UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF WATER

Mr. Glenn LaBrecque
President
Connecticut Water Pollution Abatement Association
P.O. Box 765
Vernon, CT 06066-0765

Dear Mr. LaBrecque:

Thank you for your letter regarding proper application of chlorine criteria to develop National Pollutant Discharge Elimination System (NPDES) permit limitations for publicly-owned treatment works (POTWs). Specifically, you ask the following two questions:

1. In accordance with federal permitting rules, what demonstration has to be made to justify other than average weekly and average monthly discharge limitations for POTWs?

2. Is it technically correct to establish instantaneous maximum effluent limits in permits based upon acute or chronic criteria for chlorine?

In this letter, I will attempt to give a brief response to each of these questions in order.

Rules for POTW Effluent Limits

As you noted in your letter, the federal regulations for calculating NPDES permit limitations at 40 CFR 122.45(d)(2) require that all effluent limitations for POTWs be stated as average weekly and average monthly discharge limitations unless it is "impracticable" to do so. EPA has interpreted this regulation with regard to water quality-based permitting for toxics through the *Technical Support Document for Water Quality-based Toxics Control* (TSD) (EPA 505/2/90-001, March 1991).

> EPA believes that a maximum daily permit limit [MDL] can be directly used to express an effluent limit for all toxic pollutants or pollutant parameters except chronic whole effluent toxicity. . . . in lieu of an [average weekly limit] for POTWs, EPA recommends establishing an MDL (or a maximum test result for chronic toxicity) for toxic pollutants and pollutant parameters in water quality permitting. This is appropriate for at least two reasons. First, the basis for the 7-day average for POTWs derives from secondary treatment requirements. This basis is not related to the need for assuring achievement of water quality

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> standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and therefore the discharge's potential for causing acute toxic effects would be missed. (TSD, p. 96).

In other words, EPA's guidance states that for purposes of assuring that an effluent discharge meets water quality standards and, thus, complies with the Clean Water Act, it is impracticable to express water quality-based effluent limitations for toxics in POTW permits as only average weekly and average monthly limits. By using only average weekly and average monthly limits, it is quite possible that a permitted discharge could meet its effluent limits, but exceed the applicable water quality standards, depending upon the toxicity of the pollutant and the type of treatment given the pollutant. For example, if the pollutant would require a long exposure period before having a toxic effect, like dioxin, or the treatment has a long detention time that inherently "averages out" peaks, then a average weekly limit would be protective of water quality standards. For a pollutant like chlorine, however, which can quickly cause lethality and for which both the introduction and removal is conducive to spike loads, a average weekly limit is impracticable.

EPA recommends that permitting authorities discuss in the permit fact sheet the basis for selecting a daily or other time period (e.g., instantaneous) for application of effluent limits. In the case of limits on toxics, the basis for choosing a maximum daily limit is EPA's guidance in the TSD or similar state permitting procedures. This discussion in the fact sheet is particularly important where the permitting authority develops water quality-based effluent limits with averaging periods other than those generally required by regulation or recommended in EPA guidance or standard state permitting procedures.

Instantaneous Maximum Limits

In most cases, compliance with maximum daily limits and average monthly limits will ensure that a discharge meets water quality standards. The permitting authority may determine, however, that even a maximum daily limit will miss fluctuations and potentially toxic spikes in levels of certain parameters in the effluent such as total residual chlorine (TRC). For this reason, some states and EPA Regions have expressed limits on TRC in POTW effluent discharges as instantaneous maximum limits rather than average weekly or maximum daily limits.

The TSD explains the basis for permitting authorities' decisions to express effluent limits for TRC in terms other than average weekly limits (see discussion above). The TSD procedures explain how to calculate maximum daily and average monthly effluent limits based on the desired lognormal distribution of pollutant concentrations in effluent. The desired lognormal distribution is defined by a long-term average concentration and coefficient of variation. If the discharge follows this desired distribution, water quality standards (including both acute and chronic aquatic life criteria) are achieved. The TSD does not provide guidance for calculating instantaneous maximum limits from the long-term average of a lognormal distribution. This does not mean that the authors of the TSD rejected the use of instantaneous limits, but rather that they did not consider the question of how to calculate instantaneous maximum limits.

To statistically calculate an instantaneous maximum limitation, a permitting authority would have to modify the TSD procedure to determine a concentration that is "never to be exceeded" rather than maximum daily concentration. The instantaneous maximum calculation would be based upon a lognormal distribution of "instantaneous measurements" or measurements averaged over a short period of time (e.g., one hour) to approximate instantaneous values. Theoretically, the instantaneous maximum limit would always be higher than the maximum daily limit calculated for the same facility. The instantaneous maximum is a concentration that is "never to be exceeded" or averaged over a short period of time rather than an average of all observations made within a 24 hour period (the maximum daily limit).

Rather than using a statistical procedure to calculate an instantaneous maximum limit, a permitting authority could empirically determine the relationship between the calculated maximum daily limit and an instantaneous maximum limit. In this case, the permitting authority would use observed data to determine a ratio between a maximum daily limit that would achieve water quality standards, and a corresponding instantaneous maximum limit for that same facility or type of facility. Using this method, the magnitude of the instantaneous maximum limit would depend upon the variability in instantaneous measurements around the average of all measurements within a 24-hour period. Again, the instantaneous maximum limit should be somewhat higher than the corresponding maximum daily limit for the same effluent.

Currently, EPA has no plans to develop national guidance for calculating instantaneous maximum limits since they typically are needed only in specific cases where there are rapid and significant fluctuations in effluent quality. EPA would find Regional and state methodologies for calculating instantaneous limits technically correct to the extent that they: 1) are based upon the same principles as the statistical models presented in the TSD and use a statistically valid calculation for determining an upper-bound, instantaneous concentration from the desired distribution or 2) represent a logical empirical approach to deriving an instantaneous maximum limit from an appropriately derived maximum daily limit.

If you have any additional questions regarding federal permitting regulations and guidance or if you would like to discuss any specific permitting procedures, please call me at (202) 260-9545 or call Greg Currey, of my staff, at (202) 260-1718.

Sincerely,

James F. Pendergast

James F. Pendergast
Acting Director
Permits Division

cc: John C. Hall, Hall & Associates
Roger Janson, EPA Region 1