability and Change, Potential Impacts of Climate Change and Variability on the Water Resources of the United States*, *Draft Report of the Water Sector of the National Assessment of the Potential Consequences of Climate Variability and Change* cites Wood et al. (1997) and Lettenmaier et al. (1999) who note that the influence of long-term demand growth on system performance had a greater impact than climate changes when long-term withdrawals are projected to grow substantially in several special studies.

This same report notes that readily available alternative supplies for meeting domestic water demand growth are not available. The report summarizes available new supply options as follows:

While new supply options are increasingly expensive and controversial, traditional and alternative forms of new supply will also play a role in addressing changes in demands and supplies caused by climate changes and variability. ***Options to be considered include wastewater reclamation and reuse,*** *water marketing and transfers, and even limited desalination where less costly alternatives are not available and where water prices are high. None of these alternatives, however, are likely to alter the trend toward higher water costs. They are either expensive relative to traditional water costs or their potential contributions to supplies are too limited to make a significant impact on long-term supplies"* (Page 82) [emphasis added]

Figure 4. Water Withdrawals in The United States: 1950 – 1995
Source: *Draft Report of the Water Sector of the National Assessment of the Potential Consequences of Climate Variability and Change*



Clearly policies that further increase the price of potable water and move even more systems closer to needing reuse options to meet basic water demands is not a sound public policy, or an intended consequence of the §1412(b)(14) of the 1996 SDWA Amendments.

7.0 Inaccuracies in FBR Provision Premise

7.1 Small v Large Protozoa (§ II.A., 65 FR 19051)

It appears that the Agency is trying to highlight differences in size between *Giardia* cysts and *Cryptosporidium* oocysts in order to justify the need for additional regulation. While there is a size difference, i.e., perhaps 7 to 12 microns for *Giardia* versus 3 to 7 microns for *Cryptosporidium*, this difference is not especially significant as good removal by granular media filters is controlled by proper coagulation and flocculation prior to filtration. The important distinguishing characteristic between these two protozoa is their relative susceptibility to disinfection using chlorine or alternative disinfectants. The adequate chlorine CT's for *Cryptosporidium* oocysts are enormous and even advanced oxidants like ozone require CTs on the order of 6 – 10 times those of *Giardia* cysts. This distinguishing characteristic has been the major driver in changes to the Surface Water Treatment Rule since 1991.

7.2 Frequent Observation v. Cause-Effect Relationship (§ II.C., 65 FR 19053)

The preamble cites Joan Rose indicating that

> *"... the following types of environmental and operating conditions commonly present in filtered surface water systems at the time cryptosporidiosis outbreaks have occurred: ... filter backwash recycle ..."* (Col. 1, Para. 1)

As noted later in the preamble (Table IV.11 and IV.12), 65 – 85 percent of surface water plants recycle spent filter backwash water. If more than half of the surface water treatment plants in the country employ recycle, then it is highly likely that recycle will be "commonly present" in more than half of the plant failures linked to cryptosporidiosis outbreaks. It should be noted that all of the surface water treatment plants where cryptosporidiosis outbreaks have occurred also employed filtration, yet in the IESWTR, the Agency found (and others have made the same independent finding) that a properly operating conventional water treatment plant employing filtration is the primary barrier to waterborne cryptosporidiosis. Co-occurrence is not evidence of a cause-and-effect relationship, and in this instance, the author pointed out several design or operational failures of significance at the water treatment plants experiencing outbreaks (e.g., improper monitoring, inoperable flocculators, chemical injectors, or filters; inadequate personnel response; and sub-optimal filtration)

7.3 Source Water Occurrence of Cryptosporidium (§ II.D., 65 FR 19054)

Table II.3 is an interesting assemblage of studies, and appears to reflect 1,907 individual samples, which as presented cannot be directly related to drinking water sources. Few of these individual studies obtained positive samples and large data sets appear to be prone to lower observed occurrence than smaller data sets. Twenty-six of the studies either reported ranges of observations including zero or neglected to provide a range of observations.

Indeed this table fails to include the most recent and comprehensive survey of drinking water treatment plant influent water concentrations available, the *Cryptosporidium* occurrence data set from the ICR. In 1994 U.S. EPA promulgated the ICR and implemented the associated 18 months of data collection in 1997 and 1998. During that data collection process, drinking water utilities serving greater than 100,000 persons collected monthly protozoan samples using an existing U.S. EPA approved method. The resulting data have been available to the Agency since December, 1999. Figure 5 illustrates the oocyst concentrations observed in the ICR. The raw ICR data suggest that less than 7 percent of large drinking water utility source waters contain oocysts. Statistical models of this same data set only shift the median oocyst concentration to approximately 0.03 oocysts / Liter and the 90^{th} percentile oocyst concentration to ≈ 0.5 oocysts/L (see Figure 6) *(Caveat: These estimates are preliminary; U.S. EPA should reference the estimate prepared for the M/DBP FACA and referenced in the FACA's technical documentation.)*

For comparison purposes, Table 4 reflects the national distribution *Cryptosporidium in* source water underlying the LT1FBR.

Table 4. Baseline Expected National Source Water Cryptosporidium Distributions Underlying LT1FBR

Percentile	Source Water Concentration	
	Oocysts / 100 L	Oocysts / L
25	109	1.09
50	231	2.31
75	516	5.16
90	1064	10.64
95	1641	16.41
Mean	470	4.70
Standard Deviation	841	8.41

A more recent survey of 80 drinking water treatment plants serving 10,000 persons or more is now just completing data compilation. This effort, also undertaken by the U.S. EPA in support of upcoming changes to the SWTR, provides 24 measurements per water treatment plant. This data was not available during development of the FBR provisions but should be considered in development of the final rule, particularly since the Supplemental Survey data employs U.S. Method 1622 / 1623 with its improved recoveries. This survey also captures a diverse range of water treatment plant sizes.

Figure 5, Reflects M/DBP TWG Summary of Total ICR *Cryptosporidium* Occurrence in Source Water
(This graphic is illustratory only, the associated analysis is incomplete and should not be used without a full understanding of the estimate's assumptions, uncertainties, and limitations.)

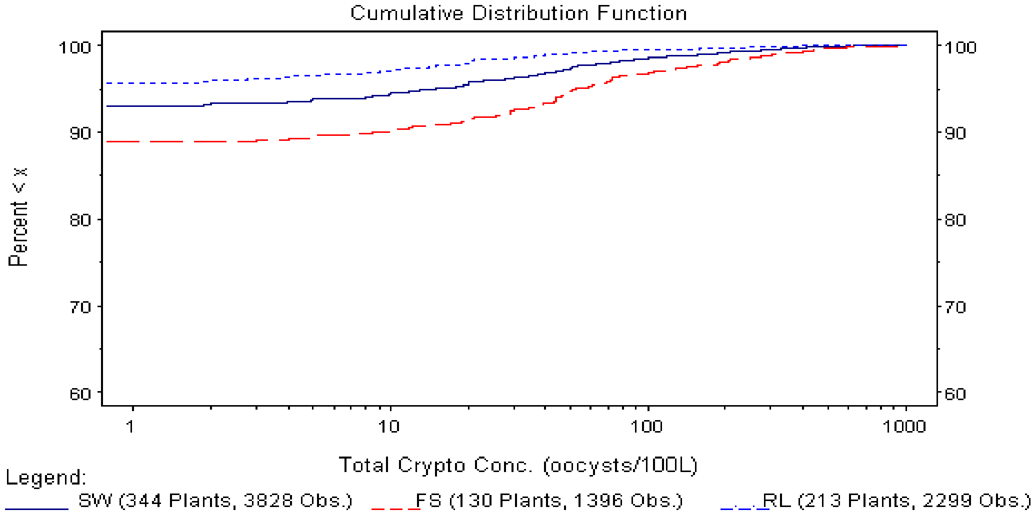
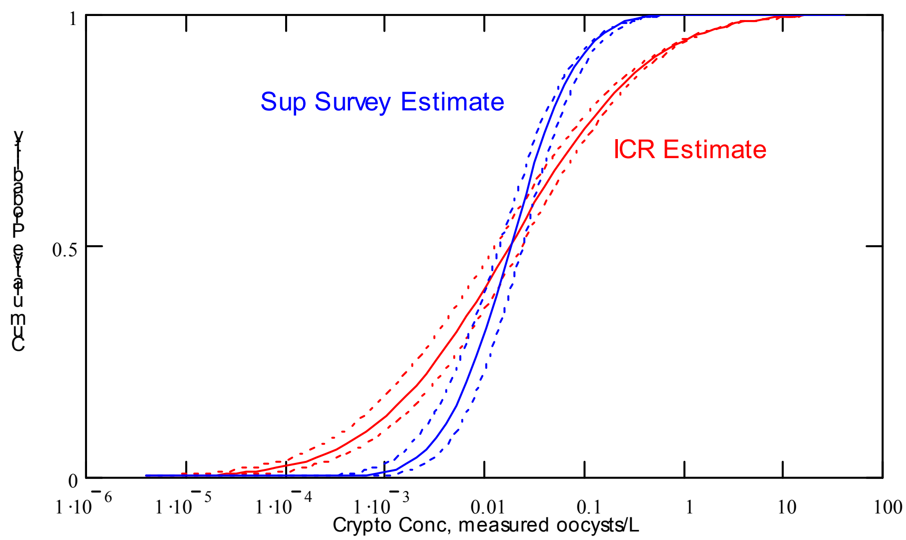


Figure 6, Reflects DRAFT M/DBP TWG Estimate of *Cryptosporidium* Occurrence in Source Water
(This graphic is illustratory only, the associated analysis is incomplete and should not be used without a full understanding of the estimate's assumptions, uncertainties, and limitations.)



The observed concentrations at which *Cryptosporidium* oocyst occur on average in source water was captured in both the ICR and Supplemental Survey data. The FBR provisions should reflect the occurrence rates observed by these two analyses.

7.4 Understanding Direct Filtration (§ IV.D.1.a.ii., 65 FR 19099)

The last sentence of the preamble section describing direct filtration plants (Page 19099, Col. 2, Para. 2) states that *"*[the] *concentration of solids in source water is a key variable in filter run length."* Indeed, the source water solids concentration is an issue in the design of conventional and direct filtration water treatment plants. In general, direct filtration facilities are located on water supplies with low solids loadings. If the loadings were high, a conventional plant would have been constructed.

However, it is the pre-filter water solids concentration, not the source water solids concentration, that is a key operating parameter for the filtration unit process. Given source water quality criteria (i.e., conventional plants have worse and probably more variable quality) in plant design, one could argue that post sedimentation water quality can be more variable and of lower quality than direct filtration pre-filter water quality. This is yet another reason to treat direct and conventional filtration plants through the same rule construct.

7.5 Softening Process (§ IV.D.1.a.iii., 65 FR 19099)

On page 19099 (65 FR 19099) the preamble discusses softening plants recycling practices. That discussion includes the following statement:

> *"Without this recirculation, additional hydraulic detention time in the flocculation and sedimentation basins may be required to prevent excessive scale deposits in the plant clearwell or in the distribution system."* (§ IV.D.1.a.iii., 65 FR 19099)

Taking solids recirculation out of the softening process will have a much more dramatic impact on the process than this statement indicates. Without the "seed particles" provided by the recirculated solids, no amount of "additional hydraulic detention time" will produce the same water quality. In AWWA's members' experience treating a low turbidity, hard surface water, recirculated solids is nearly as critical to the process as the lime and coagulant. Based on extensive bench and pilot testing of raw water at softening utilities, water treatment is not expected to produce comparable finished water with the existing plant design if recirculated solids are eliminated from the process. In lieu of major design changes, higher dosages of lime and/or coagulant would be required to partially offset the loss of recirculated solids, although finished water quality would still degrade. The above statement is an oversimplification of a complex issue. Discontinuing recirculated solids in the softening process would result in major design changes to plants to maintain current finished water quality, higher chemical costs, or a degradation of finished water quality.

In discussing solids contact clarification on page 19099 (65 FR 19099), the Agency recognizes that:

> *"The key operational consideration for these types of systems is the maintenance of a high concentration of solids within the skirt to allow high loading rates while maintaining adequate solids removal."* (§ IV.D.1.a. iv., 65 FR 19099)

This same principle applies to the lime softening process used at plants with conventional sedimentation basins. Maintaining a high concentration of solids in the flocculation chamber is critical in maintaining adequate solids removal. Due to the low turbidity (typically <10 NTU) of our raw water, we must have the particles provided by the recirculated solids to create enough particle collisions to achieve a high level of particle removal from the raw water.

Contact Clarification (§ IV.D.1.b.ii., 65 FR 19099 and Table IV.19, 19110)

The notion of eliminating the recirculation of settled solids has widespread implications on drinking water treatment plants. Solids contact clarifiers, as well as several proprietary clarifiers (e.g. Infilco-Degremont's Superpulsator) all rely on contact between settled solids and the process stream. These units are appealing because they are more space efficient and require less concrete and steel than conventional sedimentation basins. As such, they are widespread throughout the country. Operation of these units without recirculated solids would diminish their effectiveness as a treatment barrier. Crippling the sedimentation/clarification treatment barrier would place more burden on the filtration process, making it more vulnerable to breakthrough.

Spent Filter Backwash Return (§ IV.D.1.b.ii., 65 FR 19101)

The text in the 2nd paragraph in 3rd column of page 19101 appears to relate to the Agency's subsequent definition of "direct recycle" and "equalization." As noted in earlier discussion of these two definitions, the rate of release is the defining criteria.

> *"First, the sedimentation process detains the spent filter backwash in treatment basins for a period of hours, which lowers the possibility a large recycle volume will be returned to the plant in a short amount of time and cause the plant operating capacity to be exceeded."* (§ IV.D.1.b.ii., 65 FR 19101)

The most critical issue here is the size of the recycle pump. If it is oversized, a large recycle volume can still be returned to the process in a short amount of time. The advantage of a detention basin for minimizing hydraulic surging is lost if the recycle pump is not sized properly.

7.6 "Great Lakes Standards" (§ IV.D.3.b.ii., 65 FR 19112)

The criteria identified by the *Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers* (generally referred to as the "Great Lakes Standards" are design criteria not operational criteria. These standards are focused exclusively on the hydraulics of plant design –the FBR provisions are targeting the linkage between hydraulics and water quality. These two goals are not the same. AWWA is concerned that in the absence of clearly articulated FBR provisions States will default to the Great Lake Standards for guidance, such an action would establish a new regulatory criteria but it would not address water quality impacts associated with improper recycle practice. The Great Lake Standards would limit recycle to 10 percent of average plant flow, pilot plant studies conducted by EE&T and summarized in Attachment 2 demonstrate that a 20 percent recycle rate did not negatively impact treatment.

7.7 Current Data Limitations - Equalization (§ IV.D.3.b.iii., 65 FR 19115)

The proposed rule preamble concludes that recycle flow equalization offers "substantial benefit" but withholds judgement due to lack of data. Specific data which U.S. EPA notes are not available include:

1. Oocysts concentrations and data correlating oocyst concentrations in recycle streams and finished water,
2. Data establishing the magnitude of hydraulic disruption caused by direct recycle, and
3. Inability of a national standard to address site-specific factors.

AWWA concurs with the Agency that inadequate information exists on the concentration of live, infectious oocysts in source, recycle stream, and finished water. Moreover, the absence of a sound *Cryptosporidium* analytical method for monitoring of source, finished, and backwash water is not available, a robust analytical method that identifies viable oocysts is not likely in the near future.

AWWA disagrees with the Agency with respect to our understanding of hydraulic disruption impacts associated with direct recycle. Data are available, as the proposed rule requirements demonstrate, to address hydraulic impacts. The question before the Agency and the drinking water community is the impact these hydraulic changes may have on oocyst breakthrough.

7.8 Residuals (§ IV.D.1.a.i., 65 FR 19098)

The preamble description of how residuals are managed is very misleading:

> *"These solids, termed "residuals," are currently disposed to sanitary sewer, treated with gravity thickening, or some other process prior to returning them to plant headworks or other locations in the treatment train."*

As written, this text suggests that residuals are returned to the head of the plant. The recycle of solids (e.g., residuals) is not at issue in the FBR provisions. The FBRR addresses the management of clarified or supernatant liquid streams from residuals management processes which may be recycled.

This text also implies that residuals management and recycle return practices are the same for all water treatment plants. The variety of residuals management strategies and policies regarding the recycle of water from those processes is very diverse.

7.9 Flow Pacing (§ IV.D.3.a.iv., 65 FR 19111)

On page 19111 (65 FR 19111) of the proposed rule preamble U.S. EPA specifically requested comment on flow pacing of coagulant.

> *Regulatory options are available to ensure direct recycle plants practice real-time chemical dose and influent flow management? Should flow-paced coagulant feed be required at direct recycle plants to minimize potential harmful impacts of recycle? What regulatory requirements may be applicable to ensure the integrity of the coagulation process?*

Flow pacing is not a solution for all systems.

Impact on Softeners, Oversoftening

As noted above, flow pacing is not a solution for all systems, and should not be a regulatory requirement for drinking water treatment plants. With respect to water treatment plants that soften, flow pacing of lime and coagulant feeds is not accomplished using the same equipment or approach as is applied in conventional treatment facilities because of scaling issues and pH in which monitoring equipment must operate inherent to the softening process. Softening plants typically approach flow pacing by monitoring flow rather than water quality (e.g., conventional plants flow pace by monitoring indicators like conductivity of influent water quality to adjust chemical feeds). As the Agency is well aware water quantity is not necessarily indicative of water quality.

ATTACHMENT 1.
Cornwell and LeChevallier, AWWARF, 2000

ATTACHMENT 2.
Cornwell *et al.* (2000)

ATTACHMENT 3.

Levesque *et al.*, Water Quality Technology Conference paper, 1999

ATTACHMENT 4.
Tobiason *et al.*, Water Quality Technology Conference paper, 1999

ATTACHMENT 4.

Marston *et al.*, Connecticut Water Company Special Study, 1999