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State of Washington

Water Quality Program Guidance Manual

Supplemental Guidance on Implementing Tier II Antidegradation

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Water Quality Program Guidance Manual

Supplemental Guidance on Implementing Tier II Antidegradation

Water Quality Program
Washington State Department of Ecology
Olympia, Washington

Intent: The following information provides assistance to NPDES permit writers when implementing the Tier II antidegradation rules, found at WAC 173-201A-320. These antidegradation rules were updated July 2003, and subsequently approved by EPA in February 2008. This document provides clarification on the intent of WAC 173-201A-320.

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I. Introduction

Federal regulations (40 CFR 131.12) and the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-300, 310, 320, 330) establish a water quality antidegradation program for surface waters[1]. The federally-mandated program establishes three tiers of protection for water quality. These three tiers function to protect existing and designated in-stream uses, to limit the conditions under which water of a quality higher than the state standards can be degraded, and to provide a means to set the very best waters of the state aside from future sources of degradation entirely.

WAC 173-201A-320 contains the Tier II antidegradation provisions for the state's surface water quality standards. Consistent with the federal water quality antidegradation regulations, Washington's Tier II program functions as a pollution-prevention program to provide an extra measure of protection for water quality.

In the following directive, significant excerpts from the Tier II antidegradation rule language are incorporated and reflected through the *italic font* text (in some cases the excerpts are partial rule text from a given section. The complete rule text can be found in Appendix A).

II. Overview of the Tier II Antidegradation Process

A. Summary of Tier II analysis requirements

> *173-201A-320(1). Whenever a water quality constituent is of a higher quality than a criterion designated for that water under this chapter, new or expanded actions that are expected to cause a measurable change in the quality of the water may not be allowed unless the department determines that the lowering of water quality is necessary and in the overriding public interest.*

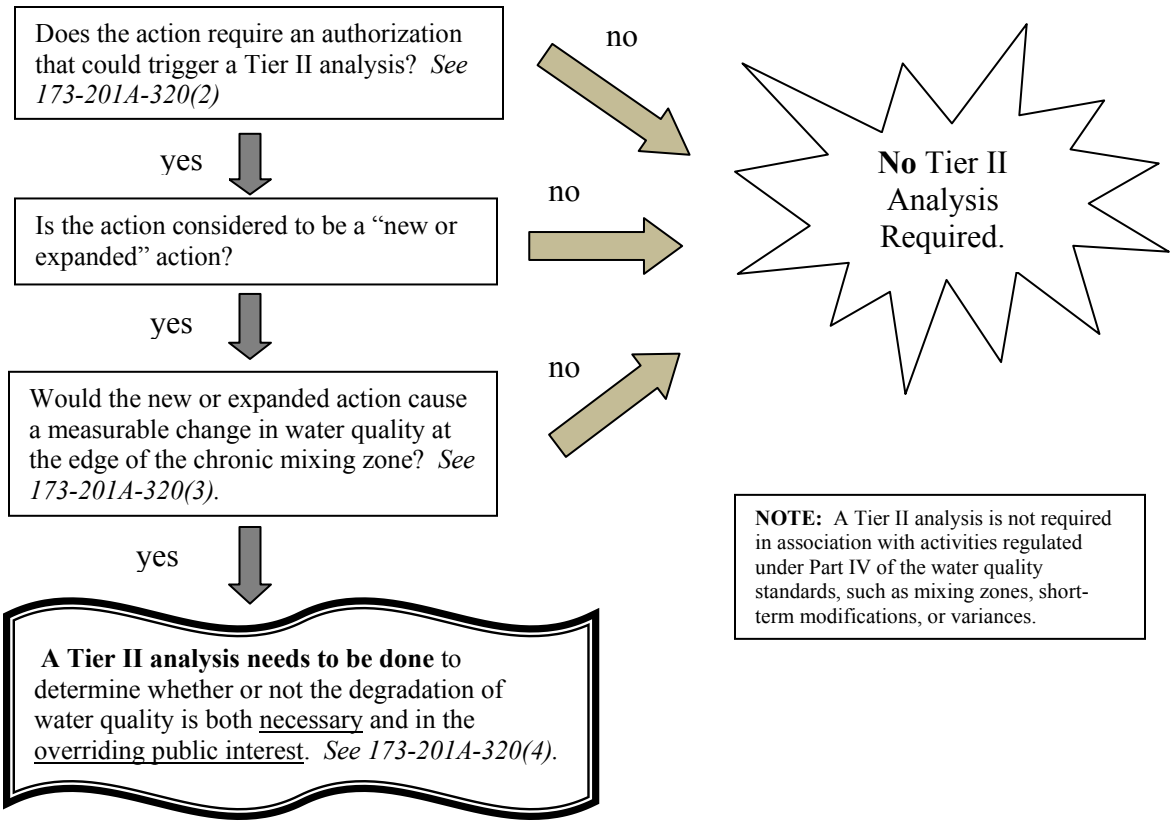
A Tier II analysis consists of an evaluation of whether or not the proposed degradation of water quality that would be associated with a new or expanded action would be both *necessary* and in the *overriding public interest*.

Figure 1 provides a flowchart for a quick overview and analysis for determining whether a Tier II analysis should be done.

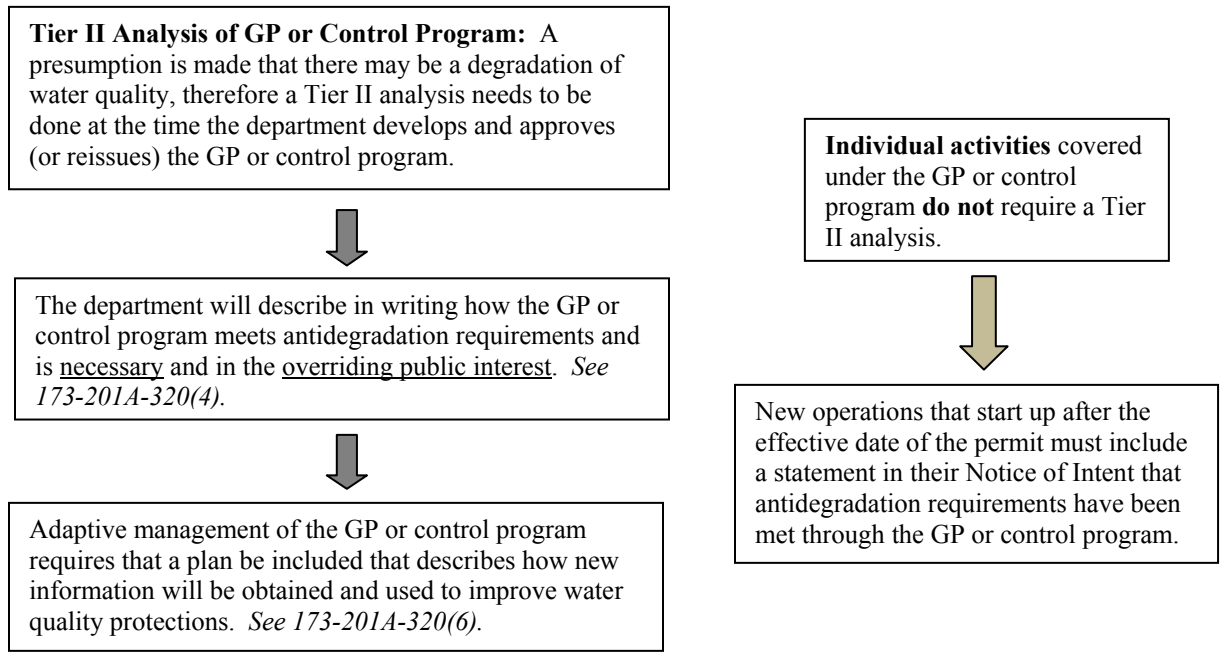
[1] For antidegradation rule language and guidance specific to Ecology's groundwater quality standards see Chapter 173-200 WAC and Ecology publication #96-02 *Implementation Guidance for the Ground Water Quality Standards*.

Implementing Tier II Antidegradation in permits

For Individual Actions:



For General Permits (GP) or Other Pollution Control Programs:



All three of the following conditions must be met before an activity would be required to go through a Tier II analysis:

1. It must be an action associated with specified authorizations by Ecology.
2. It must be a new or expanded action.
3. The action must have the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

If all three of these conditions occur, then a Tier II analysis is required. The Tier II analysis focuses on evaluating and incorporating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs of allowing the lowering of water quality, and prohibits actions from lowering water quality that are not in the overriding public interest**.**

A Tier II analysis is not required in association with activities regulated under Part IV of the water quality standards, such as mixing zones, short-term modifications, or variances. For example, Tier II analysis would not be required for short-term modifications or mixing zones issued in association with construction and maintenance activities or the periodic use of herbicides to control of noxious aquatic plants.

B. Timing of a Tier II review

A Tier II antidegradation review should be initiated as early in the facility planning stage as possible. Early consideration will keep the costs of the antidegradation review to a minimum. Also, it would reduce the likelihood that a permit application or certification would need to be denied later, based upon a failure to satisfy the Tier II antidegradation provisions. Generally, the Tier II analysis should be conducted by the permittee as a companion to an engineering report.

III. Identifying Actions Required to Do a Tier II Analysis

A. State authorizations eligible for a Tier II review

173-201A-320(2). A Tier II analysis will only be conducted for new or expanded actions conducted under the following authorizations. Public involvement with the Tier II review will be conducted in accordance with public involvement process associated with these actions.

(a) National Pollutant Discharge Elimination System (NPDES) permits.

(b) State waste discharge permits to surface waters.

(c) Federal Clean Water Act Section 401 water quality certifications.

(d) Other water pollution control programs authorized, implemented, or administered by the department.

Only actions for which Ecology has specific regulatory oversight are required to be reviewed under Tier II. Subparagraph (a), NPDES permitting actions, are the most prevalent state authorization issued by Ecology that need to consider whether a Tier II antidegradation analysis is needed.

To date, no state waste discharges permits have been issued for surface water discharges (as described in subparagraph (b) above), but this provision is included for any potential permits that could be considered in the future.

Subparagraph (c), 401 water quality certifications are required when a federal permit or license is needed and the project has a discharge to waters of the state. The 401 certification is issued with conditions to ensure that state water quality standards are met. New or expanded projects requiring a 401 certification that will potentially cause a measureable change in water quality will be required to undergo a Tier II analysis for antidegradation (for example, a new hydropower project). Projects that may cause short term exceedances for turbidity during in-water construction are not required to go through the Tier II antidegradation test if they adhere to the requirements for turbidity criteria that are described in sections 173-201A-200(1)(e)(i) and 173-201A-210(1)(e)(i).

Subparagraph (d) of the rule currently applies only to the forest practices rules, but would be expanded to cover any similar formal program implemented or administered by Ecology in the future. The forest practices system in Washington is specifically designed to meet the requirements of the Clean Water Act and the state water quality standards. Forest practices must be conducted so as to meet the state's narrative and numeric water quality standards and the Tier II antidegradation requirements. These requirements are monitored through the comprehensive Forest and Fish Adaptive Management Program, which includes compliance, validation, and effectiveness monitoring.

This adaptive management program uses the findings of scientific investigations to periodically update forestry requirements. These updates are designed to ensure that compliance with the forest practice rules also results in compliance with the state surface water quality standards,

including the Tier II antidegradation requirements. This expectation should remain true so long as: 1) the adaptive management program continues to be adequately funded, functional, and scientifically robust; and, 2) an antidegradation evaluation is conducted as part of any rule making affecting water quality related requirements in the forest practices system.

B. New or expanded actions

Only new or expanded actions are potentially eligible for a Tier II analysis. "*New*" means facilities that are just being built or actions first initiated. "E*xpanded*" means:

- A physical expansion of the facility (production or wastewater system expansions with a potential to allow an increase the volume of wastewater or the amount of pollution) or activity.
- An increase (either monthly average or annual average) to an existing permitted concentration or permitted effluent mass limit (loading) to a water body greater than 10%.
- The act of re-rating the capacity of an existing plant greater than 10%.

New or expanded individual activities

Production and wastewater systems that are being redesigned or expanded offer good opportunities for applying new, less-polluting technology and for re-evaluating long-term plans for wastewater controls. Using 10% as a trigger for defining what is considered an expanded facility for antidegradation is consistent with the current Ecology practice of applying new source performance standards to dischargers who increase production by more than 10%. Where a permit limit is not based on a facility's design capacity, it is necessary to track the changes that occur in effluent mass loading over successive permit cycles, in order to implement the 10% rule for an existing facility.

Provisions must be established in the permit or fact sheet to determine and set the initial base line effluent mass loading rate (typically expressed as pounds per day and calculated using flow and pollutant concentrations). Starting with this base-line value, subsequent permits or fact sheets must track any cumulative increase in loading rate. Once the cumulative increase over the initial base line exceeds 10% the facility becomes eligible for a Tier II antidegradation analysis. Permit managers should include any monitoring necessary to establish a baseline in existing permits as they come up for renewal, and should use these baseline estimates in all following renewals.

In re-rating a facility, it is important to recognize that anti-backsliding rules still apply, and Ecology cannot allow a decrease in pollution control technology performance.

Stormwater dischargers regulated under individual permits

In situations where stormwater dischargers are regulated under individual permits rather than through a general permit (discussed in Section VI), it is necessary to determine eligibility based on whether or not the discharge is new or expanded. For stormwater discharges, "new or expanded" refers to changes in the amount of polluted stormwater runoff that would reach waters beyond the stormwater treatment network. A good surrogate measure of increased polluted runoff is the change in impervious surface area, or alternatively, a change in the use of existing impervious surface to activities known to contribute greater levels of pollutants in runoff. For industrial facilities applying for an individual stormwater permit, an expected increase in

impervious surface (compared to the previous landscape) of more than 10% or a significant change in the use of existing impervious surfaces should generally be considered an indication that a new or expanded discharge has occurred or will occur. For municipal stormwater permits, it should be assumed, absent defensible information to the contrary, that there will be new or expanded discharges of stormwater that would cause a measurable lowering of water quality. It is appropriate to incorporate an adaptive management process in the issuance and successive revisions of an individual permit, similar to that described for general permits in Section VI (c).

C. Measurable change

> *173-201A-320(3) Definition of measurable change. To determine that a lowering of water quality is necessary and in the overriding public interest, an analysis must be conducted for new or expanded actions when the resulting action has the potential to cause a measurable change in the physical, chemical, or biological quality of a water body. Measurable changes will be determined based on an estimated change in water quality at a point outside the source area, after allowing for mixing consistent with WAC 173-201A-400(7). In the context of this regulation, a measurable change includes a:*
>
> *(a) Temperature increase of 0.3°C or greater;*
>
> *(b) Dissolved oxygen decrease of 0.2 mg/L or greater;*
>
> *(c) Bacteria level increase of 2 cfu/100 mL or greater;*
>
> *(d) pH change of 0.1 units or greater;*
>
> *(e) Turbidity increase of 0.5 NTU or greater; or*
>
> *(f) Any detectable increase in the concentration of a toxic or radioactive substance.*

There are cost and complexity issues associated with making the Tier II eligibility determination. Estimating dilution factors, collecting any necessary ambient water quality data, predicting effluent concentrations, and determining how these factors all combine to lower water quality is not a trivial undertaking. A project proponent may choose to move straight to a Tier II "necessary and overriding public interest" analysis, rather than make these eligibility determinations. This may be a cost- and time-effective strategy where there is a reasonable probability that measurable degradation will likely occur.

In considering what is *measurable*, the expected increased concentration of each pollutant at the edge of a chronic mixing zone, as described in WAC 173-201A-400(7), must be determined. Thus, a dilution factor will need to be determined based on the flow and channel characteristics of the water body at the location where the action is proposed. The use of the maximum chronic mixing-zone dimensions, in this case, is only for the purpose of determining eligibility for a Tier II analysis, and does not negate the requirement in WAC 173-201A-400(6) to minimize the size of mixing zones, nor any other regulatory provisions for allowing mixing zones established in Section 400, when effluent limits are established. For dissolved oxygen, however, the point of compliance for determining if a measurable change would occur is at the point of maximum oxygen depletion (caused by an increase in BOD and nutrients), which often occurs many miles down gradient.

The same basic process currently used for characterizing effluent concentrations to determine a *reasonable potential* to violate the water quality standards (described in the Water Quality Permit Writer's Manual in Chapter VI) should be used to determine whether a measurable change would occur, except that a different water quality target would be considered. Instead of targeting the numeric criteria for each pollutant as defined in WAC 173-201A-(200-250), the target becomes the incremental increases identified as measurable (noted previously) and used for determining eligibility for a Tier II analysis. Because of this different target, however, it is not always necessary to have background water quality information to determine eligibility. This is true since eligibility is based upon the absolute change in water quality caused by the one action being evaluated. Since the goal is to track the incremental effect on water quality from a single action or discharger it is appropriate, in most cases, when making the eligibility determination to assume zero as a background concentration. Notable exceptions where it would not be appropriate to assume zero as a background concentration would be for evaluating the effect on conventional pollutants such as dissolved oxygen, temperature, and pH.

Chapter VI of Ecology's Permit Writer's Manual establishes the ambient water flows and effluent design flows for estimating the concentration of pollution at critical conditions. These same design flows should be used, where appropriate, to estimate measurable degradation for the Tier II analysis.

IV. Evaluating New and Expanded Actions

Since an antidegradation eligibility analysis is to be performed on new or expanding actions, direct measurement of the final wastewater is not possible. The determination of eligibility for a Tier II analysis must therefore be based upon the expected concentration and loadings, or expected change in concentration, of the final permitted effluent or resultant ambient water. In evaluating whether a measurable change in the concentration of a toxic or radioactive substance would likely occur, the focus of the estimates is on those compounds for which numeric criteria exist under the state's water quality standards (including those imposed on the state through the federal toxics rule). The permittee or applicant should be asked to report on any compound they expect will be discharged for which such criteria exist, and Ecology staff should use their best professional judgment in reviewing the strength of those assumptions.

The estimates on the expected effluent concentrations or effluent mass loading need to be based on an engineering analysis of the proposed facility, on a proposed change to the facility, or on a re-rating of the facility (discussed previously in section III.B). The expected concentrations and effluent mass loading that are provided, through the engineering analysis, can be cross-checked through a comparison with the final effluent from other similar facilities. Where an expansion is proposed to an existing facility, the projection of the change in effluent quality can be reasonably cross-checked by assuming that the same relative concentration of pollutants will occur in the final effluent (absent information to the contrary).

Public involvement requirements under Tier II

The antidegradation Tier II rule does not address specific expectations for public review. However, public participation is a required element of the state's antidegradation program.

The need to include a public review opportunity is critical to being able to make the overriding public interest determination incorporated in the state rule. Early public involvement may also prevent public opposition at the final approval stage, where it can be more costly to address. Providing an opportunity for the public to review Ecology's examination of less-degrading alternatives is also important. Doing so demonstrates we are fully implementing a crucial element of rule by considering and incorporating all feasible alternatives to protect water quality.

Conducting public involvement activities for Tier II

In accordance with section II of the rule, public involvement for the Tier II review should be included as a part of the public involvement process associated with the Ecology authorization being conducted. This means that the Tier II requirements must be adequately discussed as a part of those other public involvement mechanisms. For example, in a permit application notification, specific mention of the water body affected, the need to find that any lowering of water quality is necessary and in the public interest, and the openness to receiving public comment on these issues, would initiate the appropriate public review process for Tier II.

Where an existing mechanism for public review that can be used to incorporate the Tier II review issues does not exist, Ecology will need to create one that is unique to this purpose. This can be as simple as a public notice to the local community and established interest groups.

Regardless of the mechanism or form used, the public review process should include:

- A clear statement on the need to make a Tier II antidegradation determination.
- Sufficient information to identify the water body affected, the type of action being reviewed, and the constituents of concern.
- A description of the process for reviewing and selecting the least degrading alternatives which can be feasibly implemented.
- The method by which public comments will be considered.

Timing of public participation

Public participation for Tier II review should ideally be initiated during the project planning phase, but can alternatively be initiated after an activity has been determined to qualify for a Tier II analysis (i.e., likely to cause a measurable lowering of water quality). If public involvement is delayed until after a facility plan has been approved by Ecology, there is a risk that new Tier II issues may be raised that cause Ecology to require a re-analysis of the proposed facility. This could create unnecessary costs that could have been minimized or avoided through early and effective public involvement.

V. Necessary and Overriding Public Interest (OPI) Determinations

The Tier II antidegradation rules at section IV require that a project proponent prepare a statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality. This information will be used by the department, in association with the public involvement process, to determine if the lowering of water quality is necessary and in the overriding public interest (OPI). The antidegradation Tier II test potentially allows for water of higher quality than the established water quality criteria to be degraded. However, it cannot be used to authorize a violation or exception to those water quality criteria.

Section IV of the rule has two parts (a) and (b). Part (a) gives examples of information that will help the department determine if the lowering of water quality is in the over-riding public interest. Part (b) describes information to assist the department in determining if the lowering of water quality is necessary. Further description follows.

A. OPI requirements

The OPI requirements in the rule found at 173-201A-320(4)(a) create a cost/benefit analysis that can be used by the department and other interested parties to evaluate whether the costs of allowing the degradation to water quality are too great in proportion to the benefits. It is intended that the analysis focus on reasonable expectations and be generally based upon available information. The use of narrative descriptions is acceptable, and should be encouraged, where numeric information is not readily available.

For example, we may not know the lost economic benefits of using up most of the remaining assimilative capacity for a common water quality pollutant, but the relative change in capacity and the fact that newcomers will meet very stringent requirements is important social and economic information. Similarly, it may not be reasonable to put a value on the increased contamination of a popular fishing hole or swimming beach, but it is a social effect that is worthy of discussion and is further illuminated by including information on the estimated number and types of users. Also, while it may not be possible to estimate the extent that ground water is protected or economic expansion promoted by connecting septic systems to a treatment plant, the risk prevention benefits for drinking water sources can be discussed in relation to the relative change in water quality to the proposed receiving water.

Thus, even without quantitative data the various benefits and costs can be compared and contrasted. Even where financial costs and benefits are uncertain, most of the underlying factors can be reasonably quantified (e.g., assimilative capacity, number of households, acres of land, visitor numbers at local river parks) and are important to weighing the relative benefits and costs. In making such comparisons, it is important to focus only on the benefits and costs associated with the specific proposal and not the industry or facility as a whole. What this means is that if there is an expansion of a facility, only the benefits and costs associated with the expansion are considered as part of the antidegradation Tier II analysis.

One of the key purposes of the OPI evaluation is to set the stage for a public discussion on the relative merits and tradeoffs associated with allowing water quality to be degraded. Whether based on qualitative or quantitative information, however, the fact that the OPI evaluation

includes issues of varying human values means that the results and how they are interpreted are subjective in nature. Rather than trying to identify strict cost-to-benefit ratios, Ecology's final decision is most appropriately focused on identifying those actions that are clearly not in the overriding public interest.

Following are examples of information from the rule that can assist in the determination of OPI. These are only examples and should not be used as either a mandatory or exclusive list of OPI factors. The goal is to find those factors that are applicable to the specific action undergoing the Tier II analysis:

- *Economic benefits such as creating or expanding employment, increasing median family income, or increasing the community tax base.*

It is important to characterize the creation of employment and improvements to the community economic structure. How many jobs? How will the wages compare to median wages in the area? How many of the jobs will employ from the local labor pool? These are attributes of the project that an applicant should be able to quantify, and the basis for the estimates provided must be included.

- *Providing or contributing to necessary social services.*

Waste water treatment plants, hospitals, and energy developments are examples of social services that may be important in some situations. But it is important to explain why they are important in the local community when water quality will be degraded if the project is approved.

- *The use and demonstration of innovative pollution control and management approaches that would allow a significant improvement in AKART for a particular industry or category of action.*

AKART is often based on readily demonstrated technology. Where a facility/entity is intentionally demonstrating the reliability and cost-effectiveness of more effective technology, that demonstration creates a public benefit by setting the stage for a refinement of what is considered AKART for the activity or for controlling a specific problem pollutant. In citing this provision, a discussion of the current technology-based limits and the expected improvements in performance for the approach being demonstrated should be clearly described.

- *The prevention or remediation of environmental or public health threats.*

One example is the construction of a central treatment plant to correct problems with failing septic systems. In using this and other provisions, it is important to discuss the relative costs and social impact of other options that may be available to address these threats. For example, can a problem of failing septic systems be addressed by repairing those systems or creating just a small package plant in the problem area rather than one that receives all of the community's sewage? An important question in this context is whether the selection of the remediation tool and its scale of coverage goes beyond the actual existing threat. It is also important to consider the economic and social costs of the remediation project. For example, what is the impact of any required hookup fees and the capital construction costs to the community compared to other alternatives?

- *The societal and economic benefits of better health protection.*

Toxics and bacterial pollutants can both reduce life expectancy and increase illness rates. Such effects come with lost revenue, increased burden on social systems, and increased contribution rates to health plans. These economic and social costs should be considered against the economic benefits of increased employment and median family income, etc.

- *The preservation of assimilative capacity for future industry and development.*

Particularly for parameters such as dissolved oxygen, bacterial pollutants, and common metals, the loss of available assimilative capacity may mean that future entities and expansions will be held to higher and more expensive treatment requirements. The less each individual activity uses of the assimilative capacity, the better the potential for cost-effective future development will be. Discussing the relative impact on the remaining assimilative capacity addresses the relative impact of the activity on the costs and opportunities for future growth.

- *The benefits associated with high water quality for uses such as fishing, recreation, and tourism.*

Problems with water quality, particularly with those attributes that impact aesthetics, may reduce the value of the water to provide social and economic benefits through recreation and tourism. Describing the level of the changes in water quality in areas used for recreation can help address this question.

B. Determining the lowering of water quality is necessary

Before a lowering of water quality can be authorized under the Tier II antidegradation rules, that lowering of water quality must be demonstrated to be necessary. Information to conduct the Tier II analysis of necessity must be provided by the applicant seeking the authorization, or by the department in developing a general permit or pollution control program, and must include information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. Examples that may be considered as alternatives can be found at 173-201A-320(4)(b) and include (directly from rule language):

(i) Pollution prevention measures (such as changes in plant processes, source reduction, and substitution with less toxic substances);

(ii) Recycle/reuse of waste by-products or production materials and fluids;

(iii) Application of water conservation methods;

(iv) Alternative or enhanced treatment technology;

(v) Improved operation and maintenance of existing treatment systems;

(vi) Seasonal or controlled discharge options to avoid critical conditions of water quality;

(vii) Establishing buffer areas with effective limits on activities;

(viii) Land application or infiltration to capture pollutants and reduce surface runoff, on-site treatment, or alternative discharge locations;

(ix) Water quality offsets as described in WAC 173-201A-450.

As with the OPI analysis discussed previously, the examples just listed are not intended to be mandatory or exclusive. The goal is to identify and evaluate those alternatives that are applicable to the specific action undergoing the Tier II analysis. As such, the rule includes the proviso that the department retains the discretion to require that the applicant examine specific alternatives, or that additional information be provided to conduct the analysis.

Evaluating less degrading alternatives

All less-degrading alternatives which can be feasibly implemented must be considered. This demands an expanded site-specific review of alternatives that would reduce or completely eliminate the degradation of water quality. The rejection of any alternative that would produce a significant improvement in the resulting discharge or water quality must be based on a solid determination that the costs are prohibitively expensive.

The list of alternative examples in the rule suggests broad areas to investigate and help clarify alternatives that are sometimes overlooked when approving activities. For example, in most cases it would not be acceptable to consider only treatment techniques that can be applied to the effluent. From the types of supply materials, to steps that recapture and reuse materials and wastewater, to application to land and the use of seasonal holding facilities, the feasibility of all applicable opportunities to reduce the level of pollution must be considered. The permit manager should assist the applicant, where necessary, in identifying less-degrading alternatives.

One approach to conducting an alternatives evaluation for a proposed action is to create the expectation that, if achievable, the action is to have no measurable increase of pollution at the edge of a chronic mixing zone. Back calculating from the measurable threshold concentration (established to determine eligibility for a Tier II review) at the edge of a mixing zone to an effluent/effect level creates the target, and the applicant must demonstrate why meeting that target is not possible. The benefit of this approach is that it provides a specific target for engineering studies. However, it should be noted that if this approach is used, non-degrading options should also be evaluated.

Inclusion of water quality offsets as an alternative

The inclusion of water quality offsets in (4)(b)(ix) is intended for two purposes. The first is that offsets can be used to minimize the impact, and where they result in a net improvement of water quality, also serve as an example of a public benefit. The second is that offsets can be used to reduce the impact of an action such that there would not be a measurable degradation of water quality, thus eliminating the need for a Tier II analysis.

Determining economic achievability

Determining the economic achievability of less-degrading alternatives under Tier II of the antidegradation rules would be generally equivalent to the BAT analysis described in Chapter IV, Section 2, of the Permit Writer's Manual – except that it applies to the economic achievability of reducing the concentrations of conventional, non-conventional, and toxic pollutants. Performing the economic achievability test requires estimates of the costs of process, treatment, and disposal technologies; estimates of pollutant removal levels; and estimates of profit, cost, and revenue data. Municipal wastewater facilities should be evaluated based on the impact of the alternative on the costs to households. Existing EPA guidance considers a sewerage cost of 1% or less of the community's annual median household income to be

affordable, and costs of 2% or more to be generally unaffordable. If the cost estimate falls between 1-2%, affordability is considered uncertain and a secondary test is invoked. This secondary affordability test examines and weighs bond rating, net debt, unemployment, median household income, property tax collection rate, and property tax revenues. Ecology's grant program uses 1.5% of the median household income as the threshold above which grant funding is available. Thus a cost below 1.5% may be a good threshold for determining alternatives that remain affordable under the Tier II test.

The permittee is responsible for providing any data needed by the permit manager to make a decision. Permit managers should explicitly instruct the applicant to review all process, treatment, and disposal technologies that would eliminate or significantly reduce the level of degradation, as generally guided by WAC 173-201A-320(4)(b). The applicant should be instructed to quantify the expected concentration and loadings of pollutants, detail the costs, and list the environmental factors associated with each identified alternative as part of the required engineering report. This information will form the basis for the permit manager's best professional judgment determination on the required combination of alternatives that meet the Tier II requirements, and ultimately as the basis for determining effluent limits.

VI. Tier II Requirements for General Permits and Water Pollution Control Programs

In addition to individual permits, Ecology directs activities that can cause water pollution through broader control programs that prevent pollution through identified technologies and best management practices (BMPs). These are designed for a class or type of activity or pollution source, regardless of location. For example, Ecology develops and maintains general permits for certain types of industrial activities (e.g. construction, sand and gravel operations, fruit packing,) that are conducted throughout the state by numerous entities. General permits allow a large number of applicants to be regulated efficiently and effectively, thus maximizing resources for Ecology and the regulated entities and preventing pollution of waters of the state. Ecology's decision to develop a general permit or a control program for a type of pollutant source is considered in the overriding public interest because it takes into account the costs and benefits of permitting a large number of activities in the most effective and efficient way possible, thus saving public funds while protecting water quality.

173-201A-320(6) General permit and water pollution control programs are developed for a category of dischargers that have similar processes and pollutants. New or reissued general permits or other water pollution control programs authorized, implemented, or administered by the department will undergo an analysis under Tier II at the time the department develops and approves the general permit or program.

(a) Individual activities covered under these general permits or programs will not require a Tier II analysis.

(b) The department will describe in writing how the general permit or control program meets the antidegradation requirements of this section.

(c) The department recognizes that many water quality protection programs and their associated control technologies are in a continual state of improvement and development. As a result, information regarding the existence, effectiveness, or costs of control practices for reducing pollution and meeting the water quality standards may be incomplete. In these instances, the antidegradation requirements of this section can be considered met for general permits and programs that have a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of this section. This adaptive process must:

(i) Ensure that information is developed and used expeditiously to revise permit or program requirements;

(ii) Review and refine management and control programs in cycles not to exceed five years or the period of permit reissuance; and

(iii) Include a plan that describes how information will be obtained and used to ensure full compliance with this chapter. The plan must be developed and documented in advance of permit or program approval under this section.

The intent of this section of the rule is that a Tier II determination will occur during the public involvement process associated with the general permit or pollution control program authorization. It is the responsibility of Ecology to provide information in the general permit fact

sheet that describes how the proposed general permit or program meets the intent of the antidegradation rule. The rule recognizes that many water quality protection programs and their associated control technologies are in a continual state of improvement and development. As a result, information regarding the existence, effectiveness, or costs of control practices for reducing pollution and meeting the water quality standards may be incomplete. WAC 173-201A-320(6) states that the antidegradation requirements can be considered met for general permits and programs that have a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of this section. This adaptive process must review and refine the general permits or programs during the permit reissuance or at least once every five years, and must include a plan that describes how information will be obtained and used to ensure full compliance with this chapter.

A. Process for developing a general permit

Ecology's process for developing or reissuing a general permit includes a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of WAC 173-201A-320. All NPDES permits, including general permits, are effective for a fixed term not to exceed five years (40 CFR 122.25). Each time Ecology reissues a general permit, the effluent limits and permit conditions are evaluated to determine if additional or more stringent requirements should be incorporated. Federal rules mandate that permits not become less stringent each five-year permit cycle with few exceptions. In the case of effluent limitations established on the basis of best professional judgment [Section 402(a)(1)(B) of the CWA], a permit generally may not be renewed, reissued, or modified on the basis of effluent guidelines to contain effluent limitations that are less stringent than the comparable effluent limitations in the previous permit. [40 CFR 122.44 (l)(2)]

B. Evaluating information for reissuing general permits

Ecology's evaluation of a general permit reissuance includes a review of information on new pollution prevention and treatment practices for the wastewater activity. These are considered for possible incorporation as permit conditions or effluent limits to further reduce the discharge of pollutants during the five-year permit cycle. Sources of such information can include, but are not limited to the following.

Public comments and testimony

Ecology accepts comments on the draft permit during the public comment period. Ecology encourages the public to share what is working and what is not, including any new and appropriate pollutant control methods. Ecology uses this formal public process to review and refine management and control requirements in each successive permit.

Stormwater management manuals (SWMMs)

Ecology develops SWMMs that describe BMPs to prevent pollutant discharges. These manuals receive periodic updates based on new information and science and include a public involvement process. Since stormwater general permits require permittees to select BMPs from the most recent edition of the SWMMs (or approved equivalent SWMMs), the BMPs contained

in updated SWMMs are adopted and used to refine and improve the effectiveness of controls to protecting water quality and meet the intent of the antidegradation provisions in the WQ Standards.

Technology assessment protocol – Ecology (TAPE) program

The TAPE program is a formal process that includes reviewing and testing treatment technologies for eventual adoption into Ecology's Stormwater Management Manuals. This process stimulates the development and use of innovative stormwater technologies, including chemical treatment systems (e.g., multi-media filtration, electrocoagulation, polymer-enhanced sand filtration) used at sites covered under stormwater general permits. Ten treatment technologies are currently at various stages of the approval process. The city of Puyallup, University of Washington, and Washington State University received grant funding to establish the Washington Stormwater Center (WSC) and oversee the TAPE program. A "Board of Expert Reviewers (BER)" will accept new applications and review them according to the existing TAPE process.

Industry-sponsored pilot projects

Industries can take the initiative to improve stormwater controls for their industrial discharges. For example, the boatyard industry and an environmental organization sponsored a pilot test of three stormwater treatment devices specifically for boatyard stormwater.

Permittees wishing to use an alternative BMP that is not in Ecology's Stormwater Management Manuals or their Stormwater Pollution Prevention Plan (SWPPP) must document the technical basis for the BMP. The SWPPP must document:

1) The method and reasons for choosing the storm water best management practices selected.
2) The pollutant removal performance expected from the practices selected.
3) The technical basis supporting the performance claims for the practices selected, including any available existing data concerning field performance of the practices selected.
4) An assessment of how the selected practices will comply with state water quality standards.
5) An assessment of how the selected practices will satisfy both applicable federal technology-based treatment requirements and state requirements to use all known, available, and reasonable methods of prevention, control, and treatment.

USEPA effluent limitation guidelines

See 40 CFR Parts 405 through 471 - Effluent Limitations Guidelines and Standards. Ecology and other NPDES-permitting authorities are required to incorporate effluent limit guidelines, developed by the U.S. Environmental Protection Agency (USEPA), into each permit as they come up for reissuance. Although Ecology's NPDES permit requirements are typically more stringent than USEPA effluent limit guidelines, this is another formal process used to develop, adopt, select and refine control practices for protecting water quality and meeting the antidegradation provisions in the water quality standards.

Ecology staff expertise

Ecology staff members (inspectors, enforcement staff, permit writers, and engineers) attend training and conferences, and review professional journals and scientific literature. Ecology conducts research on pollutant control practices and the effect of discharges on water quality. Ecology uses its expertise in the field of pollution control to adopt and refine controls and management practices in the SWMMs and general permits.

C. Adaptive management for general permits

In addition to the formal programmatic improvements to the SWMM and re-issued general permits described previously, general permits contain an adaptive management process. For example, stormwater general permits require permittees to implement timely revisions to their stormwater pollution prevention plans when stormwater discharges exceed the benchmarks. As such, stormwater controls on individual projects are subject to ongoing refinement (for example, addition of new BMPs and/or enhancement of existing BMPs) that reduces the amount of pollutants that would otherwise be discharged to receiving water bodies.

D. Requirements for individual actions under general permits

Since Ecology is addressing Tier II anti-degradation in accordance with WAC 173-201A-320(6), Ecology will not perform site-specific analyses of each "new or expanded action" proposed for coverage under a general permit. However, it is important that the public be able to weigh in on whether individual actions are "necessary and in the overriding public interest". The antidegradation rule establishes a refutable presumption that they do, but only through a public notice process does the general public have an opportunity to question individual actions.

Ecology requires the general permit applicant's public notice to include language regarding Tier II antidegradation. Specifically, when an applicant runs two public notices per WAC 173-226-130(5), the notices will include a statement that Ecology will review and consider public comments regarding Tier II antidegradation.

Appendix A: Antidegradation Tier II Rule Language

WAC 173-201A-320 Tier II -- Protection of waters of higher quality than the standards.
(1) Whenever a water quality constituent is of a higher quality than a criterion designated for that water under this chapter, new or expanded actions within the categories identified in subsection (2) of this section that are expected to cause a measurable change in the quality of the water (see subsection (3) of this section) may not be allowed unless the department determines that the lowering of water quality is necessary and in the overriding public interest (see subsection (4) of this section).

(2) A Tier II review will only be conducted for new or expanded actions conducted under the following authorizations. Public involvement with the Tier II review will be conducted in accordance with the public involvement processes associated with these actions.

(a) National Pollutant Discharge Elimination System (NPDES) waste discharge permits;

(b) State waste discharge permits to surface waters;

(c) Federal Clean Water Act Section 401 water quality certifications; and

(d) Other water pollution control programs authorized, implemented, or administered by the department.

*(3) **Definition of measurable change.** To determine that a lowering of water quality is necessary and in the overriding public interest, an analysis must be conducted for new or expanded actions when the resulting action has the potential to cause a measurable change in the physical, chemical, or biological quality of a water body. Measurable changes will be determined based on an estimated change in water quality at a point outside the source area, after allowing for mixing consistent with WAC 173-201A-400(7). In the context of this regulation, a measurable change includes a:*

(a) Temperature increase of 0.3°C or greater;

(b) Dissolved oxygen decrease of 0.2 mg/L or greater;

(c) Bacteria level increase of 2 cfu/100 mL or greater;

(d) pH change of 0.1 units or greater;

(e) Turbidity increase of 0.5 NTU or greater; or

(f) Any detectable increase in the concentration of a toxic or radioactive substance.

*(4) **Necessary and overriding public interest determinations.** Once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the analysis must be provided by the applicant seeking the authorization, or by the department in developing a general permit or pollution control program, and must include:*

(a) A statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is in the overriding public interest.

Examples of information that can assist in this determination include:

(i) Economic benefits such as creating or expanding employment, increasing median family income, or increasing the community tax base;

(ii) Providing or contributing to necessary social services;

(iii) The use and demonstration of innovative pollution control and management approaches that would allow a significant improvement in AKART for a particular industry or category of action;

(iv) The prevention or remediation of environmental or public health threats;

(v) The societal and economic benefits of better health protection;

(vi) The preservation of assimilative capacity for future industry and development; and

(vii) The benefits associated with high water quality for uses such as fishing, recreation, and tourism.

(b) Information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is necessary. Examples that may be considered as alternatives include:

(i) Pollution prevention measures (such as changes in plant processes, source reduction, and substitution with less toxic substances);

(ii) Recycle/reuse of waste by-products or production materials and fluids;

(iii) Application of water conservation methods;

(iv) Alternative or enhanced treatment technology;

(v) Improved operation and maintenance of existing treatment systems;

(vi) Seasonal or controlled discharge options to avoid critical conditions of water quality;

(vii) Establishing buffer areas with effective limits on activities;

(viii) Land application or infiltration to capture pollutants and reduce surface runoff, on-site treatment, or alternative discharge locations;

(ix) Water quality offsets as described in WAC 173-201A-450.

(5) The department retains the discretion to require that the applicant examine specific alternatives, or that additional information be provided to conduct the analysis.

(6) General permit and water pollution control programs are developed for a category of dischargers that have similar processes and pollutants. New or reissued general permits or other water pollution control programs authorized, implemented, or administered by the department will undergo an analysis under Tier II at the time the department develops and approves the general permit or program.

(a) Individual activities covered under these general permits or programs will not require a Tier II analysis.

(b) The department will describe in writing how the general permit or control program meets

the antidegradation requirements of this section.

(c) The department recognizes that many water quality protection programs and their associated control technologies are in a continual state of improvement and development. As a result, information regarding the existence, effectiveness, or costs of control practices for reducing pollution and meeting the water quality standards may be incomplete. In these instances, the antidegradation requirements of this section can be considered met for general permits and programs that have a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of this section. This adaptive process must:

(i) Ensure that information is developed and used expeditiously to revise permit or program requirements;

(ii) Review and refine management and control programs in cycles not to exceed five years or the period of permit reissuance; and

(iii) Include a plan that describes how information will be obtained and used to ensure full compliance with this chapter. The plan must be developed and documented in advance of permit or program approval under this section.

(7) All authorizations under this section must still comply with the provisions of Tier I (WAC 173-201A-310).

Appendix B: Special Considerations for Dissolved Oxygen, pH, Turbidity, and Toxics

1. Special Considerations for Dissolved Oxygen

A. Are there situations where modeling the dissolved oxygen impact is not appropriate? Yes, the cost and complexity of determining the impacts on far field dissolved oxygen concentration can be significant, and the following considerations may be warranted.

i. *Where other parameters trigger the Tier II analysis requirement.* It is recommended that the Tier II eligibility analysis first examine other water quality parameters that are easier to analyze than dissolved oxygen. Since it only takes degradation of a single water quality constituent to cause the Tier II test to be required, it may not be necessary to model the impacts on dissolved oxygen to determine Tier II eligibility.

ii. *Where the proponent chooses to forego the Tier II eligibility test.* In some cases a project proponent may want to voluntarily choose to conduct the Tier II analysis and bypass the requirement to determine if their action causes a measurable lowering of water quality at the edge of a chronic dilution zone. Unless there is significant doubt about whether a measurable lowering will occur, it may be more cost and time effective in some cases to move directly to a demonstration that the lowering of water quality is necessary and in the overriding public interest.

B. For dissolved oxygen, the following procedure should be used:

i. *Near-field depression of dissolved oxygen*. As described in the Permit Managers Manual in Chapter VI, determinations of dissolved oxygen concentrations following initial dilution can be made by using a simple mixing calculation found in EPA (1985) and EPA (1982). This method should be used to evaluate whether or not measurable degradation would occur at the edge of a chronic mixing area (WAC 173-201A-400(7)).

ii. *Far-field depression of dissolved oxygen (general).* Ecology uses QUAL2Kw as the preferred model to evaluate the far-field impacts of BOD and nutrients to dissolved oxygen. Where adequate site-specific information exists or can be obtained, the QUAL2Kw model should be used to estimate the impact to dissolved oxygen.

Ecology plans to develop default rates, constants, and other input parameters to allow QUAL2Kw to be used effectively as a screening-level model. This will give staff a tool which can be used to expediently make an initial assessment of the far field impact to dissolved oxygen. Since reasonable, yet conservative, input parameters will be incorporated into the screening model, it will be useful in sorting out which projects warrant conducting more sophisticated modeling efforts. But as noted previously, it would be wise for the proponent to consider if undertaking a more complicated and costly modeling effort is justified so as not to undergo "necessary and in the overriding public interest" tests.

Until the screening model is developed, or anytime more precision in the eligibility analysis is desired, a more site-specific modeling effort is necessary and the discharger should be provided with adequate time to conduct the analysis. It is important to remember that the antidegradation eligibility test only considers the relative contribution of the new or expanded portion of a discharge. Permit managers only need a reasonable estimate of whether the relative negative change in oxygen is likely to exceed 0.2 mg/L.

C. **Dissolved oxygen depressions due to BOD in fresh waters.** If the resulting model output value for critical DO deficit is greater than 0.2 mg/l, then the potential to exceed a measurable level should be considered adequately demonstrated.

D. **Dissolved oxygen depressions due to nutrients.** In many waters the secondary effect related to the stimulation of algae is more likely to cause a measurable decrease in dissolved oxygen. To estimate the potential for such an effect the QUAL2Kw model (as discussed previously in the general discussion on far-field effects) should be used to assess the potential impact to oxygen by increasing nutrients.

E. **Measuring depletion (0.2 mg/l) of dissolved oxygen in marine waters.** Conduct dilution modeling with the EPA model PLUMES (See Ecology Permit Managers Manual). The ambient density profile and the current speed are required to run the model, and data may be available from nearby Ecology monthly monitoring stations. The expected maximum day flow rate and maximum day BOD is needed to characterize the effluent. PLUMES should be run using flow rates, current speed, and density conditions conforming to the recommendations in the Ecology Permit Managers Manual. In general, these conditions are to be selected to yield the lowest dilution. Where a significant potential for reflux occurs, the far field dilution factors should be reduced by a factor of two, as outlined in the Permit Managers Manual, and the maximum dissolved oxygen depletion calculated over a 3-day discharge period. A method for assessing far field dissolved oxygen deficit from effluent discharge in an ocean environment is presented in the Revised Section 301(h) Technical Support Document (EPA 1994).

   Using the far field dilution factors obtained from PLUMES, the IDOD, CBOD, and NBOD are used to calculate the dissolved oxygen deficit over time. If the difference in the far field oxygen concentration between the starting date and the end date used in the model run is greater than 0.2 mg/l at any depth, then it should be assumed that the discharge would have the potential for causing a measurable depletion of oxygen and that a Tier II test should be required.

   It is important to recognize that this approach is only to be used as a screening tool for determining when a Tier II analysis should be required, and these techniques are not appropriate for deriving water quality-based effluent limits. Where a discharger desires a more comprehensive analysis, they should be provided with a reasonable period to conduct the necessary field monitoring and modeling. Ecology's oceanography staff within the EAP program may be available to help with more comprehensive system-level analyses of the impact to dissolved oxygen.

2. Special considerations for pH

As described in Chapter VI of the Permit Managers Manual, a change in pH can be calculated using the process described by EPA (1988) or by using the Ecology spreadsheet PHMIX2. For a newly proposed discharge, where there is inadequate data on background pH, the model should be run at both 6.6 and 8.4 to get a reasonable worse-case estimate on the ability of the wastewater to cause a measurable change in pH. If the effluent would allow the pH to drop from 6.6 to 6.5 or rise from 8.4 to 8.5 it should generally be assumed that the new discharge would meet the Tier II test for causing a measurable degradation of water quality.

3. Special considerations for turbidity

For the purpose of conducting an antidegradation Tier II eligibility analysis, turbidity should be assumed to have a linear relationship to dilution. Under this assumption, a simple mass balance equation can be used to estimate whether or not turbidity likely increases by more than a measurable amount (0.5 NTU) at the edge of a chronic mixing zone (WAC 173-201A-400(7)). Assuming a background concentration of zero is an acceptable method to estimate the potential level of degradation from turbidity, where sufficient data on actual background turbidity is not available. As an example, if there is a dilution factor of 100, an effluent turbidity of greater than 50 NTU would indicate the potential to cause a measurable lowering of water quality.

Short-term projects that may cause temporary exceedances for turbidity during in-water construction are not required to go through the Tier II antidegradation test if they adhere to the requirements for turbidity criteria that are described in sections 173-201A-200(1)(e)(i) and 173-201A-210(1)(e)(i).

4. Special considerations for toxic substances

A. Existing discharges

For expanded discharges, e.g. for existing publicly-owned treatment works (POTWs) that are expanding, the effluent concentration for toxic metals/organics will likely not vary much, but there will be a reduction of the dilution factor. In this case, toxic concentrations at the edge of chronic mixing zone need to be calculated based on the existing and future dilution factor. The increase in concentration at the edge of the mixing zone needs to be compared with the method detection limit to determine whether there is a measurable change.

B. New discharges

The following guidance is recommended for estimating whether a new discharge would have the potential to cause a measurable degradation of water quality due to toxic substances.

i. *Estimating edge of mixing zone concentrations of toxics*. The following procedure should be used to estimate the concentrations of toxic pollutants at the edge of a chronic mixing zone for the purpose of determining eligibility under antidegradation Tier II. This procedure is based on the premise that the quantification level associated with the analytical method yielding the lowest detection level represents measurable degradation under Tier II for toxics (refer to Appendix A of the NPDES

permit for pollutant concentrations). The procedure is dependent upon identifying the analytical method with the lowest detection and quantification levels approved by the USEPA or the USGS for surface water monitoring (see http://www.epa.gov/epahome/index/ for assistance):

ii. *Identify the analytical method yielding the lowest detection limit that is approved for use in surface water analysis by the USEPA or the USGS*:

- If the estimated (i.e., based on the engineering report) effluent concentration is below the method having the lowest detection level, then no Tier II analysis is required.
- If the estimated effluent concentration is above the lowest detection limit, then the estimated value should be assumed to represent the effluent concentration. Divide the estimated effluent concentration by the dilution factor. If the resulting value is less than the quantification limit, then no Tier II analysis is required.

iii. *Assigning measurable/quantifiable values to effluent samples.* Tier II eligibility determinations will typically be based on the wastewater concentrations established in an engineering report. However, in some situations it may be necessary to directly measure the concentration of toxic pollutants in wastewater (either to cross check the engineering analysis using a similar facility or to estimate the concentrations that would result from expanding an existing facility).

Where direct measurement of effluent is being used to make decisions under Tier II, the following approach should be taken:

a. *When the method yielding the lowest detection limit is used to analyze the effluent concentration:*

- If the measured effluent concentration is below detection, then no Tier II analysis is required if the sample is believed to represent the effluent concentration of the proposed action.
- If the measured effluent concentration is between the detection limit and the quantification limit, then the quantification limit is treated as the effluent concentration. Unless there is no dilution, the edge of the mixing zone concentration would always be less than the quantification level, so no Tier II analysis would be required.
- If the measured effluent concentration is above the quantification limit, then the reported value represents the effluent concentration. Divide the reported concentration by the dilution factor. If the resulting value is less than the quantification limit then no Tier II analysis is required.

b. *When the method yielding the lowest detection limit* is not *used to analyze the effluent concentration***:**

- If the measured effluent concentration is below the detection limit for the method used, then that detection limit is treated as the effluent concentration. Divide the detection limit value by the dilution factor. If the resulting value is less than the detection limit provided by the most sensitive method, then no Tier II analysis is required.

- If the measured effluent concentration is between the detection limit and the limit of quantification, then the limit of quantification is treated as the effluent concentration. Divide the limit of quantification value by the dilution factor. If the resulting value is less than the method detection limit that would have been provided by the most sensitive method, then no Tier II analysis is required.
- If the measured effluent concentration is above the limit of quantification, then the reported value is used as the effluent concentration. Divide that reported value by the dilution factor. If that value is below the practical quantification limit that would be yielded by the most sensitive method, then no Tier II analysis is required.

Ecology has defined acceptable detection and quantitation levels for most pollutants, and provides it as part of issued permits (listed as Appendix A) and permit application forms. You can access Appendix A at http://www.ecy.wa.gov/programs/wq/permits/guidance.html

iv. *Selecting analytical methods for toxic pollutants*. Standard methods for analyzing wastewater do not necessarily detect toxics at concentrations that would violate state water quality standards. Thus it is important to use the most sensitive analytical method that allows for quantification of the pollutants in the wastewater. However, requiring more sensitive methods than needed to quantify pollutant concentrations, creates unnecessary costs and potential problems for laboratories, and so should be avoided where possible. It may be appropriate to identify expected effluent concentration levels from other existing facilities prior to selecting the analytical method. Where a method is used that has a quantification level above the state water quality criteria a non-detect or unquantifiable result should be followed up with additional monitoring using a more sensitive analytical method, where one is available and approved for use in surface water analysis by the USEPA or the USGS (see http://www.epa.gov/epahome/index/ for assistance).