Unfiltered Systems Working Group

January 9, 2004

Water Docket
Environmental Protection Agency, Mail Code 4101T
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

RE: Long-Term 2 Enhanced Surface Water Treatment Rule, Proposed Rule, 68 Federal Register 47639, Docket No. OW–2002–0039

Filed Electronically to EPA Docket

Dear Sir or Madam:

The Unfiltered Systems Working Group, representing most of the largest unfiltered water systems in the country, appreciates the opportunity to review the Proposed Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) released on August 11, 2003 (68 Federal Register 47639). Given the volume of related materials we also appreciate that EPA extended the comment period.

The Unfiltered Systems Working Group was actively involved in the Stage 2 Microbial / Disinfection By-Products Federal Advisory Committee (FACA) and was a signatory to the Agreement in Principle (AIP). The Agreement in Principle included the following provisions specifically related to unfiltered systems. *Unfiltered systems must:*

Continue to meet filtration avoidance criteria, and

Provide 4 log virus inactivation, and

Provide 3 log Giardia lamblia inactivation, and

Provide 2 log Cryptosporidium inactivation.

Overall inactivation requirements must be met using a minimum of 2 disinfectants.

Ongoing monitoring and any eventual reassignment to risk bins for unfiltered systems will be consistent with requirements for other systems of their size, with the provision that unfiltered systems must demonstrate that their Cryptosporidium occurrence level continues to be less than or equal to 1 in 100 liters (or

equivalent, using advanced methods) or provide 3 logs of Cryptosporidium inactivation.

As it relates specifically to the provisions directly affecting unfiltered surface water supplies, we believe that the draft as published is in substantial agreement with the AIP. We have reviewed the many thousands of pages of rule language, preamble, guidance, and decision support documents, and based on that review, offer the following comments. The comments represent the general consensus opinion of the undersigned utilities.

Responses to EPA's specific requests for comments on the treatment requirements for unfiltered systems:

EPA solicited comments on the proposed requirement for unfiltered systems to use two disinfectants and for each disinfectant to meet by itself the inactivation requirement for at least one regulated pathogen.

While no specific technical argument is made for its inclusion in the regulation, the requirement as detailed in the draft regulations and preamble meets the intent of the FACA Agreement in Principle (AIP). As the risk analysis for unfiltered systems already assumed meeting a *minimum* inactivation, and given that by their very nature unfiltered sources have low and stable *Cryptosporidium* levels, there may be no demonstrable health benefit from adding a second disinfectant at all times. In fact, depending on the choice of the disinfectants, there may be an increase in exposure to disinfection byproducts (or a lost opportunity to realize a reduction). Ongoing monitoring by several of the largest unfiltered utilities indicates that the exposure assumptions for *Cryptosporidium* levels used by EPA in the preamble may be extremely conservative. The Unfiltered Working Group urges EPA to carefully conduct a risk analysis based on current occurrence and health data before finalizing the two primary disinfectants requirement. As discussed below, a more flexible approach makes more sense, at lower cost.

EPA solicited comments on an alternate approach to allow systems to meet the inactivation requirements using any combination of one or more disinfectants that achieved the required inactivation level for all pathogens.

This approach would allow utilities additional flexibility to design and operate treatment plants that are responsive to the unique local water quality conditions. It does not appear to have any substantive disadvantages over the more rigid proposal in the current draft, and may allow more systems to effectively leverage their existing treatment investments with less expensive treatment process additions. More importantly, if two primary disinfectants are required in the final rule, this more flexible approach may allow some systems to minimize their reliance on chlorine.

EPA solicited comments on whether the proposed requirements for use of two disinfectants establish an adequate level of multiple barriers in the treatment provided by unfiltered systems.

The Unfiltered Working Group believes that the proposed requirement, or preferable a more flexible version, provides more than adequate protection. By complying with the stringent source water quality and watershed control criteria contained in the Surface Water Treatment Rule, unfiltered systems already have a substantive barrier in place prior to treatment. The addition of the second primary disinfectant requirement represents not just the traditional "belt and suspenders" of high-quality well-protected source water and effective disinfection, but an approach of "belt, suspenders and two guys holding up your pants". The draft regulation proposes no similar degree of extreme redundancy for the substantially more at risk systems with wholly unprotected source waters that rely for substantially all of their *Cryptosporidium* risk reduction on the single barrier of filtration. Bin 1 systems have no source water protection, and rely only on the average performance of their filters to achieve the required 3-log reduction of *Cryptosporidium*, with essentially no redundancy. The risk analysis suggests that Bin 2 utilities need 4-reduction, but 3-logs are assumed for the filters and an additional 1-log is required from the toolbox or inactivation, but no redundancy is required for either. And so on. There simply does not appear to be a data-supported, internally consistent argument for any additional degree of redundancy than provided by the existing SWTR provisions redundant disinfection systems combined with the provisions for two primary disinfectants agreed to in the AIP and presented in the draft rule. The Unfiltered Working Group urges EPA not to adopt this modification.

In response to all three of these requests for comment on the second primary disinfectant requirement, the Unfiltered Utilities Working Group recommends that the current proposal represent the most stringent disinfection requirement that EPA considers in drafting the final regulations. Given the lack of a demonstrable health benefit, if the two primary disinfectants requirement is to remain in the final rule, we urge EPA to include as much flexibility for utilities to make site specific decisions as possible.

EPA also solicited comments on whether or how this possibility of unfiltered systems having a mean source water Cryptosporidium level of 0.075 oocysts/L or higher should be addressed.

Based on the occurrence data available to the Unfiltered Systems Working Group, and to EPA, this does not appear to be a realistic scenario. However, there are three significant physical and regulatory differences between filtered systems with unprotected sources, and those systems that meet the SWTR filtration waiver criteria, and an examination of them suggests that EPA does not need to take any additional action on this topic.

First, all unfiltered systems have source water watersheds which must be annually reviewed by the state primacy agency for adequate control of potential health threats: the Interim Enhanced Surface Water Treatment Rule has already made the inclusion of *Cryptosporidium* control a required goal of watershed protection plans. Any evidence of an actual source of *Cryptosporidium* at levels high enough to affect source water quality at the intake should already be grounds for the state primacy agency to take action to

order the elimination of the threat or the addition of filtration. No new regulatory restriction or authority is required.

Second, by their nature, the source waters of unfiltered supplies are significantly more likely to have a higher fraction of older, more degraded, and non-infectious oocysts, and a smaller proportion of human infectious oocysts. While for the purpose of the binning procedure in the proposed rule, the unfiltered systems agreed with the simplifying approach to treat all enumerated oocysts as if they were the same, they are not. Many filtered systems have direct discharges of sewage treatment effluent to their sources, in some cases in large volumes and in close proximity to their intakes. This is certainly an opportunity for fresh, human-infectious oocysts to arrive at their treatment plants. This is not the case for unfiltered systems. The detention time in most unfiltered systems is substantial: not hours or days from pollutant source to intake, but months or years. The physical nature of these systems serves to allow for natural degradation, reducing the potential of any given enumerated oocyst to be infectious, and the well protected watersheds mean that any viable oocysts are less likely to be of human origin.

Third, all unfiltered systems are required to have some type of outbreak monitoring program in place and annually must demonstrate that there have been no water-borne disease outbreaks to their state primacy agency. Filtered utilities are not required to do this. This additional layer of vigilance and oversight provides an additional opportunity to discover any actual threat to public health, and any evidence of a source water related disease outbreak would be grounds for the primacy agency to withdraw the waiver of filtration status. Many of the largest unfiltered systems aggressively undertake this responsibility in partnership with local or state health agencies. This includes in many cases directly funding dedicated staff at the health agencies to conduct active surveillance. San Francisco PUC funds 2 full-time staff at the county health department. MWRA funds 2 staff at the state Department of Public Health and 2 additional at the Boston Public Health Commission. New York City DEP has had a decade long partnership with the city health department. If there was an outbreak of cryptosporidiosis or an increase in endemic rates due to the source water, it would be detected.

Responses to other aspects of the treatment requirements for unfiltered systems:

Minimum level of *Cryptosporidium* inactivation required: The preamble described the process used to establish the required two log (99%) inactivation requirement. The analysis uses the simplifying assumption that the ICR data for unfiltereds is only about 10 times lower than that of utilities required to filter, and then further assumes that a well operated filtration plant can achieve an *average* of 3 logs reduction[1]. The rule will require that unfiltered systems utilize disinfection with a regulatory required target of a

[1] A review of the preamble reveals that virtually every reference to filtration performance cites average performance, rather than the minimum performance of the particular technology. Given the higher likelihood of extreme variability in an uncontrolled and unprotected source water, attention to minimum performance for filtration technologies would have seemed commonsensical. Given that literature available does not seem to support the ability to achieve this, some explicit acknowledgement of the disparate approaches might be appropriate.

minimum of 2 logs inactivation of C*ryptosporidium*: in practice, to reliably achieve the minimum requirement systems must employ a margin of safety to account for normal variations in flow, temperature and pH as well as disinfectant dosing. Both by the use of *minimum* rather than *average*, and by the very conservative exposure assumptions, the draft regulations require more treatment than the actual risk would warrant, increasing treatment investment with little or no public health benefit.

The Unfiltered Working Group urges EPA to consider adding at least one additional bin for unfiltered systems with lower levels of *Cryptosporidium* in their source waters. Those systems with source water levels below 0.1 oocysts per 100 liters should be required to provide 1 log of inactivation. This would move the regulatory approach of treatment tailored to exposure for unfiltereds more nearly in line with that filtered systems. Most systems adding new treatment will opt for technology and sizing to allow for achievement of at least 2 logs, and probably 3 logs, but this approach would open up additional flexibility for systems which already have treatment facilities in place which might be modified to achieve 1 log *Cryptosporidium* inactivation, and for groundwater systems under the influence of surface water. Such an approach could be coupled with a requirement for higher volume sampling to increase the sensitivity of *Cryptosporidium* detection.

Compliance Determination for UV disinfection: For unfiltered systems using UV disinfection to meet the required inactivation requirements, the draft regulations propose that compliance with the standard be based on a 95th percentile of water delivered to the public. We fully support this commonsense approach to extending the existing SWTR requirements for chemical disinfectants to UV. It is protective of public health, while avoiding the excesses of extraordinary redundancy.

EPA should consider some accommodation of operational realities so that an unfiltered water system is allowed to calculate 95th percentile performance using actual radiation and flowrate measurements. This would allow unfiltered water systems to gain some disinfection credit for measurable disinfection effect even when it is defined as "off-spec" by some small amount.

EPA may want to consider the merit of offering this approach as an alternate for compliance for those unfiltered systems that use chemical disinfection, but monitor continuously. It would provide additional data to operators and primacy agencies on how plants actually operate over the course of the days and month, and capture short periods of 'off-spec' or under disinfected water in periods other than the hour of maximum flow rate.

Minor Exceedances of Filtration Avoidance Criteria: The Unfiltered Systems Working Group requests that EPA consider modifying the application of the filtration avoidance requirements of the SWTR (40 CFR 141.71). In general as a group, our concern is not as much with the criteria themselves, which are generally related to source water protection and disinfection effectiveness, but with their overly rigid application. The addition of the *Cryptosporidium* inactivation requirements of the LT2 rule will require all the unfiltered systems to make substantial capital investments in treatment changes.

As the SWTR criteria are currently structured, a strict reading of the regulations requires any excursion outside the criteria, no matter how minor result in the automatic requirement that filtration be added, abrogating the substantial investment in treatment improvements. We request that EPA make explicit in the regulations the authority of state primacy agencies to examine the particular situation, and require whatever appropriate changes are necessary to bring the system back into compliance.

What we are requesting is that EPA create an equivalent approach to that in place for filtered systems. Specifically, if a filtered system experiences an MCL violation (e.g., for coliforms or DBPs) or a Treatment Technology violation (e.g. for finished water turbidity), the initial compliance step is not to require the filtered system to install an entirely new treatment facility. The steps are: (1) assess the cause of the violation, (2) determine an appropriate solution, and (3) require that the water supplier implement the determined solution, whether it be a change in operating procedures, modifications to existing treatment processes, or the additional of capital improvements. This same reasonable approach should be granted to unfiltered systems that are in compliance with the LT2. For unfiltered systems that fall out of compliance with one of the Filtration Avoidance criteria, installation of a filtration plant may NOT be the most appropriate solution, may NOT be the cost effective public health investment, and thus should not be automatically triggered.

Issues Affecting Both Filtered and Unfiltered Systems:

Implications of Missing or Un-Approved *Cryptosporidium* Samples: As currently drafted, the rule requires that a 24 month sampling period must be an unbroken record of samples; any missing samples, or samples which for whatever reason fail to meet laboratory QA standards result in the system being required to provide the maximum level of treatment. This requirement is not based on anything in the Agreement in Principle, nor is it required by good sampling design. Any number of unintentional utility or laboratory errors or accidents could result in a missing sample, without altering the source water quality or underlying public health risk health. The commonplace occurrence of a missed sample costing a few hundred dollars could result in the expenditure of tens to hundreds of millions of dollars when there was no basis in public health risk.

We urge EPA to consider allowing resampling and the addition of additional samples at the tail end of the sampling period. Both are needed for particular circumstances, and neither influences the resultant source water concentration. We are supportive of AWWA's more detailed recommendations on this topic:

- Additional provisions to take replacement samples at the end of the defined monitoring period,
- Greater flexibility in handling of missed samples when utility collected 48 or more samples, and

- Greater flexibility in handling of missed samples in pre-existing data.

The latter two provisions are of particular interest to the unfiltered utilities as many of us already collect source water samples regularly or expect to conduct more frequent sampling for the purposes of the LT2 rule.

Excessive Conservatism in UV Guidance Manual: An important reason that the FACA process resulted in consensus on the AIP was the recognition that inactivation of Cryptosporidium using ultraviolet light (UV) was possible at a low cost. Unfortunately, as developed in the UV Disinfection Guidance manual, the multiple layers of redundant safety factors unnecessarily raise the costs of compliance.

The water systems in the Unfiltered Working Group include some of the largest systems in the US. We are concerned that the validation protocols developed in the Guidance be such that we can cost-effectively procure UV systems. For larger reactors, computational fluid dynamic (CFD) modeling may soon prove to be a cost-effective validation method, but as currently drafted the regulations appear to exclude it. While feasible, the bioassay tests used to validate UV reactor performance are both impractical and uneconomical at the flow rates that will be required for larger plants. The required quantities of test organisms, the large volumes of water needed, and the disposal of contaminated water during testing, all present significantly different challenges for large reactors. In addition, the safety factor, if any, added due to the use of CFD must be reasonable: the 20% increase in required dose described in the current version of the manual is absurdly conservative and without technical basis. We urge EPA to explicitly permit CFD analysis without site-specific flow testing, following protocols to be developed in guidance at a later date. This explicitly preserves the option, and encourages investment in improving the technique.

The validation process is too cumbersome, unreliable, unpredictable, lengthy, complex, and costly to be forced on each and every UV installation. It raises a considerable barrier to implementation of what should be a relatively predictable and easily installed technology. It would be more beneficial to the industry and the public if the EPA focuses the validation process upon the manufacturers in all but the most unusual installations. That way, the EPA could perform very rigorous validation tests up front, allowing the manufacturers to use the results to improve the designs. The resulting pre-validated systems could then be installed across the country with speed and certainty, allowing the public to enjoy their benefits years earlier.

While we agree that CFD should be available as an option, it need not be the only cost-effective validation method. We think manufacturer pre-validation could basically replace any site-by-site validation when flow rate and channel dimensions and characteristics are specified. In other words, a manufacturer should be able to validate a modular system consisting of a given bank of bulbs when installed in a smooth concrete channel of specified cross-sectional and longitudinal dimensions and operated in a specified flow range. Utilities can then build the required number of such channels based

on individual situations, knowing that the UV supplier has already been validated for such an installation.

The collimated beam test is riddled with internal variability hazards, both biological and physical. The variability of this test alone is enough to throw the entire validation process into question. In addition, if every UV installation is required to repeat it, the variability between tests would likely be statistically excessive. It should therefore be performed by the EPA once, up-front, with rigor and applicability for all.

The Unfiltered Working Group urges EPA to use the UV dose table for *Cryptosporidium* and *Giardia* from the proposed rule in the final rule. The UV Manual should be refocused on a more straightforward process to ensure that the applied UV dose reliably equals or exceeds the required dose in the rule. Clarity and simplicity will be needed if UV is expected to be the inactivation technology of choice for compliance with the LT2.

We are also concerned with the Calgon's UV patent and its cost impact to unfiltered systems, which, based on the proposed rule, will have to rely on the operation of UV to meet the *Cryptosporidium* inactivation criterion. We believe it is inappropriate that the proposed rule's reliance on "UV only" causes the unfiltered systems to pay a substantial patent fee annually to Calgon to meet the LT2 requirements.

Excessive Conservatism in Application of Ozone: The Unfiltered Systems Working Group appreciates the progress made by EPA between the pre-proposal draft and this draft in realistically determining required CT levels. We still believe that the statistical approach adds excessive conservatism to the calculation of the required CT for a given level of inactivation, raising capital and operating costs, and increasing the levels of ozone byproducts unnecessarily.

Because of the higher ozone doses required to inactivate *Cryptosporidium* than *Giardia*, particularly in the colder water temperatures that several of our systems experience, it is important to further develop the SWTR concept of "segregated flow analysis" to allow utilities to better estimate and manage the application of ozone for CT. SFA is not currently in the Guidance Manual: we urge that the Guidance Manual explicitly indicate that a system may demonstrate the SFA method to the Primacy Agency for use at its plant, include an appendix to the Guidance Manual that details the use of the SFA method.

Inaccuracies in Risk and Cost Information Presented in the Preamble:

The preamble and its supporting appendices present risk, benefit and cost data to support that the proposed rule provides more benefit than it costs. Our review of the component parts raises concerns that the benefits may be overestimated and the costs underestimated. Both may cause harm to the regulated community. An overestimate of risk reduces the consumer's confidence in public water supply and may be misused by less scrupulous interest groups. Underestimating the cost of compliance misrepresents what the the

national investment will actually be, and may misdirect public investment from more cost-effective system improvements.

Morbidity Analysis: EPA's analysis, based on a series of assumptions and estimates, of the number of cryptosporidiosis cases averted in areas supplied by unfiltered supplies through the new regulations does not come even close to the actual numbers that utilities have found through actual active surveillance.

If the results from New York City's and MWRA (Metro-Boston) customer bases are combined, the actual active surveillance results demonstrate a much different picture than EPA. The two areas combined serve about 10 million people, almost 5/6 of the 12 million that are supplied by unfiltered source waters, and are projected, under EPA's estimate, to avert close to 140,000 to 455,000 cases of disease with improved disinfection. Yet combined the two active surveillance systems average only about 150 total cryptosporidiosis cases per year. Not every case of cryptosporidiosis is picked up by the active surveillance system, but even using the Corso ratio of disease underreporting of about 88:1, or the CDC estimate listed by Mead et al (CDC Emerging Infectious Diseases, Vol. 5, No.5) of about 50:1 to 100:1, the difference between the two estimates is substantial. Somehow, the preamble analysis seems to indicate both active surveillance systems (after under-reporting is taken into account) missed over 125,000-440,000 cases of disease. This seems unreasonable, as virtually every lab in the service areas is checked for confirmed positive cryptosporidiosis tests, which leads to the conclusion that the EPA estimate is excessively high.

Mortality: EPA's estimate of the number of deaths that will be averted with new treatment is quite high compared to the surveillance results. The estimate for deaths averted in the New York City and MetroBoston areas would be an estimated 23-75 deaths. Over the last 6 years, only once has cryptosporidiosis been indicated as cause of death in New York City, with zero cases listed in Boston over the last three years (the informal review of death certificates is for 2001-2003). Death certificate data is imperfect, but with active surveillance looking for cryptosporidiosis cases, one would think that 23-75 deaths related to cryptosporidiosis would not be completely overlooked. Also, the estimated number of deaths seems quite when (23-75) when compared to the total number of actual confirmed cases of the disease from all sources of only about 150 per year.

Capital Costs: Just as the benefits appear to be overestimated, the costs of the capital improvements needed to come into compliance seem underestimated. Individual systems will be presenting information on the estimated site-specific costs of adding UV to their systems based on conceptual or preliminary designs in their own comment letter. The range of underestimation appears to range from about 2 to 4 times the actual anticipated costs.

Thank you for the opportunity to comment on these important regulations. If the Unfiltereds Working Group can provide EPA any additional data on any of these topics, please feel free to contact us.

Very Truly Yours:

Massachusetts Water Resources Water Authority

New York City Department of Environmental Protection

San Francisco Public Utilities Commission

Seattle Public Utilities

Tacoma Public Utilities