PROACTIVE ENVIRONMENTAL PERMITTING: STRATEGIES TO CONSERVE COSTS AND IMPROVE ENVIRONMENTAL PROTECTION

By John C. Hall & Ronald L. Raider

The 1987 amendments to the Clean Water Act ("CWA") imposed strict permitting requirements for toxic pollutants, stormwater, and combined sewer overflows. Many states are adopting stringent toxics water quality standards which must be incorporated into the next round of permits. Regulators are trying to satisfy these permitting demands without increases in staff or resources. Consequently, permit writers will not be able to devote the time to ensure that only necessary and appropriate requirements are established. The compliance risks to the regulated community, including the paper and packaging industry, can be substantial.

Quality-based permits for toxic pollutants create enormous strain on agency resources because of the highly technical nature of the science involved and the need for site-specific water quality data. To reduce the workload, many regulators continue to use simplified analyses because such practices require less resources, do not impose the same training demands, and ensure conservative permitting requirements. For example, most permitting authorities continue to rely on steady-state modeling approaches. In addition to these procedures, permit writers may employ further conservative assumptions which typically result in overly stringent water quality-based limits. The compliance costs for these requirements will be substantial, and achieving extremely low levels of pollutant discharge may cause more harm to the environment than it prevents.

To obtain reasonable and appropriate permit limitations, active participation in the entire permitting process is essential. This article addresses the basic concepts of proactive permit negotiations. These concepts are universal and may be applied in virtually all environmental programs. The fact that many agencies do not apply state-of-the-art analytical methods does not imply that other more reasonable procedures cannot be used. Many state agencies allow permittees to develop more complex analyses. This is an opportunity to provide site-specific information that will enable the permit writer to calculate the scientifically appropriate effluent limits and thereby avoid unnecessary capital expenditures.

PERMIT NEGOTIATIONS

Permittees who know that water quality-based limits are likely to be imposed can either engage in proactive or reactive negotiations. A proactive permitting strategy is preferable because it provides informal opportunities to participate in the decision-making process and reduces the need for permit appeals.

The CWA permitting process involves five basic steps over a one-year period. The first step is the permit application in which permittees submit basic facility information and performance data to the regulatory agency six months before permit expiration. In the next two steps the agency assesses environmental impacts, develops draft permit limits and then solicits public comment. After the public comment period closes, the final steps are the issuance of the final permit, and, if necessary, a permit appeal. The following discussion outlines the framework for successful proactive permit negotiations.

Proactive Permit Negotiations

Proactive permit negotiations can be defined as permittee involvement in the calculation of effluent limits as early in the renewal process as possible. This means that even before an application for permit renewal is filed, permittees should determine whether water quality-based limits are likely to be imposed in the next permit. If so, the permittee should begin its proactive negotiations. Generally, any discharger with less than a 10:1 dilution under low flow conditions is a likely candidate for water quality-based limitations.

The first step is to determine how the permitting authority calculates water quality-based limits. A review of agency rules and policies will disclose whether regulators are using state-of-the-art techniques. The permittee should also review the existing data that is before the agency. This initial investigatory phase should conclude by contacting the agency to discuss future permit requirements.

If the permittee's initial estimate shows that the permit limit is likely to be reasonable, then confirming that the agency will continue to use existing methodology becomes important. Permittees should seek assurances that the agency will in fact continue to use the methodology. An initial meeting is also important if the permit limits are not expected to be favorable. In these circumstances, the permittee should explore areas of flexibility while suggesting that more advanced analytical techniques are available.

Prior to the meeting, possible limits using the agency's approach should be calculated and compared to more refined techniques. In addition to the federally-mandated monthly discharge monitoring reports ("DMRs"), data concerning stream flow, temperature and other relevant information should be prepared and evaluated. An analysis of potential variance procedures and other site-specific methodologies should be conducted. Where an agency's current rules are based on outdated science, a discussion of new scientific information is also helpful.

To obtain reasonable and appropriate permit limitations, active participation in the entire permitting process is essential.

Frequently, this initial review will underscore the need to develop additional site-specific data. Typically, the burden falls on the permittee to furnish such information. The permittee should then reach an accord on a protocol for obtaining the new information and then conduct the additional sampling. Armed with this information and applying the accepted analyses, alternative discharge limits can be developed that more precisely regulate the impacts caused by the discharge.

Reactive Permit Negotiations

The less preferable and, unfortunately, more common approach taken by permittees, is reactive permit negotiations. In such cases, the permittee begins to actively participate in the process after unacceptable permit conditions are published for public comment. By this stage, the permitting authority has calculated the final limits, which are by then more difficult to modify. Under the current regulatory framework, acceptance of the permit in the hope of future modification presents considerable risks. If the unacceptable permit conditions are enforced, compliance becomes expensive and frequently requires substantial capital expenditure. Federal anti-backsliding provisions will apply unless the permit is contested. A permittee facing this situation should seek a stay of the permit conditions by filing an appeal. The next step is to assemble data that is needed to rebut the agency's conservative assumptions and then to present the data to the agency. The agency should review the new information and modify the permit accordingly. If not, the permittee will need to exhaust administrative or judicial remedies.

THE WATER QUALITY-BASED EFFLUENT LIMITATION PROCESS

Water quality-based effluent limits are permit conditions that are more stringent than the minimum technology-based limits and are designed to protect human and aquatic life. The calculation of water quality-based effluent limitations involves the integration of numerous technical, regulatory and legal requirements.

The key to obtaining reasonable water quality-based effluent limits is a comprehensive understanding of the science and rules that the permit writer will use to derive effluent limitations.

As discussed, regulatory agencies cannot develop detailed site-specific information on a discharge or its impacts on the environment. This leads to conservative, albeit protective, permitting assumptions. Site-specific information is essential to overcome these assumptions.

The water quality permitting process relies on the following main components in the development of a water quality-based permit:

- The water quality standard;
- Modeling procedures; and
- Permitting rules and policies.

Site-specific information may be used to modify the conservative bias included in each component. The last two factors are functions of the water quality standard and are the mechanisms by which the standard is translated into a permit to meet its objective: protection of instream uses. Wherever appropriate, data showing the impacts to actual stream uses should modify general policies and rules. Effluent limitations procedures used to establish permit limitations should accurately reflect the scientific basis and level of protection intended by the water quality standard. Both over- and under-protection should be avoided.

The following sections review a number of the assumptions incorporated into the basic components of the effluent limitation process. The analysis is intended to be illustrative and not exhaustive.

WATER QUALITY-BASED CRITERIA

The water quality criteria underlying permit conditions are intended to protect the different uses of the receiving stream. These criteria are developed pursuant to Section 304 (a) of the Clean Water Act, based upon a scientific protocol adopted by the Environmental Protection Agency ("EPA").

In developing water quality criteria, the EPA has evaluated highly toxic forms of pollutants in a pure environment. This protocol ensures that a pollutant will not be under-regulated. For many substances, aquatic chemistry is critical in determining the actual toxicity in a receiving stream. Such factors as hardness, pH, total organic carbon, and other substances contained in the effluent and receiving water may exert significant influences on the toxicity of the pollutant. Consideration of these factors, which were minimized during laboratory testing for criteria development, will often result in more realistic use protection goals.

Regulatory agencies cannot develop detailed site-specific information on a discharge or its impacts on the environment. This leads to conservative, albeit protective, permitting assumptions.

Another EPA assumption is that sensitive aquatic life is present and that exposure to pollutants is likely to occur during the most sensitive life stage. The permittee should investigate the species that actually populate or could reasonably populate the receiving stream. Use of EPA criteria in circumstances where pollutant-sensitive species do not populate, and could not populate, the receiving stream is not appropriate because the EPA's criteria are not necessary to protect the instream uses. Criteria adjustments should be considered in such cases.

In revising EPA criteria, it should be noted that the EPA's recalculation procedures favor maintaining the published criteria. Such procedures should not be used in truly habitat-limited streams. Instead, "other scientifically defensible" procedures are available as specified in the Code of Federal Regulations.

TYPICAL EFFLUENT LIMITATION AND PERMIT ISSUES

Issues commonly encountered in water quality-based permitting are discussed below.

Modeling Issues

A permittee should always review the water quality model. Factual assumptions incorporated into the model should be fully investigated. These are flexible areas, and the permittee should consider whether the model assumptions reflect expected conditions in the receiving stream. For example, steady state models are often based on critical low flow events, such as 7/Q/10 (*i.e.*, the lowest average weekly flow which occurs once every 10 years). Accepting this assumption, a permittee should ensure that the remaining critical factors reflect low flow conditions. Analyses frequently incorporate a number of conservative assumptions

regardless of whether these events are possible or even likely to occur simultaneously during the low flow event (*e.g.*, low hardness during low flow). In general, the effect of the effluent characteristics on instream quality should be accurately represented during the low dilution event.

One significant advancement in water quality-based permitting is the evolution of mathematical modeling. The advent of statistical or probabilistic modeling has eliminated the need to make assumptions regarding the likelihood of remote events occurring simultaneously. Most important, further safety factors built into the permit establishment process (*e.g.*, the need to design a facility to perform at 30-50% of its permit limit) is fully recognized and incorporated into the effluent calculation process. More time consuming and complex statistical modeling procedures routinely produce effluent limitations from 2 to 10 times *higher* than steady-state procedures.

The EPA has promoted probabilistic modeling through new water quality criteria. Permittees should ensure that permit writers use these procedures when calculating their effluent limits. Many states are adopting procedures to expressly allow use of these scientific techniques. A consistent effort by permittees in this area should result in the nationwide acceptance of these more representative modeling procedures.

Heavy Metals and Dioxin

The EPA acknowledges that metals and dioxin limitations are often unnecessarily restrictive. Unfortunately, little has been done to correct the problem.

As stated earlier, the EPA's criteria for heavy metals are based on the highly toxic dissolved ionic form. Very pure water was used to minimize chemical complexing. The EPA used these conditions to improve test reproducability and to estimate the maximum toxic impact of the metal even though that impact is rarely, if ever, realized. Similar concerns exist with respect to dioxin criteria.

The EPA acknowledges that metals and dioxin limitations are often unnecessarily restrictive. Unfortunately, little has been done to correct the problem.

As a result, hundreds of permittees face more stringent metals and dioxin limits under CWA Section 304(*l*) even though these dischargers pass whole effluent toxicity ("WET") testing. This testing often indicates no acute or chronic impacts to sensitive test species at pollutant concentrations far in excess of EPA criteria.

The linchpin issue regarding heavy metal and dioxin discharges is determining what needs to be regulated. The EPA criteria confirm that it is the bioavailable form of a metal or dioxin that poses an environmental threat. For example, discharges of metals in a chemically "complexed" form (*i.e.*, as part of a compound) are often not bioavailable and therefore, pose less environmental threat. Even acid-soluble testing will tend to overestimate some concern due to unrealistically low pH used for digestion. In most circumstances, across-the-board regulation is inappropriate. Another confounding factor is that federal regulations require permit limits for heavy metals to be expressed in terms of total recoverable metals. Unfortunately, there is no universal correlation between total recoverable metals and dissolved metals. The issue is entirely site-specific. Frequently, permit writers simply assume a 1:1 ratio of total recoverable to dissolved metals. Thus, even where the correct effluent limit is derived, regulatory agencies may inadvertently impose more stringent limits by expressing the permit condition in terms of total recoverable metals, which are largely non-toxic.

The EPA now advises that the permitting authority should appropriately adjust the metals or dioxin limitations to reflect the bioavailable metals or dioxin in the discharge. Permittees facing stringent metals and dioxin limits should assemble data addressing the biovailability of the pollutants in the discharge. This information may be used to establish a more appropriate discharge limit. For example, with respect to metals, the bioavailability of the dissolved fraction may be tested further through a variety of methods. The total recoverable limit should then be adjusted accordingly.

When calculating metals or dioxin limits it is important to consider all factors that impact the bioavailability of the pollutants in the discharge. The permittee must consider both the

effluent characteristics and any chemical transformations that may take place in the receiving stream. One such factor is the instream hardness. Hardness is a complexing agent. Therefore, the higher the instream hardness, the more dissolved metals may be safely discharged. Permittees should carefully review the hardness value used by the permit writer to ensure that it is accurate, and, if necessary, provide supplemental hardness data.

Depending on the pollutant involved, there are other agents impacting bioavailability to consider as described in the EPA's criteria documents. These factors may be identified by reviewing the EPA source documents. Permittees should provide data on all factors that support an appropriate adjustment to the permit limit.

Mixing Zones

The purpose of a mixing zone is to allow a limited area for the effluent to dilute into the receiving stream. Aquatic uses need not be fully protected in such zones so long as fish passage and floating organisms are not adversely affected. Acutely toxic conditions are not supposed to occur in mixing zones.

Conflicting EPA guidance on mixing zones has caused significant confusion on how to assess acutely toxic conditions and to apply "acute" criteria. The EPA acute criteria are not equivalent to acutely toxic conditions. These criteria are designed to cause no mortality for exposures up to 96 hours. Unless such exposures in the zone are expected to exceed the duration associated with the development of the EPA's acute criteria, mixing zone concentrations may exceed the criteria. Thus, a blanket requirement for high-rate diffusers is unnecessary. Initial effluent mixing should be considered in evaluating the potential for an acutely toxic condition and applying acute criteria.

To avoid unnecessary or overly stringent limits, permittees must be prepared to actively fill the resource gap left by the regulators.

CONCLUSION

Calculating water quality-based limits is a complex process requiring the use of substantial site-specific information and the most current analytical techniques. Unfortunately, many permitting authorities lack the resources to provide this level of effort for every permit. To avoid unnecessary or overly stringent limits, permittees must be prepared to actively fill the resource gap left by the regulators. By assembling site-specific data and providing alternative analytical methodologies, permittees can ensure that their permits are reasonable and that unnecessary capital expenditures are avoided. ■