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

SEP 20 1996

OFFICE OF
WATER

Mr. Gary Stenhouse
City Manager
City of Rochester, New Hampshire
31 Wakefield Street
Rochester, N.H. 03867

Dear Mr. Stenhouse:

I am responding to your letter dated July 1, 1996 regarding the use of seasonal flows to calculate National Pollutant Discharge Elimination System (NPDES) permit limits. I apologize for the delay in providing a formal response; however, it was necessary for me to coordinate extensively with our Regional offices in Boston and across the country to ensure that I provided you with responses that accurately reflect both EPA policy and practice. In mid-July, Margarete Heber, Acting Chief of the Water Quality and Industrial Permits Branch, spoke to John Hall and provided him with an informal, oral response. Ms. Heber told Mr. Hall that there are no outright prohibitions against seasonal limits, and they are included in permits on a case-by-case basis. This letter provides more detailed responses to the five questions you asked in your letter based upon consultation with our EPA Regional offices. Each of the five questions from your letter and EPA's responses follow.

1. Does federal law require that all water quality-based effluent limitations be developed based upon a single, non-seasonal 7Q10 flow?

EPA Response:

There is no requirement in the Clean Water Act that all water quality-based effluent limitations be developed based upon a single, non-seasonal 7Q10 flow. The Clean Water Act, however, does require that effluent limitations meet state water quality standards; therefore, if a state's water quality standards require that all water quality-based effluent limits be based upon a single, non-seasonal receiving water flow, the Clean Water Act would not allow these limits to be based on seasonal flows.

Assumptions regarding receiving water flow are incorporated into the permitting process through water quality modeling, and they have a direct effect on

implementation of water quality criteria and standards in NPDES permits. Use of water quality criteria to develop effluent limits requires selection of an appropriate water quality model to develop a wasteload allocation. Assumptions incorporated in the water quality model regarding allowable concentration of pollutants in the receiving water and receiving water flow must reflect the magnitude, duration, and frequency components of the water quality criteria.

EPA encourages permitting authorities to use dynamic models, where feasible, for the application of aquatic-life criteria because they explicitly predict the effects of variability in receiving water flow, effluent flow, and effluent concentration on receiving water concentrations of the pollutant or parameter of concern. Dynamic models can be quite complex and data intensive; however, they implicitly include, in the design conditions, the impact of receiving water flow variability on the duration for which and frequency with which criteria are exceeded (provided that the design conditions reflect the desired toxicological effects regime). Thus, one way to take into account variable stream flows is by using dynamic models to develop wasteload allocations.

If dynamic models cannot be used, then an alternative is steady-state modeling. A steady-state model requires single, constant inputs for effluent flow, effluent concentration, background receiving water concentration, receiving water flow, and meteorological conditions. For wasteload allocation studies in which a hydrologically-based method of determining stream design flow is used, EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD, 1991) recommends using the 1Q10 flow as the receiving water design flow for the acute aquatic life criterion and the 7Q10 flow as the receiving water design flow for the chronic aquatic life criterion (p. D-6). Many states use these recommended receiving water design flows to implement their water quality standards. In fact, states with federally promulgated water quality standards under the "National Toxics Rule" are required to use the receiving water low flows recommended in the TSD. The rule specifies a 1Q10 hydrologically-based low flow (or 1B3 biologically-based flow) for application of acute criteria and a 7Q10 hydrologically-based low flow (or a 4B3 biologically-based flow) for application of chronic criteria when using steady-state modeling (see 40 CFR 131.36(c)(2)(ii)). Furthermore, as noted above, some state water quality standards require the use of single, non-seasonal receiving water flows such as an annual 1Q10 or annual 7Q10. It is essential to consult individual state water quality standards and permitting regulations and procedures to determine the exact receiving water flows and conditions to use when developing water quality-based effluent limits.

2. Has EPA approved the use of a seasonal 7Q10 analysis in the development of water quality-based effluent limits? If so, what is the legal and technical rationale behind this approach?

EPA Response:

Seasonal or tiered effluent limits are legally acceptable under the Clean Water Act provided the requirements of §301(b)(1)(C) are met. This section requires that NPDES permits contain " . . . any more stringent limitation, including those necessary to meet water quality standards . . . " (see also 40 CFR 122.44(d)(1)(vii)(A)). Thus, permitting authorities incorporating seasonal limits into a permit must ensure that such effluent limits meet the magnitude, duration, and frequency requirements of the applicable water quality criteria. Also, in accordance with 40 CFR 122.44(d)(1)(vii)(B), all effluent limits (including tiered limits) must be consistent with any wasteload allocation developed for the facility as part of a total maximum daily load (TMDL). As noted in the response to question 1, states may specifically require, as part of their water quality standards, the use of single, non-seasonal receiving water flows. In such cases, a permitting authority legally could not develop seasonal or tiered water quality-based effluent limits.

EPA has accepted the use of seasonal effluent limits in both guidance and practice on a case-by-case basis. In the *Responsiveness Summary - Technical Support Document for Water Quality-based Toxics Control* (Responsiveness Summary, 1991), EPA indicates acceptance of the concept of limits that vary with seasonal receiving water flows (p. 21). In the *Questions and Answers on Implementing the Great Lakes Guidance - Set 2* (GLI Q&A, March 20, 1996), EPA has indicated the technical basis for considering seasonal or tiered effluent limits. This document states that "[t]iered limits may be considered in developing limitations to address any NPDES permitting scenario in which more that one set of circumstances exists (e.g., different effluent flows, different receiving stream flows, different hydrologic or climatic conditions) that, in the judgment of the permitting authority, need to be taken into account by way of tiered effluent limits" (GLI Q&A, p. 25). However, "[p]ermitting authorities . . . would need to ensure that these inputs and the limitations developed based on these inputs were collectively 'as protective as' those conditions referenced in [the Great Lakes Guidance procedure for calculating loading limits]" (GLI Q&A, p.26).

Both EPA and states with NPDES program authority have developed seasonally-based permit limits in some instances. For example, some states and EPA Regions have developed limits for BOD, DO, and ammonia based on a summer or annual 1Q10 or 7Q10 flow in the summer or dry season and a higher winter 1Q10 or 7Q10 flow in the winter or wet season. (The annual and summer 7Q10 flows are often equivalent because of the methodology used to calculate the 7Q10).

Permits should be evaluated on a case-by-case basis for the appropriateness of seasonal limits. Where dilution is the primary factor affecting development of an

appropriate wasteload allocation, permitting authorities might consider the use of seasonal limits based on seasonal receiving water flow. Factors important in a decision not to allow seasonal limits include the mechanics of mixing in the receiving water and concern or lack of information about the fate, transport, and long-term loading of conservative or persistent bioaccumulative toxic pollutants. In all cases, effluent limits (including seasonal or tiered limits) must meet water quality standards and be consistent with any TMDL developed for the receiving water.

3. Where it is clear that stream flows and plant flows are positively correlated, may permitting authorities, consistent with the Clean Water Act, use an average or expected dry weather flow from a discharge when assessing appropriate effluent limitations at 7Q10 conditions?

EPA Response:

The most direct way of accounting for variations in effluent flow when developing wasteload allocations and water quality-based effluent limits is through the use of dynamic modeling. Dynamic modeling can be used to explicitly model the effects of receiving water and effluent flow variability on receiving water concentrations. If dynamic models are unavailable or infeasible due to their complexity and data requirements, permitting authorities use steady-state modeling. Steady-state models require a constant input for effluent flow. The Clean Water Act and EPA regulations do not specify an effluent flow that must be used for development of wasteload allocations and water quality-based effluent limits; specifying either design or long-term average effluent flow when using a steady-state modeling approach is acceptable.

For publicly owned treatment works (POTWs), there are instances where it may be preferable to use the treatment plant design flow to calculate water quality-based limits in order to facilitate comparison with technology-based limits for the same parameters. The NPDES regulations at 40 CFR 122.45(b) require the use of design flow to calculate effluent limits based on secondary treatment requirements (i.e., technology-based limits) for POTWs. Thus, using effluent design flow to calculate water quality-based limits for POTWs may allow permitting authorities to directly compare some water quality-based limits with limits based on secondary treatment requirements and select the more stringent limits.

EPA recognizes that permitting authorities using steady-state models to develop wasteload allocations and water quality-based effluent limits may consider tiered limits to account for seasonal variations, including seasonal effluent flows, if necessary in the judgement of the permitting authority (GLI Q&A, p. 25). If a permitting authority accounts for variability in effluent flow by calculating effluent

limitations based upon a summer or dry weather effluent flow and a correlated 7Q10 or other appropriate dry weather stream flow, then it also should calculate the winter or wet season effluent limitation based upon the winter or wet season effluent flow and correlated seasonal stream flow. Seasonal limits based on effluent flows less than effluent design flow should be based upon actual flow data. Also, as noted in the response to question 2, all effluent limits (including seasonal or tiered limits) must meet water quality standards and be consistent with any wasteload allocation developed for the facility as part of a TMDL (see Clean Water Act §301(b)(1)(C) and 40 CFR 122.44(d)(1)(vii)).

4. Does federal law preclude the issuance of flow-based permits (i.e., permits that vary the allowable effluent quality as in-stream assimilative capacity varies)? If not, please describe situations where such flow-based permits have been allowed.

EPA Response:

As noted above, the Clean Water Act does not preclude tiered permit limits that vary with changing effluent or receiving water flow. In some cases where a facility has the capability to hold back a large volume of effluent and precisely control the discharge flow, EPA has developed permit limits that would allow an incrementally greater discharge concentration of a pollutant or pollutant parameter as receiving water flow increases. As stated in the Responsiveness Summary, however, "EPA is not convinced that a daily, variable approach would be universally practical given wastewater treatment response and performance" (p. 21). Permitting authorities also should consider the practicality of enforcing flow-based limits when making a decision about whether to include such limits in an NPDES permit. Permitting authorities wishing to consider <u>all</u> receiving water flows have the option to use dynamic modeling to calculate water quality-based effluent limits.

5. Has EPA issued any guidance documents supporting the use of seasonal water quality-based permits and the use of seasonal flow analyses to avoid imposition of unnecessarily stringent effluent limitations? If so, please provide a listing of such guidance.

EPA Response:

EPA has indicated acceptance of the concept of seasonal or tiered water quality-based effluent limits on a case-by-case basis in the *Technical Support Document for Water Quality-based Toxics Control* (1991), *Responsiveness Summary - Technical Support Document for Water Quality-based Toxics Control* (1991), and the *Questions and Answers on Implementing the Great Lakes Guidance - Set 2* (March 20, 1996). EPA also has indicated that the acceptability of such seasonal or tiered limits is subject to the statutory and regulatory requirements that they

achieve water quality standards and are consistent with any TMDL developed for the receiving water. Please see the responses to questions 2-4 above.

If you have any questions concerning the responses in this letter or any other questions regarding the use of seasonal flows in water quality-based effluent limits, please call me at (202) 260-9545 or call Margarete Heber, Acting Chief of the Water Quality and Industrial Permits Branch, at (202) 260-9537.

Sincerely,

James F. Pendergast

James F. Pendergast, Acting Director
Permits Division

cc: John C. Hall, Esq.
Christine Russell, Office of Senator Smith
Roger Janson, EPA Region 1