WATER QUALITY ANTIDEGRADATION IMPLEMENTATION GUIDANCE

COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Supply and Wastewater Management

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AUTHORITY: Pennsylvania Clean Streams Law (35 P.S. §691.1 *et seq.*) and regulations at Title 25 Pa. Code Title 25, including Chapters 91, 92, 93, 95, 96, 102, and 105.

POLICY: It is the policy of the Department of Environmental Protection (DEP) to protect the existing uses of all surface waters, and the existing quality of High Quality (HQ) and Exceptional Value (EV) Waters. Existing uses are protected when DEP makes a final decision on any permit or approval for an activity that may affect a protected use. Existing uses are protected based upon DEP's evaluation of the best available information (which satisfies DEP protocols and Quality Assurance/Quality Control (QA/QC) procedures) that indicates the protected use of the waterbody. For a new, additional, or increased point source discharge to an HQ or EV water, the person proposing the discharge is required to utilize a nondischarge alternative that is cost-effective and environmentally sound when compared with the cost of the proposed discharge. If a nondischarge alternative is not cost-effective and environmentally sound, the person must use the best available combination of treatment, pollution prevention, and wastewater reuse technologies and assure that any discharge is non-degrading, unless (in the case of HQ waters), DEP finds, after satisfaction of intergovernmental coordination and public participation requirements, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In addition, DEP will assure that cost-effective and reasonable best management practices for nonpoint source control in HQ and EV waters are achieved.

PURPOSE: The purpose of this document is to provide guidance to DEP staff and aid the regulated community and the public in understanding the implementation of the Antidegradation Program in Pennsylvania.

APPLICABILITY: This guidance applies to all persons conducting or planning to conduct activities which may impact surface waters in the Commonwealth.

DISCLAIMER: The policies and procedures outlined in this guidance are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements.

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The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of DEP to give the rules in these policies that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

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CHAPTER 1

GENERAL OVERVIEW

1. Background

Antidegradation is a concept and policy created by the Department of the Interior in 1968 and was included in EPA's first water quality standards regulation in 1975. The federal basis for the program is contained in the federal Clean Water Act, and is set forth in regulations at 40 CFR §131.12, which is a part of the overall EPA water quality standards regulation promulgated in 1983, and 40 CFR §131.32, which was promulgated by EPA for the Commonwealth in 1996. States are required to adopt an antidegradation policy meeting minimum requirements and must include this policy as a required element of their surface water quality standards programs in order to gain federal approval of the standards. This requirement complements the Pennsylvania Clean Streams Law available on DEP's website at www.dep.state.pa.us, enacted to preserve and improve the purity of the waters of the Commonwealth for the protection of public health, animal life, aquatic life, and other beneficial uses.

The basic concept of antidegradation is to promote the maintenance and protection of existing water quality for High Quality (HQ) and Exceptional Value (EV) waters, and protection of existing uses for all surface waters because it recognizes that existing water quality and uses have inherent value worthy of protection and preservation. As a required element of a state's water quality standards, the Antidegradation Program introduces levels of protection for deserving waterbodies above the basic standards. It should be noted that the level of protection of HQ waters may be reduced from maintenance of existing quality, if necessary, to accommodate important economic or social development in the area in which the waters are located. This Social or Economic Justification (SEJ) process is discussed in detail in Chapter 10.

"Water quality standards" for any surface waterbody are the combination of "water uses" and the instream "water quality criteria" necessary to protect and maintain those uses. The uses of a waterbody are determined by considering the values a waterbody has for such things as water supply, propagation of fish and wildlife, recreation in and on the water, and other uses. The adopted water quality criteria are the numerical and descriptive chemical, biological, or physical stream conditions which must be maintained to support the uses. Uses may be either "designated uses," that is, water uses specifically contained, for each waterbody, in Title 25 Pa. Code Sections 93.9a - 93.9z, or "existing uses." Existing water uses are those actually attained by the waterbody whether or not they are listed in §§93.9a - 93.9z as designated uses. These distinctions are further explained later in this Chapter.

Water quality standards govern the degree of degradation a waterbody may incur without causing the loss of a use. They provide a base level of protection-maintenance of designated water uses. The antidegradation concept adds an additional level of protection by providing for protection of existing uses of all surface waters and, for selected waterbodies that represent significant aquatic resources, the maintenance of existing water quality.

Antidegradation requirements in Pennsylvania are designed to provide this protection in discrete levels or tiers, as explained in the next chapter. These levels of protection are appropriately

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matched to categories of waterbodies, based on their existing uses, level of water quality, and environmental characteristics.

2. Discussion

Protected Uses/Existing Uses

As stated in §93.4a(b), ***"existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."*** At this level of protection, which is applicable to all surface waters, water quality may not be degraded below levels that protect the existing uses. This is accomplished, for waters listed in Table 1 of Pennsylvania's Water Quality Standards regulation (Chapter 93) with Protected Uses for Aquatic Life and for HQ waters where a Social or Economic Justification (SEJ) determination has been made, through the application of numeric and general narrative water quality criteria found in Chapter 93 of DEP regulations and the toxic substances criteria found in Chapter 16, Toxics Management Strategy - Statement of Policy. For EV waters and HQ waters where SEJ has not been demonstrated, protection of existing use is accomplished through maintenance of existing water quality. Existing uses are defined in §93.1 as ***"those uses actually attained in the waterbody on or after November 28, 1975, whether or not those uses have been included in the water quality standards."***

In Pennsylvania's antidegradation regulations, this level of protection is prescribed in §93.4c(a), "*Existing use protection.*" This section of the regulation contains important elements regarding how DEP will act when, upon evaluation of data, it determines that a waterbody is attaining or has attained an existing use.

For all surface waters, the existing uses of the water must be protected when an activity, which may affect a surface water and which requires a DEP permit or approval, is proposed. Existing use protection also includes the protection of threatened and endangered species.

High Quality Waters (HQ)

The regulations specifying how a waterbody may qualify as HQ waters provide that such qualification may occur by demonstration of suitable chemical or biological conditions.

Under the chemical test, a surface water is HQ if long-term water quality (at least 1 year of data) for 12 chemical parameters is better than levels necessary to support propagation of fish, shellfish, and wildlife and recreation in or on the water. Under the biological test, a water is HQ if it meets either of the following: (a) in comparison to a reference stream, the water shows a macroinvertebrate community score of 83 percent or greater using a protocol based on EPA's Rapid Bioassessment Protocol (RBP); or (b) the water is a Class A wild trout stream designated by the Pennsylvania Fish and Boat Commission (PFBC) following public notice and comment.

Exceptional Value Waters (EV)

This highest level of protection requires that "*water quality ... be maintained and protected.*" To be compatible with the federal regulation, Pennsylvania's EV waters classification includes "Outstanding National Resource Waters." In addition, outstanding state, regional, and local

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waters are also protected at this level. Thus, the Pennsylvania antidegradation regulation provides multiple routes for these waters to qualify for EV protection. At this highest level, no lowering of water quality is allowed. For point sources, only discharges that produce a non-degrading effluent can be allowed in EV waters.

Pathways to qualifying as EV waters are discussed below and in detail in Chapter 5. A water qualifies for EV if it is an HQ water which meets one or more of the following attributes: (1) it flows in a national wildlife refuge or a state game propagation and protection area; (2) it flows in a designated state park natural area, state forest natural area, national natural landmark, federal or state wild river, federal wilderness area, or national recreation area; (3) it is an outstanding national, state, regional, or local resource water as defined in Section 93.1 of the regulation; (4) it is a surface water of exceptional recreational significance as defined in Section 93.1 of the regulation; (5) the water achieves a biological test score of 92 percent or greater using the modified RBP; or (6) the water is designated a wilderness trout stream by PFBC following public notice and comment. An additional pathway is available for waters that possess "*exceptional ecological significance*." Water quality better than the criteria set forth in Chapter 93 of DEP regulations is not needed to qualify as EV waters for surface waters of exceptional ecological significance. These waters include but are not limited to EV wetlands and thermal springs (see Chapter 5). Collectively, these "conditions," used to qualify surface waters as EV, represent the Pennsylvania equivalent to "Outstanding National Resource Waters" as described in federal regulation.

Protection of HQ and EV Waters

Point Sources

To satisfy the antidegradation requirements of DEP water quality standards regulations and Executive Order 1999-1 relating to the coordination of state actions with local land use planning concerns, a special pre-permit analysis is required prior to a proposed discharge to HQ or EV waters. Alternatives to new, additional, or increased point source discharges to surface waters must be employed where they are cost-effective and environmentally sound. This requirement is known as a nondischarge alternative analysis (Chapter 7) and does not apply to existing (non-expanding) discharges. These alternatives, depending on the nature of the activity, may include land application of wastewater, use of an alternative discharge location, use of holding facilities coupled with wastewater transport and treatment, and establishment of buffer zones to protect waters from proposed earth disturbance.

If a nondischarge alternative is not cost-effective and environmentally sound, a proposed discharger must utilize the best available combination of cost-effective treatment, land disposal, pollution prevention, and wastewater reuse technologies. This process, known as the antidegradation best available combination of technologies (ABACT) analysis, establishes a minimum level of performance for dischargers in HQ and EV waters based upon the more stringent of water quality-based effluent limits (WQBEL) or ABACT (see Figure 3).

If ABACT produces a non-degrading discharge, the discharge can be approved in either HQ or EV waters. If implementation of ABACT would produce a degrading discharge, it cannot be used, without supplemental treatment, to ensure protection of existing quality in EV waters and could only be applied to HQ waters after approval of SEJ as described in Chapter 10.

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Nonpoint Sources

Cost-effective and reasonable Best Management Practices (BMPs) as required in Section 93.4c of DEP's regulations and Section 131.12 of EPA regulations are required to protect Pennsylvania's water resources from the effects of nonpoint sources. Methods for implementing this provision are outlined in Chapter 11.

Activities not Involving a Discharge

Withdrawal of water from streams or lakes for various uses can have an adverse impact. Mechanisms to address water quantity issues are discussed in Chapter 6 of this guidance document.

3. Purpose

This implementation guidance has been compiled to define and clarify numerous complex issues surrounding the Antidegradation Program. It discusses implementation issues concerning the protection of existing uses (Chapter 2); the petition process and methods of waterbody evaluation and assessment (Chapter 4); the criteria used to place waterbodies into the program at the various levels of protection (Chapter 5); and the protection of HQ and EV waters (Chapters 6 & 11) through various DEP programs. The role that local and county level government, as well as private citizens, can play in the identification and protection of these waters is also discussed throughout the guidance and summarized in Chapter 12.

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CHAPTER 2

EXISTING AND DESIGNATED USES

1. Background

In addition to the definition of existing use in §93.1, the existing use protection provisions of the regulations are found in §93.4a(b) which provides that:

"Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

and in §93.4c(a)(1) which provides that:

"(i) Existing use protection shall be provided when the Department's evaluation of information (including data gathered at the Department's own initiative, data contained in a petition to change a designated use submitted to the Environmental Quality Board pursuant to §93.4d(a), or data considered in the context of a Department permit or approval action) indicates that a surface water has attained an existing use.
(ii) The Department shall inform persons who apply for a Department permit or approval which could impact a surface water, during the permit or approval application or review process, of the results of the evaluation of information undertaken pursuant to paragraph (1)(i).
(iii) Interested persons may provide the Department with additional information during the permit or approval application process regarding existing use protection for the surface water.
(iv) The Department will make a final determination of existing use protection for the surface water as part of the final approval action."

and in §93.4c(a)(2) which provides that:

"If the Department has confirmed the presence, critical habitat, or critical dependence of endangered or threatened federal or Pennsylvania species in or on a surface water, the Department shall ensure protection of such species and critical habitat."

Existing use protection is referred to as the "Tier 1" protection level in the federal regulations. The basic requirement is that, for all surface waters, all *existing* instream water uses and the level of water quality necessary to protect those uses must be maintained and protected. In addition, special existing use provisions apply to the protection of threatened and endangered (T&E) species. This chapter addresses existing use protection, procedures, and implementation. Provisions relating to the protection of T&E species are set out in Chapter 3.

2. Discussion

What is an existing use?

An "existing use" is defined in Title 25 Pa. Code Section 93.1 as ***"Those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the water***

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quality standards." The same definition appears in the federal regulations at 40 CFR Part 131.3(e).

What uses are protected as existing uses?

All of the water uses listed in §93.3 are protected as existing uses. These water uses include warm water fishes (WWF), trout stocking (TSF), cold water fishes (CWF), HQ waters, and EV waters as well as others designed to protect water supply and recreation. The uses are protected on a waterbody segment when DEP makes a decision to issue or deny a permit or approval request for an activity that may impact the use. This is accomplished, for WWF, TSF, CWF and HQ waters with SEJ, through the application of numeric water quality criteria found in Chapter 93 of DEP's regulations and the toxic substances criteria found in Chapter 16, Toxics Management Strategy - Statement of Policy. For EV waters and HQ waters where SEJ has not been demonstrated, protection of existing use is accomplished through maintenance of existing quality.

Existing uses are protected in the same manner as designated uses. DEP protects such uses by making decisions to issue or deny requests for DEP permits or approvals.

How are existing uses different from designated uses?

Existing uses are different than designated uses in several ways. First, while a designated use is a regulation that is the product of a rulemaking process, an existing use is a DEP classification for a stream based on valid technical information for a surface water that DEP has reviewed. Existing uses are generally the same as, but in some situations may be more or less protective than, designated uses.

Next, an existing use is the use a waterbody actually attains on or after November 28, 1975. A designated use, on the other hand, may constitute the regulatory goal that the Environmental Quality Board (EQB) promulgates for a surface water, regardless of whether the water has actually attained such a use. For example, all Pennsylvania waters are designated for use as public water supplies although that use may not be actually attained in all waters. If available information indicates that a waterbody attained a use at any time on or after November 28, 1975, and the waterbody has since been degraded, the existing use is the most stringent use attained on or after that date regardless of subsequent degradation.

Another important difference between existing and designated uses is that the regulations provide a mechanism whereby the designated use of a waterbody may be made less stringent by the EQB in certain circumstances. However, a designated use of a surface water may not be lowered to a use that is less stringent than the existing use for the water. Procedures to change designated uses are discussed further in Chapter 4.

3. Identification of Waterbodies and Procedures for Existing Use

Sources of data

The identification of waterbodies for existing use evaluation occurs as a result of information provided by, for example, (1) DEP staff; (2) the Pennsylvania Fish and Boat Commission

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(PFBC); (3) a person, organization, or agency seeking a DEP permit or approval; or (4) a person, organization, or agency submitting a complete stream redesignation petition to the EQB.

Requests for existing use evaluations must be supported by information that either establishes the existing use or casts sufficient doubt on the current designated use to warrant further study. These requests can take the form of a report generated by DEP or PFBC staff, data considered in the context of a DEP permit or approval action, or a petition submitted to the EQB to change a designated use.

If the Bureau of Water Supply and Wastewater Management (BWSWM) receives data for an existing use evaluation, it will review the submission to determine if it is in accordance with applicable protocols. If the submitted information meets all applicable protocols and demonstrates an appropriate existing use classification more stringent than the designated use for a particular waterbody, the results of the evaluation will, after concurrence of the Director of the BWSWM, be added to the existing use list.

Evaluation of existing uses

The evaluation of the existing use of a waterbody considers the nature of the data or information presented, the quantity and quality of the data, any existing and readily available data which DEP and others may have gathered, and DEP's own knowledge of the subject waterbody.

DEP verifies that data submitted in support of a permit application or petition to the EQB has been collected following recommended protocol and QA/QC procedures (the procedures outlined in DEP's Quality Assurance Workplan entitled *Aquatic Life - Use Attainability Studies for Flowing and Impounded Waterbodies*, DEP ID: 391-3200-004 available on DEP's website) before using the data in the review of permit or approval requests. In addition, a petition must contain the information and follow the procedures outlined in the protocols as well as the requirements of Title 25 Pa. Code Chapter 23, which relates to the EQB policy for processing petitions for redesignation of streams (see Chapter 4, Section 2 and Appendix G).

DEP's quality assurance review of either document listed above may involve field verification of the data or additional data collection. If the data has been submitted and does not follow recommended protocol or quality assurance and control procedures, or is otherwise incomplete or insufficient, it will be returned to the submitter with an explanation of why it is being returned. Where DEP finds deficiencies in the data submitted by the public or other entities, it will inform the parties who submitted the data what the deficiencies are. Final determination on the existing use protection level will be made by DEP on the basis of the sound data that exist at the time of final permit or approval action. If the existing use does not match the designated use listed in Chapter 93, DEP will recommend that the EQB proceed with the rulemaking process to amend the designated use.

Existing uses list

DEP maintains a publicly accessible list of surface water segments where data has been evaluated which indicates an existing use classification of a waterbody that is more protective than the designated use (including those segments which are HQ or EV). The list is maintained and updated by BWSWM on DEP's website and will be used by DEP and county conservation

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district staff with responsibility to protect surface water quality in reviewing requests for permits and approvals. Only an existing use which is more protective than the designated use in §§93.9a - 93.9z for a particular waterbody is placed on the existing use list.

The existing use list consists of two primary data sources. First, the list includes the results of all existing use decisions that have been made as part of any DEP final action on a request for a permit or approval, with concurrence of the Director of BWSWM. Second, the list contains the results of all existing use evaluations which have been completed by DEP staff and have been concurred with by the Director.

Classification of existing uses is an on-going process driven by the sources of data listed above. Individuals, agencies, or organizations outside DEP have the option of providing sufficient data to substantiate their position that the existing use differs from the designated use, or simply providing enough information to establish that the waterbody in question warrants an existing use evaluation.

The list of existing uses includes at least the following information: stream name, stream segment description, county, designated use, existing use, and date of survey.

Waterbodies on this list are periodically compiled into rulemaking actions taken before the EQB in order to change the designated uses as they appear in DEP regulations to match the existing use of the water. These rulemakings are subject to public notice and input opportunities before finalization.

4. Existing Uses in DEP Actions

What is the standard of protection for existing uses?

Section 93.4a(b) provides that "***existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.***" The same protection standard appears in the federal antidegradation regulations at 40 CFR Part 131.12(a)(1).

When is existing use protection provided?

Like designated use protection, existing use protection is provided for a waterbody segment by DEP when it takes a final action on a permit application or other request to DEP for an approval to conduct an activity which could impact a surface water.

DEP review of requests for a permit or approval

DEP will, during the course of permit application or approval review, utilize existing and readily available data on the subject waterbody in the review of all permit applications and plan/activity approval requests.

A person seeking a permit or approval from DEP to conduct an activity that may impact a surface water must demonstrate to DEP that its activity will protect and maintain the more protective of the designated use or the existing use for the receiving water. To this end, DEP staff who issue permits or approvals for such activities must ensure that the request for permit or

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approval is reviewed and processed in a manner which ensures that the most protective of the designated use or existing use is protected (also see discussion in Section 3, Chapter 6).

Determining and applying designated and existing uses

The designated use for a surface water is found in DEP's regulations at §§93.9a - 93.9z. Each surface water in the Commonwealth has a designated use, either specifically or by virtue of its location in a watershed. These designated uses have been adopted as a result of Pennsylvania's water quality standards efforts over the last 30 years. They represent actual or potentially attainable water uses for all surface waters of the Commonwealth based upon data collected by DEP, other resource agencies or the public and consultation with other resource agencies and after receipt of considerable public comment. These uses are continuously evaluated and updated as part of the state's federally mandated water quality standards reviews. DEP's staff person reviewing the request for a permit or approval must determine the applicable designated use by looking in the regulations in §§93.9a - 93.9z for the particular stream segment that the proposed activity may impact.

Existing uses are determined based on the best available water quality information on a waterbody. DEP maintains a list of existing uses that are more protective than the designated uses. The staff person reviewing the request for permit or approval must review the list when processing an application or request. If a more protective existing use for a waterbody segment applies, DEP will use it in making the permit or approval decision.

Procedure for existing use decisions as part of DEP action on a request for permit or approval

Existing use classifications are implemented in DEP's regional offices, at the level of permit or approval signature authority, as part of the final issuance, approval, or denial decision on a request to conduct an activity that may impact a surface water. The existing use decision which is part of the final action on the permit or approval request occurs after the Director of BWSWM concurs in the existing use component of the decision. Concurrence by the Director assures statewide consistency in the review of existing use evaluations. Notification to the permit or approval signature authority of the concurrence will occur as expeditiously as possible to ensure DEP compliance with Money-Back Guarantee (MBG) timeframes.

For most NPDES permits (e.g. sewage, industrial wastes, stormwater from construction activity) or other approvals that may impact surface waters, the existing use decision will be implemented by the regional Water Management Program Manager. For NPDES permits associated with mining proposals or oil and gas activities, the decision will be implemented by the District Mining Manager or the regional Oil and Gas Program Manager, respectively.

Review staff for NPDES permit applications or other requests for approval have the responsibility of identifying the existence or submission of data regarding the appropriate existing use for a waterbody. The regional water pollution biologist and/or other professional staff will review the data and confer with staff in BWSWM as early as possible in the review process. The regional biologist then prepares a recommendation which is forwarded to the regional Water Management Program Manager, the District Mining Manager, or the regional Oil and Gas Manager, as applicable, for a decision. Following concurrence of the Director of

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BWSWM, processing of the permit application or approval request will continue on the basis of the existing use evaluation.

Applications or approval requests, such as requests for NPDES general permit coverage (Notice of Intents (NOIs)), may be returned to the applicant if they are incompatible with the results of the existing use evaluation. The person seeking the permit or approval may then amend and resubmit the application or request for approval, submit an individual NPDES application if necessary (as in the case of requests for NPDES general permit coverage in waters with an existing use of HQ or EV), provide additional data to be considered in DEP's existing use determination, or withdraw the application or request for approval.

In conjunction with DEP's final action on any permit or approval that involves the determination of an existing use which differs from the designated use of the waterbody in Chapter 93, DEP will include information on the existing use determination in the *Pennsylvania Bulletin* notice of the final permit or approval action and on DEP's website, if applicable.

Relationship to MBG

DEP will at all times be sensitive to the need for prompt decision making and will strive to be timely in its review of existing use data. DEP will consider the nature of the data or information presented, the quantity and quality of the data, and any existing and readily available data which DEP and others may have gathered, in addition to DEP's own knowledge of the subject waterbody in evaluating the existing use. Every effort will be made to maintain permit review schedules under DEP's MBG and the MBG clock will only be stopped in response to the submission of credible data documenting the need for an existing use evaluation.

Existing use protection for Class A wild trout streams

DEP will review all data submitted to it by the PFBC and others regarding the Class A wild trout stream status of a stream. If, upon DEP review, DEP finds that: (1) the waterbody has been designated by the PFBC as a Class A wild trout stream; (2) the PFBC designation has been adequately publicly participated, with provisions for public notice and comment; and (3) BWSWM has reviewed the fishery data and the Director concurs with the classification, DEP will place the water on the existing use list with an existing use of HQ waters.

Any requests for a DEP permit or approval on a stream which meets the above criteria will be processed to protect an HQ existing use, unless a more stringent existing or designated use is identified, in which case the more stringent use shall be used. The final existing use determination occurs at the time of DEP action on the permit or approval pursuant to §93.4c(a)(1)(iv).

Relationship of existing use to EQB stream designations

DEP will submit existing use classifications for waterbody segments that are more stringent than the designated uses in §§93.9a - 93.9z to the EQB as a proposed rulemaking package to seek the redesignation of the designated use to reflect the existing use. This will be accomplished as soon as practicable after the existing use classification is completed.

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Federal and state regulations are clear in that, even in the absence of designation, existing uses must be protected. Thus, if the EQB does not promulgate rules that codify existing uses as designated uses, DEP must implement a more protective existing water use. The regulations provide that protection of existing uses and protection of designated uses are separate and independently applicable principles. Thus, if a waterbody has been identified in DEP's review of a request for a permit or other approval as having an existing use more stringent than the designated use for the water, the more stringent existing use must be maintained and protected.

Another possible outcome is that the EQB adopts a higher designated use than the existing use. In such a scenario, the more stringent designated use adopted by the EQB would be utilized by DEP in processing permit applications and requests for approvals of activities on such waters.

5. Public Participation Opportunities in Existing Use Protection

Several public participation opportunities are provided with regard to existing use protection. Public participation in the existing use context occurs in three situations: (1) when DEP conducts an assessment or evaluation of a stream to determine its existing use or if it warrants protection as HQ or EV waters, (2) during the EQB process for changing the designated use of a water through the regulatory process, and (3) during DEP's review of a request for a permit or approval which may impact a surface water. Public involvement and input is solicited and encouraged in response to each of these notifications.

Public Participation during the processing of petitions, and evaluations to change a designated use

DEP will publish, in the *Pennsylvania Bulletin* and local newspapers, notice of: 1) receipt of a complete petition or evaluation accepted by the EQB, or 2) DEP's intent to assess surface waters for the purpose of establishing an existing use or redesignating waters as either HQ or EV waters. The notice will request submission of information concerning the water quality of the waters subject to evaluation and a copy of the notice will be sent to all municipalities containing those waters.

As part of its review of an evaluation or assessment, DEP may hold a combined public meeting and fact-finding hearing to discuss the evaluation or assessment and solicit additional information. Upon completion of the assessment or review of a complete evaluation, DEP will submit its recommendation to the EQB for proposed rulemaking where additional opportunity for public involvement occurs as described below in the section titled Public Participation during the EQB regulatory process.

Public participation during permit or approval requests

An applicant for an NPDES permit is required to identify the classification of the receiving water in its application. This information is provided to the public when DEP publishes and the applicant posts the Notice of Complete Application. DEP will clearly state the existing use classification supported by existing and readily available data to persons applying for a DEP permit or approval that could impact a surface water. The draft NPDES permit containing the classification will be open for a 30-day public comment period, and any data regarding the water segment may be submitted during the permit review process. DEP will consider any valid data

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submitted during the permit review process (see the Section on Assessment/Evaluation of Existing Uses, in this chapter) in making its final decision on the existing use classification of the waterbody.

Interested persons and applicants are encouraged to submit existing use information on other applications and requests for DEP approval that may impact a surface water. In addition to NPDES discharges, these activities may include the sewage facilities planning (Act 537) process; resource extraction activities such as surface and underground mining and oil and gas extraction; landfills; requests for approval of water obstructions, encroachments, and dams; stormwater management planning (Act 167) activities; water withdrawal requests; and other activities which require a DEP permit or approval and may impact a surface water.

The final existing use classification occurs as part of DEP's final action on the request for permit or approval.

Public participation during the EQB regulatory process

DEP seeks public input on the appropriate existing use of a surface water outside the context of a request for a permit or approval on many occasions. In response to a petition to redesignate a stream which has been submitted to and accepted by the EQB in accordance with the petition policy at Title 25 Pa. Code Chapter 23, or on DEP's own initiative, DEP will publish notice in the *Pennsylvania Bulletin* and in a local newspaper of general circulation of DEP's intent to assess surface waters for potential redesignation. In addition, a copy of the notice is sent by DEP to all municipalities containing waters subject to the evaluation, county planning commissions and, where applicable, petitioners.

All assessments and evaluations which are performed by DEP for the purpose of determining whether the appropriate classification of a water is HQ or EV are subject to these public notice provisions and provide broad opportunities for public input.

6. Appealing Existing Uses

The implementation of existing use protection for a surface water can be appealed as part of a challenge to a DEP final action on a request for a permit or approval before the Environmental Hearing Board (EHB), under the Environmental Hearing Board Act.

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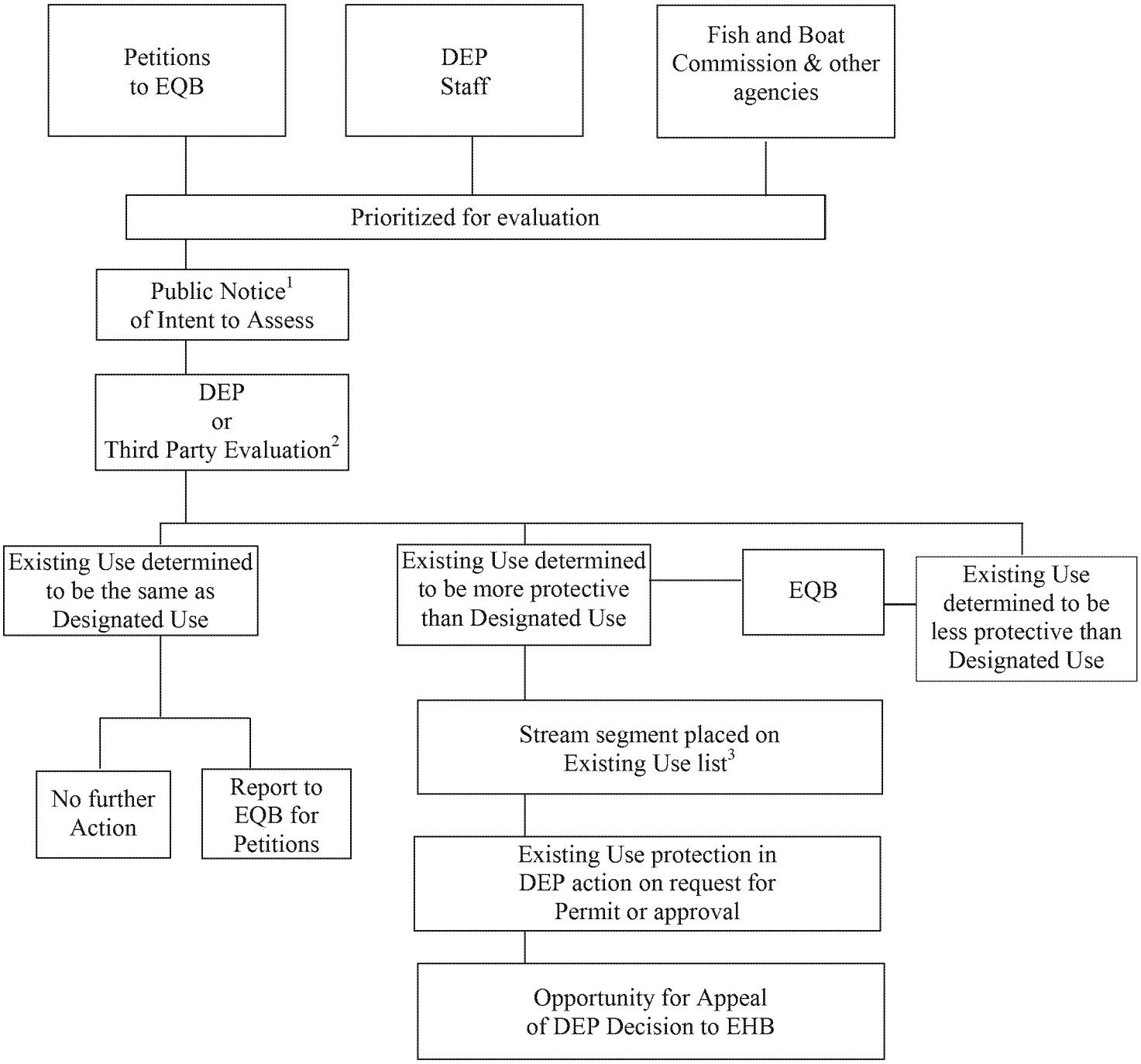
FIGURE 1
EXISTING USE PROTECTION
FLOW CHART



[1] Regions complete the notice for Regional Biologist recommendation or situations arising during permit or approval decisions; all others -- Division of Water Quality Assessment and Standards complete the notice.
[2] Concurrence by BWSWM.
[3] Maintained by BWSWM

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CHAPTER 3

THREATENED & ENDANGERED (T&E) SPECIES

1. Background

The antidegradation regulation recognizes the significance of the presence of T&E species as well as the existence of critical habitat, or a critical dependence of those species on a waterbody and offers protection of the species and its requirements, wherever they occur in Pennsylvania. This section addresses implementation measures to provide that protection.

The regulation at Title 25 Pa. Code §93.4c(a)(2) states the following:

"Endangered or Threatened Species. If the Department has confirmed the presence, critical habitat, or critical dependence of endangered or threatened Federal or Pennsylvania species in or on a surface water, the Department will ensure protection of the species and critical habitat."

2. Terms

Important terms used in the regulation are explained below.

Endangered species: Any species in danger of extinction throughout all or a significant portion of its range. Endangered species do not include insects determined by the Secretary of the Department of Interior or Commerce to constitute a pest whose protection under the provisions of the Federal Act would present an overwhelming and overriding risk to man. This definition is taken from the federal Endangered Species Act of 1973, but endangered species also include Pennsylvania listed species. For purposes of Pennsylvania regulations, the range for federally protected species is limited to Pennsylvania. Endangered species are established and listed by both federal and state resource agencies.

Threatened species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range in Pennsylvania. Threatened species are identified and listed by both federal and state resource agencies.

"Presence, critical habitat, or critical dependence": Circumstances that, when confirmed by DEP, require protection of endangered or threatened species. Because antidegradation is a water quality program, these terms are meant to limit the protected areas to surface waters of the Commonwealth. Presence connotes physically inhabiting the water; "critical habitat" means that certain physical, chemical, or biological features in the water environment are essential to the conservation of the species; and "critical dependence" is used to provide protection to species that do not inhabit the water environment, but require a specific surface water for support of one or more life stages. In addition to the protections afforded by state laws and regulations, "critical habitat" is also defined under the federal Endangered Species Act for the purpose of identifying habitat necessary to protect federally listed species.

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3. Responsibilities of Resource Agencies

A listing of the responsible resource agencies for Pennsylvania listed species and the statutory or regulatory citations for their jurisdiction follows; T&E species may be listed by one or more of the agencies.

United States Government:

Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) which is jointly administered by:

Department of Commerce, National Marine Fisheries Service -- (only the shortnose sturgeon in Pennsylvania)

Department of the Interior, Fish and Wildlife Service (USFWS) -- (all other federally-listed and proposed T&E species)

Pennsylvania:

Fish & Boat Commission (PF&BC) -- Fish Restoration and Management Act 30 Pa. C.S.A. §2305 and the regulations promulgated pursuant to that statute at 58 Pa. Code §75.1 (fish, other aquatic organisms, reptiles, and amphibians)

Game Commission -- Game or Wildlife Protection Act 34 Pa. C.S.A. §2167 and the regulations promulgated pursuant to that statute at 58 Pa. Code Chapter 133 (birds and mammals)

Department of Conservation and Natural Resources (DCNR) -- Wild Resources Conservation Act at 32 P.S. §5307 and the regulations promulgated pursuant to that Act at 17 Pa. Code Chapter 45 (native wild plants)

DCNR maintains and periodically updates the Pennsylvania Natural Diversity Inventory (PNDI), which includes all of the resource agencies' lists of T&E species. The USFWS and PF&BC provide DEP with listings of species and habitat ranges that supplement the PNDI by providing information not yet available on the PNDI for use in decision making relating to DEP approvals or permits. The lists document areas where the species, critical habitats, and areas of critical dependence are known to occur. It is the responsibility of the agency submitting the listing to be specific enough to provide meaningful information for DEP to utilize in its decision making. This specificity provides attention to and assures protection of T&E species while also minimizing delays in permit processing. In some programs, DEP has established a specific consultation process with resource agencies with respect to the identification and protection of aquatic resources including threatened or endangered species and their habitats.

4. Scope of Protection and Regulated Activities

T&E species are protected for any activity requiring a DEP permit or approval when DEP confirms the presence, physical habitat, or a condition of critical dependence of a threatened or endangered species in or on a surface water.

The following describes the process for determining the presence or absence of a federal or Pennsylvania listed species, its critical habitat or critical dependence. The process is dependent upon coordination with the state and federal natural resource agencies with the statutory jurisdiction for the species (listed above), the applicant, and DEP.

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- Prior to making a formal application, the applicant will notify DEP of his or her intent to construct a facility or conduct an activity which needs a new or expanded permit or approval action. This notification will be in the form of a pre-application meeting or other appropriate mechanism, such as the submission of a postcard application mailer for sewage planning approval or the submission of a PNDI search request for Chapter 105 permits. If a county conservation district or other agency acts for DEP in a permit or approval action, the district or agency will coordinate with the DEP regional office.

- DEP will conduct a screening search of the PNDI database and other lists made available by the natural resource agencies to determine the presence, habitat, or critical dependence of listed threatened or endangered species in the vicinity of the proposed location of the facility or activity.

- DEP will report the search results to the applicant and provide information on contacts at appropriate natural resource agencies.

- The applicant will coordinate with the appropriate natural resource agencies with jurisdiction for the protection and management of the threatened or endangered species. In practice, this means that, if the resource agency confirms the potential for impact by the proposed activity, the parties will work out the measures necessary to avoid the impact and protect the T&E species by modifying the project or devising other ways to protect the species and critical habitat. Measures taken will be project-specific depending on factors such as a critical life stage that may be impacted (timing of construction of project); or extent of critical habitat (limiting or eliminating, if necessary, criteria compliance time*), etc. If such mitigation measures are not possible, the permit or permission cannot be issued. If the applicant disagrees with the natural resource agency's determination of potential presence of T&E species, site-specific information may be gathered by the applicant to support that position.

- DEP may be asked to participate in the coordination process by either party.

- Following resolution of a T&E issue, the natural resource agency will issue a letter to the applicant providing documentation of the coordination process. The applicant will then provide the letter to DEP with the application for permit or approval so that the application can be processed within the normal time frames of the MBG process. If the PNDI and/or other list searches are negative, i.e. no potential T&E species encountered, the applicant shall include that information with the application.

- DEP confirms the presence, critical habitat, or critical dependence of the species and issues the draft permit or approval that protects threatened or endangered species, or denies the permit or approval as appropriate.

- Draft permits are made available for public participation, at which time T&E issues not previously considered may be brought to DEP's attention for consideration.

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* Criteria Compliance Time - The site-specific time allocated for mixing between discharge and receiving streams before water quality criteria must be met.

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5. Threatened & Endangered (T&E) Species Protection Measures

DEP will ensure that all water quality-related activities it permits or approves will protect and not impair a T&E species, its critical aquatic habitats, or any surface water upon which it critically depends.

Critical habitat or dependence issues must be adequately documented by the natural resource agency so that protective provisions to be included in the permit or approval may be determined.

Special attention shall be given to ensuring that criteria compliance times are designed to protect the presence of all T&E species and critical habitat. Criteria compliance times may be modified by either limiting or eliminating the mixing area of a discharge to ensure that the water quality criteria are met to maintain the presence, critical habitat, or critical dependence of T&E species.

Documentation and notification by a natural resource agency or other person to DEP and discussion with the natural resource agencies should begin as soon as possible in the public participation process so that issues may be resolved in time to meet the MBG permit review program. The MBG defines the time from receipt of an application by DEP until it is issued in final form. It demonstrates DEP's commitment to timely decisions without sacrificing public review. Details on the MBG are available on DEP's website (choose Subjects, M, Money-Back Guarantee).

If no resolution satisfactory to the applicant and natural resource agency can be reached, DEP will evaluate the information and either deny the permit or approval or issue a draft permit or approval. When a draft permit or approval is issued, DEP will notify the appropriate natural resource agencies. If a draft permit does not satisfy the concerns of the natural resource agency, the agency may raise the issue with DEP or EPA during the public comment period.

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CHAPTER 4

PROCESSING OF PETITIONS, EVALUATIONS, AND ASSESSMENTS TO CHANGE A DESIGNATED USE

1. Background

The antidegradation regulation describes the process for public notice and public participation on requests to change the designated use of waterbodies (CWF, TSF, WWF) as well as redesignate them as HQ or EV waters. The designated use for a surface water is found in DEP's regulations at §§93.9a - 93.9z. Every surface water in the Commonwealth has a designated use. These designated uses have been adopted as a result of Pennsylvania's water quality standards efforts over the last 30 years. They represent actual or potentially attainable water uses for all surface waters of the Commonwealth based upon data collected by DEP, other resource agencies or the public, consultation with other resource agencies, and public comment. Existing uses, on the other hand, are the uses actually attained on or after November 28, 1975 (see Chapter 2), and may differ from designated uses. If a person or organization has reason to believe that the designated use is inappropriate, the process described below is available to request a redesignation. If the evaluation of data indicates a more protective existing use is appropriate, the existing use must be maintained and protected. The petition process for requesting a change to the designated use of a surface water is described in Chapter 23, the Environmental Quality Board Policy for Processing Petitions – Statement of Policy. The Policy was amended on December 20, 2000 to reflect changes to the antidegradation regulations with respect to redesignating streams. Chapter 23 is attached as Appendix G.

The purpose of this chapter is to provide guidance to persons who wish to submit petitions for stream redesignations and to provide additional detail on DEP's public participation activities in this regard.

Section 93.4d states the following:

"Processing of petitions, evaluations and assessments to change a designated use.

(a) Public notice of receipt of evaluation, or assessment of waters, for High Quality or Exceptional Value Waters redesignation. The Department will publish in the Pennsylvania Bulletin and in a local newspaper of general circulation notice of receipt of a complete evaluation which has been accepted by the EQB recommending a High Quality or Exceptional Value Waters redesignation, or notice of the Department's intent to assess surface waters for potential redesignation as High Quality or Exceptional Value Waters. The assessments may be undertaken in response to a petition or on the Department's own initiative. The notice will request submission of information concerning the water quality of the waters subject to the evaluation, or to be assessed, for use by the Department to supplement any studies which have been performed. The Department will send a copy of the notice to all municipalities containing waters subject to the evaluation or assessment.

(b) Combined public meeting and fact-finding hearing. As part of its review of an evaluation or performance of an assessment, the Department may hold a combined

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public meeting and fact finding hearing to discuss the evaluation or assessment, including the methodology for the evaluation or assessment, and may solicit information, including technical data, to be considered in the Department's evaluation or assessment.

(c) Submission to EQB to alter designated use. Upon the completion of its assessment or review of a complete evaluation, and the satisfaction of the other applicable requirements of this section, the Department will submit the results of its assessment or review to the EQB for proposed rulemaking following review and comment by the petitioner, if applicable, in accordance with Chapter 23 (relating to Environmental Quality Board policy for processing petitions—statement of policy)."

2. Petitions/Evaluations

a. Stream redesignation evaluations can be initiated in two ways:

1) A person, watershed group, organization, or government agency may submit a petition for redesignation to the Secretary in the format described in Chapter 23.

2) DEP may initiate actions leading to redesignation on its own or in response to requests from another agency.

b. A petition requesting redesignation of a stream must include the following elements, as specified in Chapter 23.

- A clear delineation of the watershed or stream segment to be redesignated, both in narrative form and on a map.
- The current designated use(s) of the water from the applicable Drainage List in Chapter 93.
- The requested designated use(s) of the water.
- Available technical data for water chemistry, the aquatic community, and instream habitat. If data are not available, the petition must explain the reasons for the data gaps and describe the sources consulted such as educational institutions, watershed groups, and state and federal agencies.
- Descriptions of existing point and nonpoint source discharges and their impact(s) on water quality and the aquatic community. The names, locations, and permit numbers of existing point source discharges and a description of the types and locations of nonpoint source discharges should be included. eFACTS (DEP's web-based Environmental, Facility, Application, Compliance Tracking System) or the appropriate DEP Regional Office have information on point source discharges. DEP, watershed groups, and county conservation districts may have information on nonpoint sources.

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- Information regarding any of the qualifiers for designation as HQ or EV waters. Section 93.4b lists the ways a watershed or segment may qualify for HQ or EV designation. These qualifiers are explained in more detail in Chapter 5 of this guidance. The petition should include information on how the watershed satisfies these qualifiers.

- A general description of the land use and development patterns in the watershed. The amount or percentage of public lands and the owners thereof, and the various land use types (including residential, commercial, industrial, agricultural, and others) should be included in this part. This type of data is most readily available from county or local planning agencies.

- The names of all municipalities through which the watershed or stream segment flows, including an official contact name and address.

- One or more maps that graphically show the information listed above.

Petitions not containing the above information will not be accepted for consideration until all data gaps are filled. In order to provide clear support for a stream redesignation, the petitioner should provide complete information for each of the categories.

c. Following receipt of a redesignation petition, DEP will do the following:

- review the petition for completeness,

- within 30 days, notify the petitioner whether the petition is complete, and

- post receipt of the petition on the Public Participation Center of DEP's website

If a petition is incomplete, DEP will return it to the petitioner, who will have 30 days to revise and resubmit the petition.

Approximately two weeks prior to a regularly scheduled EQB meeting, the agenda and handouts are made available to the public on DEP's website. At the EQB meeting, DEP makes a recommendation to accept or deny the petition and the petitioner is granted 5 minutes to make an oral presentation to the Board. (All EQB meetings are open to the public.)

If accepted by the Board, a Notice of Acceptance is published in the *Pennsylvania Bulletin* within 30 days of acceptance.

3. Public Notification/Public Participation Opportunities

DEP provides the following public notification steps for all redesignation evaluations.

a. In accordance with §93.4d(a), DEP publishes a notice of intent before assessing petitioned or other waters. This notice, which solicits technical data on water quality, instream habitat or the biological condition of the stream, is placed in the *Pennsylvania*

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Bulletin and in a local newspaper and is sent to all municipalities in the watershed, county planning commissions and, where applicable, petitioners.

DEP may hold public meetings or fact-finding hearings to share information and solicit more data. Notice of these meetings and hearings is also published in the *Pennsylvania Bulletin* and in a local newspaper.

In response to the notice, persons are encouraged to submit data to DEP for consideration in the evaluation of a waterbody.

b. Following evaluation of all data, DEP prepares a draft evaluation report. DEP sends this report to all affected municipalities and, if applicable, to the petitioner providing 30 days to comment. The draft report is also put on DEP's website for public review and comment.

Interested persons may submit written comments on the draft stream report.

c. DEP considers all comments submitted during the public comment period and, within 6 months, prepares a revised report and recommendations for EQB consideration. If any changes are made to the draft report, the revised report is sent to the petitioner and local municipalities, and is placed on DEP's website.

Alternatively, if DEP's recommendation is to retain the current designation, DEP presents its recommendation at the next EQB meeting scheduled at least 15 days after close of the petitioner's comment period.

4. Regulatory Process

The process for redesignation of a waterbody then follows the standard EQB regulatory process, which is summarized in Figure 2. Redesignations are an integral part of Pennsylvania's Water Quality Standards Program. Once regulations become effective and are published in the *Pennsylvania Bulletin*, they are implemented under the Pennsylvania Clean Streams Law. Additionally, the regulations must be submitted to and approved by EPA before they become effective for implementation under the federal Clean Water Act.

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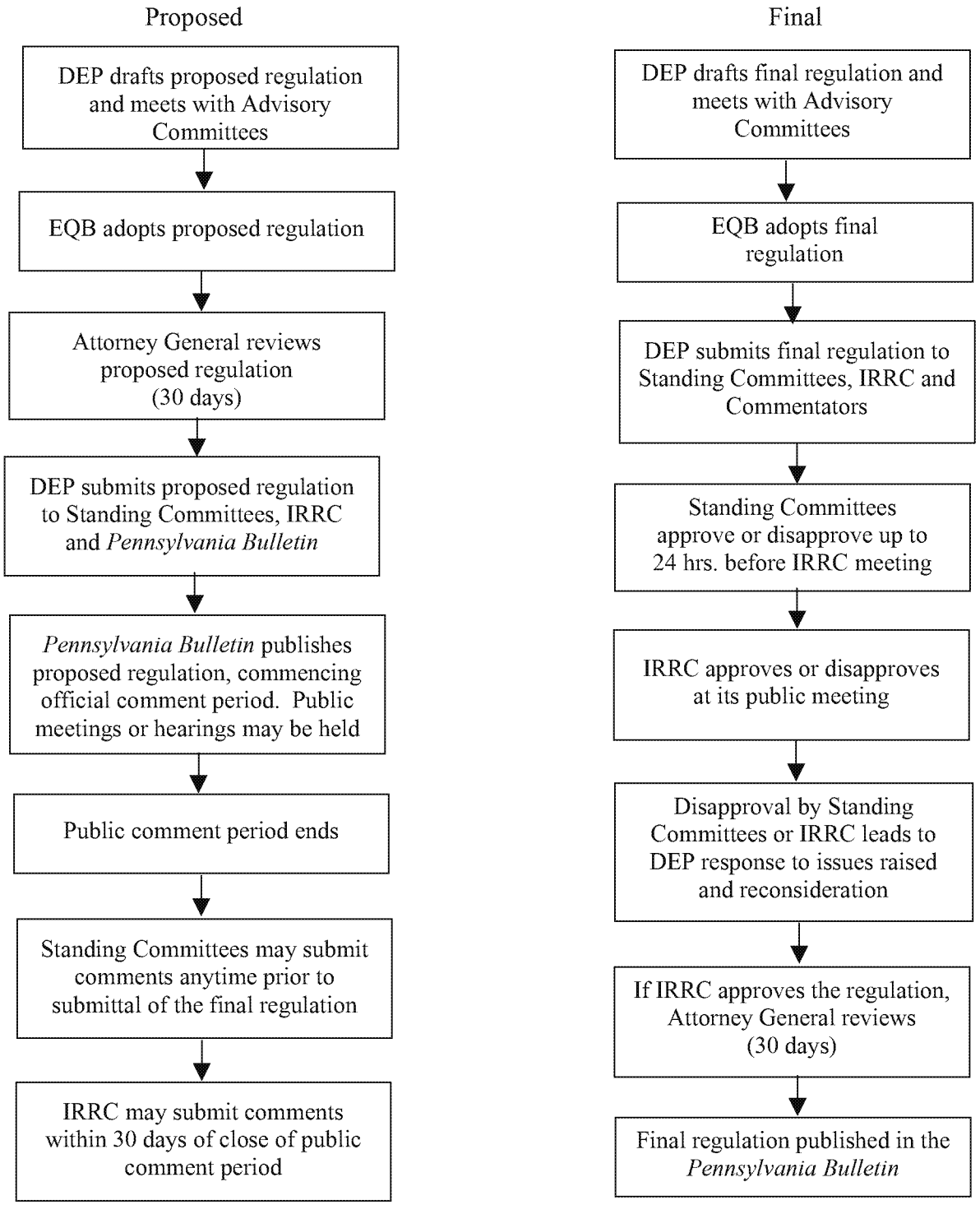
FIGURE 2
THE REGULATORY PROCESS



EQB – A 20-member board responsible for promulgating DEP's rules and regulations
IRRC – Independent Regulatory Review Commission, a 5-member commission responsible for providing independent oversight and review of agency regulations
Standing Committees – Senate and House Environmental Resources and Energy Committees

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CHAPTER 5

QUALIFYING AS HQ OR EV WATERS

1. Background

Pennsylvania's antidegradation regulation specifically addresses the issue of qualification requirements for both HQ and EV waters in §93.4b. This chapter provides additional detail on methods used to determine if a waterbody meets those requirements, first for HQ waters, and then for EV waters.

2. Qualifying as HQ Waters (Chemistry)

Section 93.4b of the antidegradation regulation provides both chemical and biological mechanisms for waterbodies to qualify as HQ waters. The regulation at paragraph (a)(1) states that a surface water that meets the following condition is an HQ water according to the chemical test:

"(i) The water has long-term water quality, based on at least one year of data which exceeds levels necessary to support the propagation of fish, shellfish, and wildlife and recreation in and on the water by being better than the water quality criteria in §93.7, Table 3 (relating to specific water quality criteria) or otherwise authorized by §93.8a(b) (relating to toxic substances), at least 99 percent of the time for the following parameters:

dissolved oxygen	***aluminum***
iron	***dissolved nickel***
dissolved copper	***dissolved cadmium***
temperature	***pH***
dissolved arsenic	***ammonia nitrogen***
dissolved lead	***dissolved zinc***

(ii) The Department may consider additional chemical and toxicity information, which characterizes or indicates the quality of a water, in making its determination."

a. Data needs

In general, enough data must exist or be collected on an HQ candidate stream to fully develop the long-term average concentration and statistical characteristics of those concentrations for the parameters listed in the regulation. The regulation specifies that the data used should cover at least one year. This will normally be sufficient, unless, during the year chosen, there were extreme weather events, unusual flows or atypical upstream discharges, in which case additional data collection is necessary. Data collected over multiple years may also be used, if it is in sufficient quantity and is representative of current conditions.

Sampling considerations. To obtain meaningful long-term averages and statistical functions for these water quality parameters, at least 24 samples should be collected at

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intervals that have been evenly timed over the flow year. Additional samples almost always provide better characterization of a waterbody and should be included if available.

Time of day. Some samples should ideally be collected at specific times of day. Under natural conditions, instream metals and ammonia nitrogen concentrations show only slight diurnal variation. These samples can be collected as grab samples at any time of day, using accepted stream sampling techniques to ensure representative sampling and, where specified, using the dissolved metals procedures. If upstream discharges exist with variable discharge rates or pollutant loads in significant amounts and proximity to cause diurnal fluctuations on the candidate stream segment, it may be necessary to collect 24-hour composite samples for each sampling event.

Stream temperature, pH, and dissolved oxygen show marked diurnal variations due to solar radiation, daily changes in ambient air temperature, and photosynthetic activity of algae and rooted aquatic vegetation. Random grab samples for these parameters, unless they exist in great numbers, may not accurately characterize the average daily condition of the stream or show compliance with the criteria. Since a true "mixed composite" sampling technique cannot be used, sample events for these parameters would best be performed as daily multiple grab events designed to cover 24 hours. Alternatively, sampling could be designed to represent worst-case daily conditions for each parameter. Accordingly, temperature readings would be taken around mid-afternoon when they are typically highest, dissolved oxygen readings would have to be taken pre-dawn when it is at its lowest point during peak plant respiration, and pH should be taken at the highest and lowest points caused by photosynthesis/respiration.

Hardness. Another consideration in a sampling plan involves stream hardness. The acute and chronic water quality criteria for five of the eight metals in §93.4b(a)(1)(i) are exponentially dependent upon stream hardness, as listed in Chapter 16, the Water Quality Management Toxics Management Strategy – Statement of Policy. Small changes in stream hardness can have a significant effect on the numerical criteria against which the candidate stream chemistry will be compared. Generally, metals are more toxic at lower hardness levels. Also, stream hardness is known to be dependent on flow conditions, varying with the relative contribution of groundwater base flow and runoff. To provide accurate results, stream sampling and analysis plans must consider hardness and be designed so that the relationship of hardness to flow can be characterized.

Duration. Chapters 16 and 93 list the specific numerical water quality criteria for each of the parameters listed in the antidegradation portion of the regulation. Metals, ammonia nitrogen, and other criteria for aquatic life protection have both an acute (or short-term exposure) component and a chronic (or longer-term exposure) component. The duration or exposure periods associated with each of the components vary depending upon the parameter, but the acute criterion exposure period is generally 1 hour, and the chronic, 4 days.

For example, for dissolved lead, the acute criterion is 65 ug/L for a stream with a hardness of 100 mg/L; and the chronic criterion is 2.5 ug/L. Together, these criteria protect aquatic organisms throughout all life stages. A water must be better than all the relevant criteria 99 percent of the time to qualify for HQ waters.

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Quality Assurance. Data used to demonstrate that the candidate stream is better than the water quality criteria should account for all of the above considerations. All sampling protocols submitted to DEP must include sample collection design and analytical methods that meet both the data needs and quality assurance protocols established by DEP. The submittal should include a description of data quality control procedures along with an analysis that verifies the accuracy of the information provided. DEP will provide more specific guidance upon request. Quality assurance standards and sampling protocol for format for the chemical qualification process are available from DEP.

b. Demonstrating water quality is better than criteria 99 percent of the time

Instream water quality is usually characterized using grab sample results. These data must be adjusted in a way to allow for comparison to the acute and chronic criteria for the parameters listed in 93.4b(a)(1). The data are evaluated using statistically based formulas to determine whether the sampling data show that the quality of the water is better than the acute and chronic criteria 99 percent of the time.

The following illustrates the process. The equations and multipliers shown in Table 1 are taken from the EPA Technical Support Document (TSD) for Water Quality Based Toxics Control (EPA/505/2-90-001 dated March 1991). The multipliers, which are computed from the equations in the headers of the table, may be read directly from the table. The multipliers are dependent on the coefficient of variation (CV), which is the ratio of the standard deviation to the mean of the data and must be determined for the sample set.

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TABLE 1

TSD EQUATIONS

Coefficient of Variation (CV)	99 percent Multiplier $_{Acute}$	99 percent Multiplier $_{Chronic}$
$CV = \frac{Standard\ Deviation}{Mean}$	$Multiplier_{acute} = e^{(0.5\sigma^2 - z\sigma)}$ z = 2.326 $\sigma^2 = In\lfloor CV^2 + 1 \rfloor$	$Multiplier_{chronic} = e^{(0.5\sigma_4^2 - z\sigma_4)}$ z = 2.326 $\sigma_4^2 = In\lfloor CV^2/4 + 1 \rfloor$
0.1	0.797	0.891
0.2	0.643	0.797
0.3	0.527	0.715
0.4	0.440	0.643
0.5	0.373	0.581
0.6	0.321	0.527
0.7	0.281	0.481
0.8	0.249	0.440
0.9	0.224	0.404
1.0	0.204	0.373
1.1	0.187	0.345
1.2	0.174	0.321
1.3	0.162	0.300
1.4	0.153	0.281
1.5	0.144	0.264
1.6	0.137	0.249
1.7	0.131	0.236
1.8	0.126	0.224
1.9	0.121	0.214
2.0	0.117	0.204

(NOTE: acute and chronic multipliers are selected based on CV of dataset used to calculate mean values.)

The basic equation from the TSD is as follows:

LTA = P99 * Multiplier

LTA - Long Term Average
P99 - Projected 99th percentile value

Multiplier - Conversion factor to transform number from a Long-Term Average to the appropriate duration.

This format holds true for both the acute and chronic criteria. The difference between the values comes from the formula used to calculate the multiplier. The chronic criteria multiplier includes the duration adjustment to represent a 4-day average, and the acute value represents the 1-hour duration.

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The equation is solved for P99, an estimate of the 99th percentile of the data set. The P99 is then compared to the appropriate criterion for a parameter. If the P99 is better than the criteria by one significant figure, the test has been passed for that specific parameter. All parameters listed in Chapter 93.4b(1)(i) along with any additional parameter that characterizes the quality of the candidate water that DEP deems necessary, must pass the test in order for the stream to qualify as HQ on a chemical basis.

The following example applies to recently collected data as well as Water Quality Network (WQN) data sets. The example parameter is dissolved lead. For this example a hardness of 100 ug/l is assumed, however, in actual cases, this value should be measured and the mean hardness used to calculate the appropriate criteria. From Chapter 16, the aquatic life criteria for dissolved lead at a hardness of 100 are 2.5 ug/l (chronic) and 65 ug/l (acute). Therefore to pass the test for lead, the P99 value of the sample set must be less than 2.5 using the chronic multiplier and less than 65 using the acute multiplier. The following table presents 24 sample values.

TABLE 2
CHEMICAL PARAMETERS INCLUDED IN DEP ANTIDEGRADATION WATER SAMPLING

Sample Values					
0.5	1	1.3	1.5	0.9	3
0.8	0.7	1	1.1	1.8	2
1	1.6	1.7	0.9	0.8	0.7
0.6	0.5	0.5	0.4	0.4	0.7

The following information is obtained from the data set.

Mean	Standard Deviation	CV	AFC multiplier	CFC multiplier	99th percentile concentration AFC	99th percentile concentration CFC
1.1	**0.6**	**0.6**	**0.331**	**0.534**	**3.3**	**2.1**

The test results for dissolved lead follow:

	Criteria	99th Percentile Conc.	Test Result (Pass/Fail)
Acute	65	3.3	Pass
Chronic	2.5	2.1	Pass

For the example dissolved lead, the qualification test has been passed for both the acute and chronic criteria.

The evaluation is conducted for all chemical parameters of concern and, if all parameters satisfy the test, the water qualifies for an HQ designation by means of the chemical qualifier test.

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c. Consideration of additional chemical and toxicity information

Determinations concerning the chemical qualification of a waterbody for HQ need to consider the complete chemical characterization of the candidate water. To be considered for HQ waters, concentrations of other substances known to be present in the water in addition to those listed in the regulation have to be better than water quality standards 99 percent of the time.

Examples include the presence of non-naturally occurring substances or other toxics like synthetic organics or metals which have been identified as present in the candidate water to the extent that the water does not support uses. Chemicals that exert human health impacts must be considered in protecting recreation and potable water supply, which are protected uses in all waters, with a few site-specific exceptions listed in §§93.9a - 93.9z.

3. Qualifying as HQ Waters (Biology)

Section 93.4b(a)(2)(i)(A) of the antidegradation regulation states that a surface water that meets the following conditions qualifies as HQ waters under provisions of the *Biological assessment qualifier.*

The surface water supports a high quality aquatic community based upon information gathered using peer-reviewed biological assessment procedures that consider physical habitat, benthic macroinvertebrates or fishes as described in Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish, Plafkin, et al., (EPA/444/4-89-001), as updated and amended. The surface water is compared to a reference stream or watershed, and an integrated benthic macroinvertebrate score of at least 83 percent shall be attained by the referenced stream or watershed.

The regulation at §93.4b(a)(2)(i)(B) also allows for the use of other "*widely accepted and published peer- reviewed biological assessment procedures that the Department may approve to determine the condition of the aquatic community*" and in (C) gives the Department the latitude to "*consider additional biological information which characterizes or indicates the quality of a water in making its determination.*"

Bioassessment techniques involve the collection of field data on benthic macroinvertebrate and fish communities in a waterbody to determine its overall aquatic health. These techniques have been used in various formats for many years to evaluate the impacts of pollution sources, assess the attainment of water uses, and classify streams. The underlying concept in bioassessment is that the physical/chemical conditions of the aquatic environment will, in the long-term, cause selection of an aquatic biological community that reflects these conditions. Because of this, the biological community, when identified and then ranked as to its tolerance for pollution and adverse conditions, becomes an excellent indicator of the long-term environmental quality of the waterbody.

The biological sampling procedures employed in the Antidegradation Program ("DEP-RBP" methods) were adapted from EPA's "Rapid Bioassessment Protocols For Use in Wadeable Streams and Rivers - Periphyton, Benthic Macroinvertebrates and Fish" Second Edition (Plafkin, et al.; EPA 841-B-99-002; July 1999). The primary purpose of EPA's document is to provide

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practical technical guidance to the states for conducting cost-effective biological assessments of streams and rivers. This guidance offers biological and habitat assessment techniques, field-tested methods, and options for states to choose, modify, and adapt to their existing water quality assessment programs.

In trying to standardize and improve its biological stream assessments for the Antidegradation Program, DEP began, in 1990, to investigate modifications to EPA's RBP, using a sound scientific basis that was supported by Pennsylvania data. The basis for Pennsylvania's Rapid Bioassessment Protocol is EPA's third macroinvertebrate protocol (EPA-RBP III) as described in the 1989 reference listed above.

Antidegradation Survey Protocol

The following section outlines DEP's biological antidegradation survey protocol. Appendix A provides the details of the methods in the outline.

a. Using 1/24,000 scale USGS topographic maps:

(1) Determine basin location and stream order.

(2) Place tentative sampling station locations. These locations may need to be adjusted once the biologist is on-site depending on the presence of riffles, access to the water, landowner permission or other factors. Generally, stations are placed at the following areas:

- mouth of the main stem or endpoint of the stream segment under study
- mouth of major tributaries (in addition, chemical grab samples but not macroinvertebrates are collected in the minor tributaries to verify that the mouth of the major tributary is a representative sampling location for all upstream conditions)
- along the main stem every 2-3 stream miles, or at closer intervals if there is a noticeable change in stream flow, instream habitat, or riparian land use/land cover
- bracketing population centers, reservoirs, nonpoint sources, point sources, land use changes, etc.

(3) A prime consideration in selecting the final site location is the condition of the macroinvertebrate riffle/run or pool/glide habitat within a stream reach. Riffle/run habitat is used in high to moderate gradient streams and pool/glides in low gradient streams. These two habitats are targeted because they are widely accepted as representing the most productive macroinvertebrate conditions found in their respective streams. Targeting these productive habitats is suggested for several reasons. First, focusing on the most productive habitat is sound science and good policy because it reflects optimal biological conditions of the streams. Second, in sampling these highly productive habitat types, the biologist gains the most macroinvertebrate information possible per sampling effort. Lastly, these

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productive riffle/run or pool/glide habitats are relatively easy to identify for an experienced biologist after evaluation of stream flow and substrate. The critical factor in the biologist's final site selection is that the targeted habitat should typify the most productive habitat in the stream.

Sometimes the best available habitat at the candidate site may not be as good as that found at the reference site, but comparison to the reference is still made. The biologist must match the natural conditions of a candidate with a reference. For example, a low gradient, soft substrate candidate stream should be matched with a similar reference, and not, for example, to a steep gradient, rocky substrate reference.

b. Matching reference sites with candidate sites:

(1) All aspects of the antidegradation biological sampling discussed in this guidance are important, but the single, most critical issue is the selection of reference sites. Care must be taken in selecting reference sites that have the same, or very similar, natural conditions as the candidate sites. The matching of candidate and reference sites generally uses the stream characterization system described below and is applied to the potential references in closest proximity to the candidate.

There are five general types of streams in Pennsylvania:

(a) Freestone

(b) Limestone

(c) Limestone-influenced

(d) Tidal tributaries to the Delaware Bay

(e) Streams draining directly to Lake Erie

Sub-categories of these four types are created using the following criteria:

(a) Stream order/drainage area

(b) Alkalinity

(c) Gradient

The candidate and reference site must possess similar gradient and alkalinity and be of equal or similar stream orders or drainage areas. DEP has found that first through third order freestone streams can be grouped. Small fourth order streams can be grouped with the first through third but the larger warm water fourth order streams should be grouped with fifth and sixth order streams.

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A measure of pH as a surrogate for alkalinity is often more practical because the biologists carry calibrated field pH meters. The pH of the reference and candidate stream should be within one pH unit.

Presently, two types of gradients are recognized: low gradient glide/pool streams with few to no riffles, and moderate to high gradient riffle/run streams.

(2) A biologist must, whenever possible, use waters with an existing or designated use of EV as references in evaluating candidate waters using the biological assessment qualifier. These EV reference waters must have attained that status based upon biological measures. Since some EV waters are classified based upon the presence of endangered species or their status as a wilderness trout stream, it must first be determined if the macroinvertebrates in the EV watershed represent best attainable biological communities before such waters are used as references. If the watershed represents the best attainable biological community, it can be used as a benchmark against which other candidate waters are judged, regardless of the original reasons for its designation. Exceptions to this procedure are discussed below and in Section (3).

The results of RBP samples for many EV watersheds have been input to DEP's biological database where they can be used to determine if the macroinvertebrates are representative of best attainable conditions. To supplement these data, DEP will make an effort to collect invertebrate samples in EV watersheds that have not been sampled (i.e., they were designated for reasons other than their macroinvertebrate composition) to determine whether or not these waters also represent best attainable conditions.

Waters must have attained an existing use of EV (see Chapter 2) by achieving a score of 92 percent or better based upon biological samples collected from the most productive habitat and compared to an appropriate EV reference stream. However, to avoid "dilution" of the reference condition, DEP uses, as reference streams, only those EV waters that represent the best attainable biological community. DEP selects sites on reference streams that represent the most productive habitat (riffle or glide) and does not use, as reference, EV waters that attained the minimal qualifying score for EV or waters that were designated EV for reasons not based on the quality of the biological community.

To further address the dilution issue, a distribution analysis of the metric scores in DEP's macroinvertebrate database is conducted as follows:

1) Select all EV stream samples

2) Group the samples by gradient (ridge vs. valley) stream order (<4 vs. >4), and alkalinity (freestone, limestone, limestone-influenced)

3) Compute the upstream land use

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4) Check the habitat scores and eliminate stations with less than optimal scores (see discussion below)

5) Score the remaining stations and delete those in the lower quartile of the distribution

This last step insures that the lowest biological scores are screened from the data set. Since the data have already had the stations with unacceptable habitat and land use removed, these remaining streams represent the best available EV reference stations for each class of streams. If a biologist samples a new reference station and it scores less than this established minimum reference score for its stream class, then the reference sample is not acceptable for use in evaluating the candidate.

To ensure that the most productive habitat is selected for sampling, the biologist evaluates a set of 12 habitat parameters during the RBP III field collection at reference sites. These 12 habitat metrics (Appendix A) are scored on a scale of 1 to 20. Five of the 12 habitat metrics correlate well with good macroinvertebrate communities in riffle/run streams. These metrics are listed below and are used to qualify reference stations.

1) Epifaunal Substrate – Mix of riffle and run and type of substrate

2) Embeddedness – Measure of sediment mixed in the gravel and cobble substrate

3) Channel Alteration – Amount of channelization

4) Sediment Deposition – Measure of sediment deposited on the substrate

5) Grazing or Other Disruptive Pressure – Vegetation disturbance on lands adjacent to the sampling site

A reference sampling station should achieve optimal scores (16 to 20) for the above five metrics. However, natural systems vary and there may be times when the reference habitat, although very biologically productive, may have one or more of the above five habitat metrics in the good (11 to 15) rather than optimal range. As a result, the biologist, while making every effort to find habitat that is optimal relative to the five habitat metrics, may sample in areas that are slightly less than optimal if the site selection is justified by high biological productivity. The biologist must also take into consideration the other seven habitat metrics and, if they score poorly (<10), disqualify the station as a reference, regardless of its biology. All 12 of the habitat metrics are explained in detail in Section 3 of Appendix A.

The 12 habitat metrics discussed above are intended for use in riffle/run streams. They do not apply to limestone waters or low gradient, pool/glide streams. Other

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criteria, currently under development, must be used to define optimal habitat in these streams.

Land use is the last major consideration in selecting reference stations. The best reference sites most commonly have large contiguous, vegetated riparian zones. There should be no upstream point sources, minimal nonpoint sources, and the stream should not be subject to unnatural, rapid or frequent flow changes. The biologist should avoid areas downstream from bridge crossings or roads (especially dirt roads) paralleling the stream. The land use considerations and instream habitat scores discussed above are the final determining factors in avoiding dilution while selecting references.

(3) Proposed reference stations not meeting the above requirements should be disqualified except under the following circumstances:

References are rare near urban and mined areas and in low gradient pool/glide, limestone, limestone-influenced, and large warm water streams. Eliminating all potential reference streams with point source discharges in these situations could eliminate some or all of the best available benchmarks. In such cases, DEP will use streams with minimal anthropogenic impacts if it has first established that there are no usable reference streams without point or nonpoint discharges. However, any point or nonpoint discharges must be small (ratio of discharge flow to stream flow), few, in compliance with their permit limits, and downstream or well upstream of the reference site. Water chemistry at the reference site should confirm the expected background chemistry of non-impacted streams of this type by comparison to the chemistry of a nearby fixed station, EV, WQN site.

The vast majority of EV streams are small, freestone streams that are inappropriate for use as reference sites for large, limestone, limestone-influenced, or low gradient streams. DEP recognizes the need to have reference comparisons for all stream types and is currently in the process of collecting data to develop appropriate metrics for these various types of habitats. In the absence of established EV reference streams, DEP will use its best professional judgment to select the appropriate reference stream, and is pursuing a two-step approach. The best field collection methods and indicators (macroinvertebrates, fish, and periphyton) may vary depending on stream type. DEP will use peer-reviewed assessment methods published by others or metrics and scoring methods developed by DEP staff based upon established RBP methods. Both approaches will be made available for public review.

c. Sampling the candidate site(s):

DEP generally uses the following procedures to evaluate candidate waters for HQ or EV.

(1) Benthic samples - Three samples per station consisting of a composite of two D-frame kicks each, preserved in ethanol in half gallon bottles (See Appendix A for details)

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(2) Habitat evaluation (See Appendix A for details)

(3) Water chemistry - DEP Standard Analysis Code 018 laboratory samples and a bacteria sample

(4) Field chemistry - Measure temperature, pH, DO, conductivity

(5) Electrofishing - Approximately 50-100 meter reach gathering all specimens for development of a total species list and relative abundance

Timing of Samples. Sampling time frames and conditions to avoid when doing antidegradation biological sampling are also issues to be considered. The recommended months to sample are mid-October through April. The insect instars are generally large, making them easier to collect and identify, and most major taxa are still present instream because they have yet to emerge as adults. The months of July through early October should generally be avoided. During these months the insects are present as eggs or are newly hatched making them difficult to collect. In addition, some major taxa are missing because they have emerged.

The months of May and June are a special case because most important insect taxa emerge then. The biologist must consider the effect emergent taxa might have on the results. Because aquatic insects emerge with greater frequency in May and June, it is important that reference and candidate sites be sampled within a day of each other during this period, to reflect similar phases of emergent activities on both waterbodies.

Samples should be collected under as normal weather conditions as possible. This means avoiding times of drought and floods. These unusual events can severely impact the macroinvertebrates and it may take an entire life cycle for them to recover. As a result, the biologist must know when the last flooding or drought occurred in the area. Again, it is always important to sample candidate and reference sites within a day of each other so unusual weather events do not complicate the results.

Number of Samples. Generally, three samples are collected at each station (see Appendix A). Each station is comprised of a stream reach 100 meters in length. Each sample consists of the composite of two D-frame kicks - one collected from a riffle and the other from a run habitat. Each kick consists of a 1 x 0.3 meters (0.3 meters is the width of the D-frame net) disturbed area immediately upstream from the net. This approach results in 3 samples representing 1.8 square meters of substrate from the three best riffle/run habitats in a representative one hundred meter stream reach. Collection starts with a reconnaissance of the stream to locate good riffle/run areas. Then, starting at the downstream end of the reach, the biologist moves upstream through the reach collecting the three composite samples.

The larger the stream the greater the potential differences in habitat and distribution of macroinvertebrates. In large streams, the collector may wish to take more than a single set of three samples to characterize the macroinvertebrate community at a station. The use of multiple assemblages as indicators such as both fish and macroinvertebrates also becomes more important as stream size increases.

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Glide/Pool Samples. DEP's development of biological methods has concentrated on riffle/run type streams. This is because, with rare exceptions, these are the types of streams petitioned for HQ or EV status. DEP does realize the need for a glide/pool sampling protocol, not only in the Antidegradation Program but also for routine stream assessments. There is a method adaptable to glide/pools described on page 7-5 of "Rapid Bioassessment Protocols For Use in Wadeable Streams and Rivers - Periphyton, Benthic Macroinvertebrates, and Fish" Second Edition (Barbour et al.); EPA 841-B-99-002; July, 1999. The method calls for a composite of 20 jabs using a D-frame dip net to proportionally sample all habitat types. DEP will test this method and also continue to develop a second alternative based upon fish populations. DEP is looking into the feasibility of using fish metrics in cooperation with the Pennsylvania Fish and Boat Commission.

d. Sampling reference sites:

(1) Benthic samples – Three samples per station consisting of a composite of two D-frame kicks preserved in ethanol in half gallon bottles

(2) Habitat evaluation

(3) Field chemistry

Biological sampling at reference sites follows the same procedure used at the candidates with the exception that no sample is collected for chemical analysis in the laboratory. The biologist must collect field chemistry at the reference site to confirm the appropriate match of pH (alkalinity) to the candidate stream.

e. Determine the status of candidate sites in relation to the paired reference sites:

(1) Calculate the candidate/reference percent comparison and compare it to the 83 and 92 percent criteria (see Appendix A for details).

(2) Write a report summarizing the findings and recommendations. (The grab chemistry and habitat information are not used in the use designation determination, but are used to support the biological findings in the report's narrative.)

Appendix A also provides a detailed discussion and example of the metric scoring. Small freestone streams are the most frequently petitioned streams so they provided the largest pool of data when the scoring development was done. These metrics were developed for small freestone streams and should not be applied to other types of streams until DEP completes the evaluation of the metrics described in this appendix for each additional type of stream. DEP is currently working on the development of appropriate metrics for use in limestone streams, streams dominated by glide/pool habitat, and non-wadeable waters.

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4. Qualifying as HQ Waters (Other)

One additional, biology related criterion, is applied to the evaluation of candidate waters for HQ status. Section 93.4b(a)(2)(ii) provides that a waterbody ***"...that has been designated a Class A wild trout stream by the Fish and Boat Commission following public notice and comment."*** is an HQ water. This criterion is designed to recognize waters supporting a high biomass of stream-bred trout and, therefore, considers both biological and recreational attributes of the candidate water.

Conflicts between chemical and/or biological stream characterizations

All data received in support of requests to redesignate waters as HQ or EV is evaluated by DEP staff for quality control purposes. It is possible that, in some cases, both chemical and biological information characterizing a stream will be available. It is also possible that in these situations the data may conflict. This is not expected to occur often because, as a rule, stream biology is a very close reflection of stream chemistry. Nevertheless, for various reasons, including misrepresentative sampling (e.g. time, location), the special chemical nature of some streams (such as limestone streams or acid precipitation impacted streams, or streams with marginal habitat), conflicts could occur. DEP will view conflicting chemical and biological data as cause for further investigation of the data and/or stream characteristics to determine the reason for the conflict.

In general, when DEP becomes aware of conflicting data, it will re-evaluate the chemical and biological stream characterization information to verify its accuracy. The verification process will be conducted to ensure that the samples are not misrepresentative, improperly collected, inaccurate, and that the sampling was designed to account for special stream conditions and characteristics. DEP may seek additional data or conduct further stream studies on its own. DEP will always apply good science in making verification, and will make evaluations based on the best professional judgment, experience, and expertise of its staff to validate existing data and any additional data gathered during the verification process. After verification, if DEP's review indicates that either the stream chemistry data or the stream biology data meets the respective qualification criteria, the stream will qualify as HQ waters, as established in §93.4b(a).

The procedures for resolving conflicting characterizations of a stream are the same whether the conflicting data are chemical/biological, chemical/chemical, or biological/biological. In all cases, DEP will verify all data. DEP will verify the biological data to ensure that it was collected properly and compared to the reference stream in the proper manner. The data will be carefully checked for possible errors in metric calculations or procedures. If the biology results showed a water did not qualify for special protection, additional stream investigation might be performed to identify problems with physical habitat or riparian buffer. On the other hand, additional stream studies might be conducted by DEP to confirm the presence of qualifying biological conditions. The chemical data will be examined to determine accuracy, conditions under which the stream was sampled, quality assurance, and the degree to which the data did not meet the criteria. The chemical data could be investigated, for example, to determine whether sampling procedures may have missed possible periodic occurrences of chemical degradation from pre-existing sources or natural processes, or if any potential pollutants could cause non-qualifying biological quality. After verification, if DEP's evaluation indicates that either the stream

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chemistry data or the stream biology data meets the respective qualification criteria, the stream will qualify as HQ.

5. Qualifying as EV Waters

Section 93.4b(b) of the regulation states the following:

"(b) A surface water that meets one or more of the following conditions is an Exceptional Value Water.
(1) The water meets the requirements of subsection (a) and one or more of the following:"

This indicates that EV waters must first be HQ waters in accordance with the requirements of subsection (a). The subsequent listing of factors in the regulation requires that the water also possess one or more of the following:

- Location in a national wildlife refuge or state game propagation and protection area
- Location in a designated state park natural area or state forest natural area, national natural landmark, federal or state wild river, federal wilderness area or national recreation area
- Qualification as an outstanding national, state, regional, or local resource water
- Exceptional recreational significance
- A score of at least 92 percent (or its equivalent) using the biological assessment qualifier described in subsection 93.4b(a)(2)(i)(A) or (B)
- Qualification as a Wilderness Trout Stream

Items 1 and 2 above are straightforward in that the waters mentioned are easily identified by virtue of their location on a state or federal tract of land clearly defined and set aside for a specific use as described in law or regulation. Outstanding resource waters (#3 above) are defined in the antidegradation regulation as waters for which a national or state government agency has adopted water quality protective measures in a resource management plan or regional or local governments have adopted coordinated water quality protective measures along a watershed corridor.

Coordinated water quality protective measures as defined in §93.1, include legally binding, sound land use, water quality protective measures coupled with an interest in real estate which expressly provide long-term water quality protection of a watershed corridor. Sound land use water quality protective measures include surface or groundwater source protection zones, enhanced stormwater management measures, wetland protection zones, or other measures which provide extraordinary water quality protection. Real estate interests include fee interests, conservation easements, government owned riparian parks or natural areas, and other interests in land which enhance water quality in a watershed corridor area.

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A surface water of Exceptional Recreational Significance (Item #4) is defined in §93.1 as "A surface water which provides a water-based, water quality-dependent recreational opportunity (such as fishing for species with limited distribution) because there are only a limited number of naturally occurring areas and waterbodies across the State where the activity is available or feasible." DEP interprets "limited number" to be generally less than ten, thus making the recreational opportunity offered not readily available. Species with limited distribution, such as Coho salmon and Steelhead trout, include those whose range has been restricted by natural or man-made barriers or management programs.

Item #5 defines the criterion for attaining a water use of EV when evaluating the waterbody using the biological assessment. All procedures outlined under HQ waters also apply to the evaluation of EV waters using this approach.

Wilderness Trout Stream designations (Item #6) are conferred by the PFBC, following public notice and comment. This designation is an effort to protect and promote native trout fisheries and maintain and enhance the wilderness aesthetics and ecological requirements necessary for natural reproduction of trout. The use as a criterion for EV waters recognizes both the biological/ecological and recreational significance of these waterbodies. DEP will evaluate and confirm the PFBC's rationale for the designation, and inclusion of appropriate public involvement prior to providing EV status under this criterion.

One additional criterion for EV waters selection is included in §93.4b(b)(2) of the regulation:

> ***"The water is a surface water of exceptional ecological significance."***

Unlike the previous six criteria, surface waters of exceptional ecological significance need not possess the attributes of an HQ water. As defined in §93.1, these are waters that are ***"…important, unique or sensitive ecologically, but whose water quality, as measured by traditional parameters (for example, chemical, physical or biological) may not be particularly high, or whose character cannot be adequately described by these parameters…"*** While these waters may be traditional aquatic systems, they are often not typical streams or lakes but rather waters such as thermal springs and EV wetlands. Such aquatic systems may be considered "important" if they occupy a position or perform a function critical to an ecosystem, "unique" if they represent the only example or one of a very few examples of a particular type of aquatic system in the state, and "sensitive" because they may be intolerant of chemical, physical, or hydraulic changes imposed by man. Their status as EV waters acknowledges the significance of the ecosystems they represent.

All of these pathways for qualifying as EV waters are applicable in national and state park waters, as well as all other surface waters of the Commonwealth that meet the criteria. Collectively, these "conditions," used to qualify surface waters as EV, represent the Pennsylvania equivalent to "Outstanding National Resource Waters" as described in federal regulations.

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CHAPTER 6

PROTECTION OF HQ AND EV WATERS

1. Background

The purpose of antidegradation is to protect the existing quality of HQ and EV waters, and the existing uses of all surface waters. Pennsylvania has implemented an effective Antidegradation Program since the late 1960s. The methods and processes for implementing antidegradation requirements have been continuously refined over the years based on this experience.

The current Pennsylvania antidegradation regulations, finalized on July 17, 1999, were the result of extensive public input into how the Commonwealth should implement an Antidegradation Program to protect its waters, and represent a careful balancing of the needs of Pennsylvania citizens and the regulated community in assuring the protection of the Commonwealth's waters. This chapter details how the Commonwealth intends to implement this important program with respect to new or expanding point sources. Chapter 11 of this guidance addresses nonpoint sources.

For all surface waters, the uses of the water, including all downstream uses, must be maintained and protected when an activity is proposed which may affect a surface water. These activities include point source discharges, regulated water withdrawals, resource extraction activities, landfills, and a variety of nonpoint source activities which may impact a surface water (including construction, agriculture, and silviculture). Use protection also includes the protection of T&E species. Where the existing use is more sensitive than the designated use, existing use is protected until the difference is reconciled (see Chapter 2).

With regard to HQ and EV waters, existing quality must be protected by applicants proposing discharges directly to these waters or upstream from these waters. A pre-permit nondischarge alternatives analysis must be conducted prior to DEP considering a proposed discharge. Alternatives to new, additional, or increased point source discharges to surface waters must be used where they are cost-effective and environmentally sound, as described in Figure 3 and Chapter 7 of this guidance. These alternatives, depending on the nature of the activity, may include land application of wastewater, an alternative discharge location, the use of holding facilities coupled with wastewater hauling, and buffer zones for proposed earth disturbance.

If a nondischarge alternative is not cost-effective and environmentally sound, a proposed discharger must utilize the best available combination of cost-effective treatment, land disposal, pollution prevention, and wastewater reuse technologies. This process, known as the ABACT analysis, establishes a minimum level of performance for discharges based upon the more stringent of water quality based effluent limits or ABACT. The project sponsor must demonstrate that any discharge will maintain and protect the existing quality of the receiving water and will result in no degradation.

Proposed discharges to HQ waters for which no cost-effective and environmentally sound nondischarge alternatives exist, must utilize technologies or methods resulting from ABACT analysis, but need not ensure that no degradation results from the discharge if the proposed discharger can demonstrate a SEJ for the proposed discharge, as described in Chapter 10. Water

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withdrawals must be designed and operated in a manner that maintains existing uses and/or quality depending on the applicable water use designation.

For applicants with withdrawal or discharge projects located in the Delaware River Basin, the antidegradation requirements set forth in the water quality regulations of the Delaware River Basin Commission (DRBC) must be met. If the proposed project could affect waters designated Special Protection Waters or waters subject to interim protection by DRBC while under study for designation as Special Protection Waters, the applicant is encouraged to meet with Commission staff early in the application process to discuss DRBC requirements.

2. Generalized Point Source Review Process

Flowcharts illustrating the generalized review process for point source projects to satisfy the antidegradation requirements are shown as Figures 3 and 4 in this chapter. For activities proposed in HQ and EV waters, the applicant or project sponsor and his or her consultant must be well versed with the antidegradation requirements in order to provide DEP with an adequate proposal for consideration. Lack of information or understanding of the program or failure to submit necessary documentation to satisfy the regulatory requirements of the program may lead to delays in obtaining permits or approvals in HQ or EV waters. DEP has instituted a MBG program where decisions must be made within set timeframes. If an applicant fails to include all of the required antidegradation submissions, an application may be returned, delaying consideration of the project. DEP strongly recommends early consultation with potential project applicants or sponsors so that the requirements and review process are understood and addressed before any formal submissions.

In the case of sewerage projects, this consultation will normally occur during the Act 537 planning process. For other types of projects, DEP encourages project sponsors to attend a pre-application meeting with appropriate regional office, county conservation district, and/or district mining office staff when it is first known that an activity is being proposed in an HQ or EV watershed. These meetings should include, when possible, both the applicant and/or project sponsor, and his or her consultant.

A number of topics can be covered and objectives accomplished at this meeting. First, the antidegradation regulation will be described in detail, with emphasis on the various 'tests' to be satisfied. The flowcharts shown as Figures 3 and 4 will be used to outline the process by which these tests are evaluated. The applicant describes the project, including volumes and expected constituents of the various wastewater streams that the project would generate, as well as the technology and/or BMPs that are contemplated to be utilized. The more stringent of the existing or designated use of the proposed receiving stream will be reviewed to ensure that the applicant knows the use of the waterbody, and the connection between that use and applicable regulatory requirements. In addition, the issue of "grandfathering" of existing discharges and permitted capacity will be reviewed with the applicant (see Chapter 7).

Once this information is exchanged, more detailed discussion of the applicability of the regulations to the specific project being proposed can be pursued. Since the first step in the process will always be the evaluation of nondischarge alternatives, and because this must necessarily be satisfied before proceeding to the next step, this will be a large component of the discussion. DEP staff will discuss the scope of the preliminary alternatives that they would like

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evaluated for the project at hand. Alternatives that are clearly not practicable, technically implementable, or cost-effective should not be examined further. This dialogue with the applicant will define the content of the nondischarge alternative analysis to be submitted with the permit application. DEP will also encourage the applicant to seek input from the affected public, local government, watershed groups, or other interested parties, relating to what alternatives are most likely to be successfully supported by the public in the future public comment periods associated with the formal application process. The importance of early and meaningful public involvement cannot be overstated (see Chapter 12).

If a total nondischarge alternative is not viable, based on the analysis described above, the next area to be considered involves the treatment itself. The proposed treatment technology will be reviewed from the standpoint of whether it can produce an effluent which will meet the performance expectations of ABACT (Chapter 9). Along those same lines, the proposed discharge will be examined as to whether it will meet the test for non-degradation (Chapter 8).

Finally, if the proposed discharge is to HQ waters, the SEJ process should be reviewed with the applicant. The critical importance of involving the public and local government in identifying and determining the appropriate significance of the various SEJ factors to be considered for a particular proposal will be emphasized with the applicant (Chapter 10).

Other topics that should be covered in a pre-application type meeting include, but are not limited to, T&E species (Chapter 3), identification of other DEP or federal permits or approvals that the project would likely require, and DEP's permit coordination process.

The applicant and his or her consultant are encouraged to request additional meetings with DEP staff to discuss any aspects of the Antidegradation Program about which they have questions. As stated earlier, emphasis will be placed on early and frequent communication between the applicant, the local community, and DEP. In some cases, preliminary discussions would be useful **before** a particular property is purchased and the owner makes plans to develop the parcel.

DEP will make final, formal decisions on the various Antidegradation Program elements within the context of its normal review processes. For sewerage cases, this will occur during Act 537 sewage facilities planning. For all other permit types, this will generally occur during the context of DEP review of an NPDES application or other request for approval. For applications first handled by delegated county conservation districts, close coordination between the district and the appropriate regional office will be necessary to ensure that the antidegradation requirements are addressed during the review process.

3. Activities Not Involving a Discharge

For projects subject to a DEP permit or approval that may affect an EV or HQ surface water but do not involve a discharge, there is a somewhat different review process. This process evaluates the effect of the proposed activity on surface water and requires that the use of the surface water be maintained and protected.

Addressing water quantity issues as part of DEP's permitting process is an evolving area. Activities involving surface and groundwater withdrawals which require a DEP permit under the Pennsylvania Safe Drinking Water Act (SDWA) are being addressed on a case-by-case basis and

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in accordance with DEP's guidance, *Screening Criteria for Water Quality/Quantity Impacts of Drinking Water Permits*, DEP ID: 383-2131-001, available on DEP's website. The procedures were developed to identify those surface and groundwater withdrawals under the SDWA which may be considered to have significant impact on streams, springs, and wetlands and indicate when additional determinations relating to water quantity are important permit considerations. It provides a means for applicants and DEP to focus on situations where additional review or assessment is needed to evaluate the magnitude and likelihood of potential impacts of such water withdrawals on surface water uses.

Another tool that is useful in assessing stream impacts from a proposed withdrawal on a stream which supports a cold water fishery is DEP's guidance on use of the *Instream Flow Incremental Methodology* (IFIM), which is currently under development. The guidance, now being revised based on comments received, will define how the IFIM process may be used to protect the designated and existing use of the surface water.

While these tools provide a framework for evaluation of water withdrawal projects, DEP and the applicant may also use other methods and resources to achieve the goal of protecting the uses of surface waters where projects impacting water quantity are proposed. This implementation document will be updated to provide timely guidance as new methods and tools are found.

DEP will continue to develop additional tools and to finalize those in draft, with full public participation through the specific permitting programs. When they are complete, appropriate tools will be added to this guidance as a reference appendix.

4. Examples of Activities That Have Occurred in EV Waters

The emphasis on non-discharge alternatives analysis in EV watersheds across Pennsylvania has successfully protected these aquatic resources while accommodating environmentally sound economic growth. The following examples are listed to illustrate the types of activities that have occurred in EV watersheds in the recent past because the project sponsors were open to innovative ways to approach development in these sensitive areas.

Stream	Type of Development	Water Quality Issues Addressed
Four Mile Run	Oil & Gas	Industrial wastes (brine), Erosion Control, Stormwater Management
Hay Creek	Quarry	Erosion Control, Stormwater Management
Letort Spring Run	Commercial Retail Space	Sanitary sewage, Erosion Control, Stormwater Management
Pine Creek	Quarry	Erosion Control, Stormwater Management
Sawkill Creek	School, Residential	Sanitary sewage, Erosion Control, Stormwater Management
Valley Creek	Commercial Office Space, Residential, School	Sanitary sewage, Erosion Control, Stormwater Management

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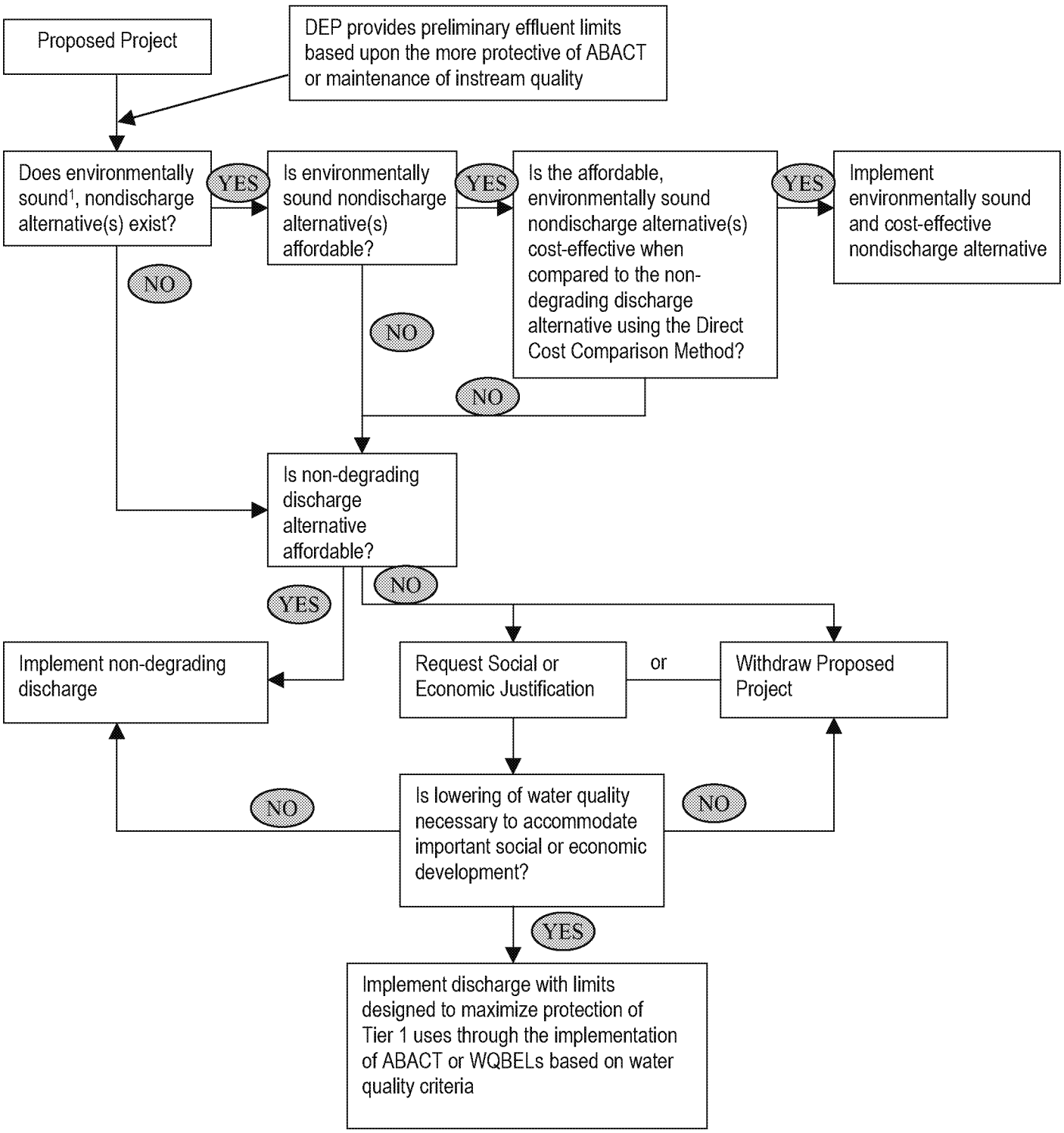
FIGURE 3
GENERALIZED PERMIT REVIEW PROCESS
FOR
PROPOSED DISCHARGES TO HQ WATERS



[1] Alternative, produces more environmental benefits than harms.

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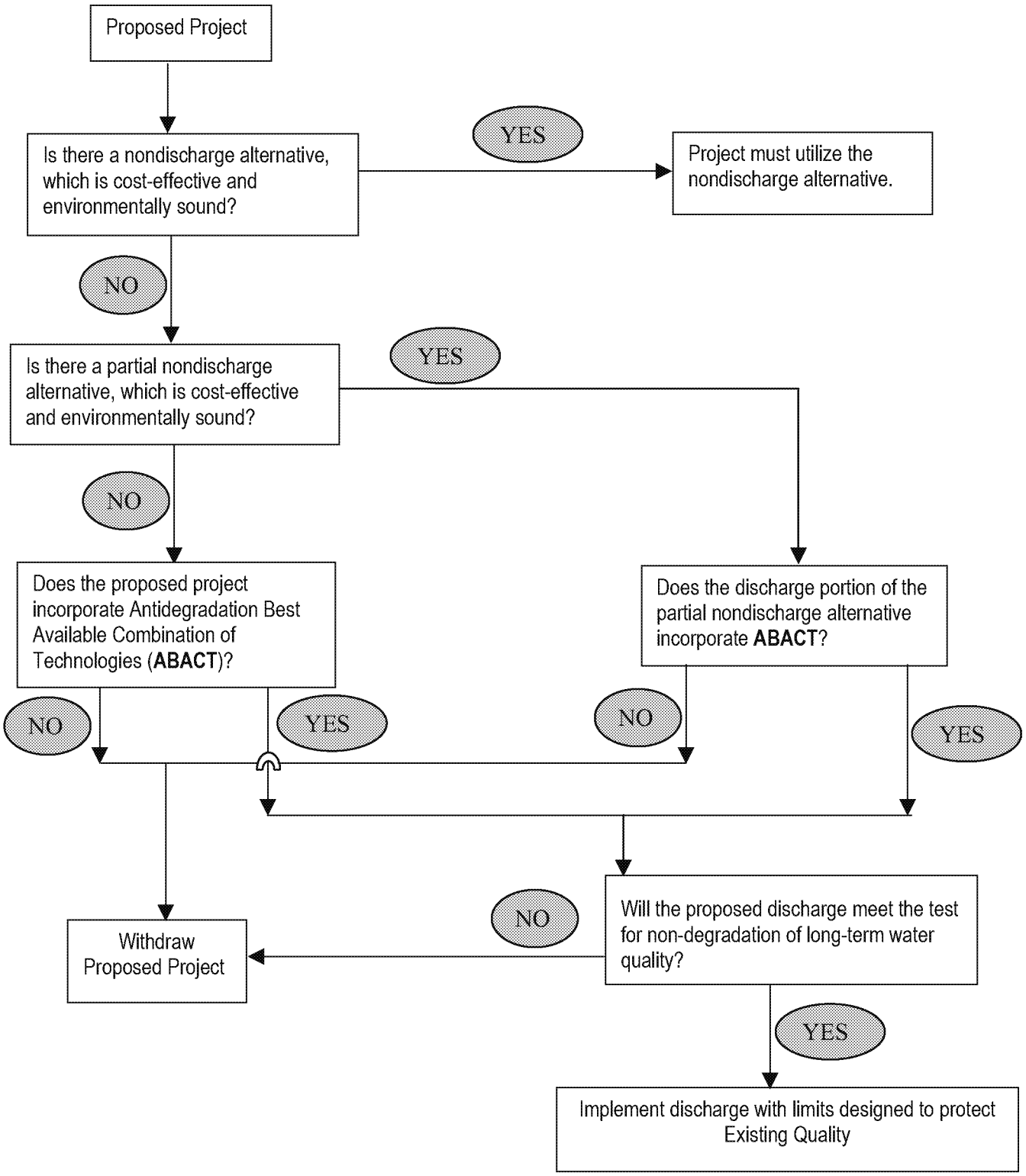
FIGURE 4
GENERALIZED PERMIT REVIEW PROCESS
FOR
PROPOSED DISCHARGES TO EV WATERS



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CHAPTER 7

NONDISCHARGE ALTERNATIVES

1. Background

An important component of the Antidegradation Program requires the use of nondischarge alternatives for projects and activities generating new, additional, or increased point source discharges to HQ or EV waters when such alternatives are cost-effective and environmentally sound. When wastewater management or disposal is feasible in an environmentally acceptable manner, without creating a direct discharge to a waterbody, or when direct discharge can be minimized, degradation of water quality is usually prevented or minimized. The potential threat of accidental harmful releases through the discharge pathway is also minimized. Use of nondischarge alternatives, such as land application of wastewater or treatment/recycle, is very effective in preventing water quality degradation and localized aesthetic impacts to the waterbody.

The regulation at §93.4c(b)(1)(i) states the following:

"***(b) Protection of High Quality and Exceptional Value Waters.***
1) Point Source Discharges – The following apply to point source discharges to High Quality or Exceptional Value Waters.
(i) Nondischarge alternatives/use of best technologies.
(A) A person proposing a new, additional or increased discharge to High Quality or Exceptional Value Waters shall evaluate nondischarge alternatives to the proposed discharge and use an alternative that is environmentally sound and cost-effective when compared to the cost of the proposed discharge. If a nondischarge alternative is not environmentally sound and cost-effective, a new, additional or increased discharge shall use the best available combination of cost-effective treatment, land disposal, pollution prevention and wastewater reuse technologies.
(B) A person proposing new, additional or increased discharge to High Quality or Exceptional Value Waters, who has demonstrated that no environmentally sound and cost-effective nondischarge alternative exist under clause (A), shall demonstrate that the discharge will maintain and protect the existing quality of receiving surface waters, except as provided in subparagraph(iii)."

(Note: subparagraph (iii) allows degradation on HQ waters where social or economic justification exists)

2. Discussion

The requirement to consider nondischarge alternatives applies to both HQ and EV waters regardless of the degree of degradation or the social or economic benefit associated with a proposed discharge. The requirement to evaluate and use nondischarge alternatives, when they are cost-effective and environmentally sound, is a critical test and must be met by any activity or project generating new, additional, or increased point source discharges to HQ or EV waters.

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Interpretation of this portion of the regulation requires an understanding of the differences between new, increased, and additional when referring to point source wastewater discharges. These categories of discharge are defined below. The reader is also referred to Section 3 of this chapter for further explanation.

New Discharge. A wasteload not previously present on that waterbody that requires the construction/placement and permitting of a new treatment facility.

Additional Discharge. Flow and/or loading added to an existing waste stream that **would not** require construction to accommodate the added waste flow.

Increased Discharge. Flow and/or loading added to an existing waste stream that **would** require new construction to accommodate the increased waste flow.

In HQ waters, the tests for nondegradation of water quality by a proposed discharge and for SEJ of a project (see Sections 4 and 6 of this chapter) are usually applied at the same time as the evaluation of nondischarge alternatives because they help define the baseline for cost comparison of the alternatives. DEP will not approve a new, additional, or increased discharge in such waters unless it has been determined that there are no feasible alternatives to a direct discharge.

The regulation also provides that, if a discharge cannot be avoided, the applicant must find and use the best available combination of discharge and nondischarge treatment and management alternatives, which is cost-effective. ABACT for various types of discharges in HQ and EV waters are described in Chapter 9. The more stringent of ABACT or water quality-based effluent limits are applied in these situations unless SEJ is successfully demonstrated.

3. New, Additional, or Increased Discharge

For purposes of the requirements established under 93.4c(b)(1)(i), "new, additional, or increased discharge" refers to point or nonpoint sources emanating from projects or activities undertaken after the waterbody is designated for HQ or EV protection. For point source discharges incremental flows are considered to be "new, additional, or increased" when:

a. Projected wastewater flow will cause the treatment facility receiving the incremental flow to exceed hydraulic or organic design capacity; or

b. Projected incremental wastewater flow will originate from:

   (1) Sources outside the area designated to be served under the approved Act 537 sewage facilities plan (domestic sewage), or

   (2) Changes in production methods that alter wastewater characteristics from those originally permitted in the design of the treatment facility (industrial waste)

Discharges in existence prior to the HQ or EV designation are "grandfathered" and considered to be part of the existing quality of the waterbody. "Grandfathered" flows are not subject to "the non-discharge alternatives/use of best technologies analysis" or SEJ (for HQ waters) in acknowledgment of the resources invested by municipal officials in planning for community

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sewage needs and corporate officials in equivalent planning to tailor treatment facilities to the wastewater volume and characteristics created by production/manufacturing processes. This approach is consistent with procedures currently being applied by DRBC to designated segments of the Delaware River in Pennsylvania.

All nonpoint source contributions and non-grandfathered point sources that occur after a waterbody is designated HQ or EV are subject to applicable provisions of the Antidegradation Program.

4. Wastewater Disposal

Traditional wastewater disposal science and technology has generally focused on direct discharge and on treatment methods designed to achieve levels of effluent quality acceptable for discharge. This may be an acceptable strategy to abate pollution and protect water uses where stream assimilative capacities are available in waters not classified as HQ or EV. However, the antidegradation regulation makes clear that environmentally sound nondischarge alternatives must be considered and used, where cost-effective, in HQ and EV waters.

A growing environmental consciousness and emerging technology for nondischarge wastewater management alternatives has evolved for a number of reasons. In areas where water supplies are severely limited, direct discharge of wastewater may not be prudent. Recycling of wastewater for re-use, wastewater minimization by changing industrial processes, or return of treated wastewater to groundwater supply aquifers by land application have emerged as strategies to respond to this need. In other instances, limited stream assimilative capacities and stringent effluent limitations and management conditions imposed on toxic and conventional pollutants have fostered pollution prevention in process design and wastewater recycling as an economic, as well as environmental, strategy. Nondischarge practices constitute good environmental management in HQ and EV waters, and are imperative considerations.

Many nondischarge alternatives employ low-level technologies, which, with adequate management, can be more reliable than discharges that rely on higher treatment technology. Good examples are land application of sewage effluent and constructed treatment wetlands.

a. Nondischarge as an Alternative

Traditional sewage disposal systems sometimes develop into sprawling sewer systems with numerous extensions, connected to large central sewage treatment plants downstream. These traditional collection and central treatment systems have been a logical and sound solution for sewage disposal in urban or heavily developed areas and will continue to fulfill an important role in providing for wastewater disposal into the foreseeable future. However, without carefully developed land use planning, these disposal strategies contribute to the problems of urban sprawl and unplanned development (Report of the Pennsylvania 21st Century Environment Commission, September 1998). In an effort to promote coordinated planning, the Municipalities Planning Code as amended by Acts 67 and 68 of 2000, in conjunction with the application of the Governor's Executive Order 1999-1, authorizes DEP to consider local planning and zoning ordinances in its decision making on permits under certain circumstances which are described in DEP's technical guidance *Policy for Consideration*

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of Local Comprehensive Plans and Zoning Ordinances in DEP Review of Permits for Facilities and Infrastructures, DEP ID: 012-0200-001 available on DEP's website.

Nondischarge disposal alternatives for sewage are generally dependent upon the availability of land sufficient to treat the quantity of sewage effluent generated. The most effective use of these methods de-emphasizes centralization of sewerage facilities and local management systems.

Decentralized sewage disposal schemes, which rely on less intensive technology like land application, small-scale treatment systems, and at-site disposal or re-use of effluent, can discourage sprawl and prevent or disperse the large adverse impacts that a central discharge can create. Also, because these approaches typically involve land application of wastewater to local groundwater aquifers, or employ re-use practices that can reduce the local water supply demand, they may help sustain the base flow of groundwater in local headwater streams. This decentralization is an alternative that must be considered to ensure maintenance of existing quality in HQ and EV waters. These systems are effective when they match desired land use, and where management and oversight systems provide local maintenance and operation.

b. Environmentally-Sound Nondischarge Alternatives

Listed below, in order of preference, are some nondischarge alternative wastewater management and disposal options, and the general environmental criteria applied to their use. The list of alternatives is not an exclusive nor exhaustive description of the environmental considerations of alternatives, but is meant to be a starting point for the evaluation of options. The project proponent can expand this list through research and/or experience with different technologies. Determination of applicability of a particular nondischarge alternative must be made on a case-by-case basis, by the project proponent, taking into account site-specific environmental and local factors. It should be noted that nondischarge alternatives may not, under all circumstances, be the most environmentally sound option.

Pollution prevention and process changes

Pollution prevention is the first nondischarge alternative considered. Pollution prevention can involve the substitution of raw materials, the segregation of wastewater flows, and/or the redesign of industrial processes to use less water, eliminate objectionable chemicals, and produce less wastewater. Pennsylvania is a leader among states in environmental programs that are designed to foster this emerging science and educate the regulated community. In antidegradation waters, all appropriate pollution prevention and wastewater minimization measures for any proposed discharge shall be considered, and shall be used where they are cost-effective and environmentally sound, when compared to discharge options.

Alternative Project Siting

One important issue that must be addressed by the project sponsor early in the process is the siting of the proposed project. Project siting is an important component of

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nondischarge alternatives analysis. It is critical that the site chosen for the project is appropriate. To this end, the following questions must be answered by the project sponsor to ensure that the HQ or EV water is the only suitable location for the proposed project or activity.

- What are the requirements for locating this project/activity?

  Infrastructure
  Utilities
  Transportation
  Raw Materials
  Work Force
  Other

- Is this watershed or specific stream segment the only location that offers these requirements?

- Were other sites considered?

Land application of wastewater

This nondischarge alternative treats sewage or wastewater to some prescribed level with conventional unit processes, and then applies it to land by irrigation or through direct in-ground infiltration systems. Some treatment systems, such as constructed wetlands, can be designed to function with this type of disposal. Additional support for land application of wastewater containing nutrients is provided by Section 96.5 of the water quality regulations but it should be noted that not all wastewater is suitable for land application.

A good example of this nondischarge alternative is land application of sewage effluent. Generally, where adequate soils and conditions exist for irrigation or direct in-ground infiltration of effluent, sewage may be pretreated only to secondary treatment levels before land application. Removal of organics, solids, and nutrients is accomplished naturally by biota in the soil, rather than by technology intensive processes. Because there is no direct discharge pathway to the receiving stream, accidental releases of acute toxics like chlorine or short-term adverse aesthetic problems caused by turbidity or color in the effluent are prevented.

In these situations, ultimate discharge of the wastewater is to the groundwater in the land application area, after percolation through the soil mantle. Therefore, adherence to DEP land application design criteria is critical to protection of the groundwater resource. This method is widely used throughout Pennsylvania for sewage disposal and food processing wastewaters, because of the ability of the soil and associated vegetation to take up nutrients and other wastewater pollutants which would be problematic in a direct discharge to surface waters. This category could include systems as small as individual and small community residential onlot sewage systems or as large as public works or industrial facilities disposing of several million gallons per day, depending on site-specific conditions.

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Environmental considerations for this method include:

- availability of soil types, depths, and slopes to accommodate the types of pollutants left in the wastewater after pre-treatment and which can adequately receive and treat the quantity of wastewater produced,
- availability of land which is sufficiently isolated from the public,
- sensitivity of local groundwater quality and uses,
- seasonality of systems which rely on vegetative uptake for additional wastewater renovation and create the need for winter storage of wastewater.

In general, these environmental factors become less critical with an increasing level of pre-treatment.

Recycle/reuse of wastewater

Treatment and recycle of wastewater for reuse at industrial facilities is frequently used and is an economical nondischarge alternative. The recycle of highly treated water for reuse can be feasible and cost-effective where water supplies are limited or costly, or where effluent must be treated to high levels of quality for discharge to surface waters. The degree of treatment necessary to produce a reusable water depends upon the sensitivity of the process in which the water is used, but in most cases, well-developed technologies can meet the necessary quality. The EPA document titled "Guidelines for Water Reuse" (EPA/625/R-92/004, September 1992) provides an excellent reference on this subject.

Recycle and reuse of sewage effluent is emerging in some states, including Pennsylvania, on both small and large scales. Tertiary effluent can be recycled back to toilet facilities for flush water and other non-sensitive uses with only minimal additional treatment. Other non-potable water reuses, such as vehicle washing or irrigation, can become possible with the addition of newer membrane filtration technologies.

A project in central Pennsylvania, currently in the construction phase, will provide for the treatment, transport, and recycle of approximately 3 million gallons per day of sewage effluent for a variety of non-potable reuses throughout an urban and suburban area. Phase I, which will be operational in 2004, involves the membrane filtration treatment of 0.75 MGD of sewage effluent before transmission to industrial/commercial sites for reuse.

Alternative discharge locations

This alternative involves transport of effluent, via pipeline, generally out of the HQ or EV waters. The alternative is most feasible when the project is located on a small HQ or EV water, tributary to some larger non-HQ/EV waterbody. In this case, effluent, requiring a less stringent degree of treatment adequate for the non-HQ/EV stream, may be

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transported downstream for discharge. Economics and environmental constraints are dictated by the relative size and assimilative capacity of the downstream water and by its proximity to the project. This may not be an environmentally sound option in cases where the project will generate a reliably HQ effluent and where low-flow augmentation would be beneficial to the HQ or EV water.

Another version of this alternative is connection of the proposed discharge to an existing permitted sewage conveyance system and treatment facility. If the treatment system discharge is located outside the HQ or EV water, the environmental review should compare the benefit of eliminating the discharge to the HQ or EV water to the potential environmental consequences of development and construction along the sewer line connection and any hydrologic impacts which might result from the transfer of groundwater baseflow to the downstream location. If the treatment system discharge is located on an HQ or EV water, connection of a new source of sewage flow will qualify as a nondischarge alternative only if the connection will not cause exceedance of the hydraulic or organic design capacity or discharge effluent limits of the existing treatment plant and the flows emanate from the area designated to be served under the approved Act 537 plan. Connection of a proposed industrial source will also be considered a nondischarge alternative if the added wastewater volume originates from production purposes and methods originally contemplated and permitted in the design of the wastewater treatment system, does not cause the treatment facility to exceed its hydraulic or organic design capacity, and does not introduce new pollutants into the waste stream.

In all cases involving proposed transport of wastewater out of the immediate watershed, nondischarge alternatives which utilize localized land disposal or groundwater discharge methods shall be considered in the alternative evaluation process, because of the benefit they offer in helping to preserve groundwater supplies and base flow to streams.

Holding facilities and wastewater hauling

The use of properly designed holding tanks for sewage and holding tanks or impoundments for industrial and other wastewaters can be a feasible nondischarge alternative, especially for short-term disposal of wastewater. Holding facilities are most effective when wastewater volumes are small, and a central treatment facility (usually a publicly owned sewage treatment plant) is close. The potential for environmental harm from holding facilities stems from neglect and overflow, creating localized health hazards or pollution. Planning for effective financial management and operation are necessary to ensure the environmental soundness of this alternative. Accidental discharge during transport may also cause environmental harm. However, with proper design, operation and management, and the use of alarm systems, holding facilities and wastewater transport can be simple and effective alternatives to stream discharge.

Constructed treatment wetlands

The construction of treatment wetlands that use natural biological processes and the nutrient uptake characteristics of planted wetland vegetation to treat wastes is an effective nondischarge alternative. When employed as a nondischarge alternative, typical wetland treatment designs include multiple lined treatment cells, followed by multiple unlined

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infiltration cells. The infiltration cells are designed and located to allow and facilitate the percolation of the naturally treated effluent through the soil mantle and into the groundwater. The treatment and infiltration cells are sized based on both hydraulics and the organic/nutrient load requiring treatment, so land availability is a factor. Because of their passive technology and relative ease of operation, however, constructed wetland systems can be a viable alternative in many rural situations.

Nondischarge alternatives to earth disturbance

Nondischarge alternatives which are to be considered by persons proposing an earth disturbance activity which requires an NPDES permit include: alternative siting of the project, limiting the extent of earth disturbance, and the maintenance and/or installation of riparian buffers.

c. Evaluation of Cost-Effectiveness of Nondischarge Alternatives

Economic criteria are needed both to guide an applicant in the preparation of information relative to the evaluation of nondischarge alternatives and to guide DEP in making its determinations. The following describes the method of determining cost-effectiveness which combines an affordability analysis with a direct cost comparison as described on the next several pages and in Figure 3. This allows DEP to review both a primary screening/affordability evaluation as well as a secondary alternative-to-alternative cost comparison before deciding the issue of cost effectiveness. The following two-step process requires that the submitted demonstration of cost effectiveness include information to support both a primary screening/affordability evaluation as well as a secondary alternative-to-alternative cost comparison.

Step 1) Affordability Analysis

EPA's "Appendix M to the Water Quality Standards Handbook – Second Edition, Interim Economic Guidance for Water Quality Standards" (EPA-823-B-95-002, March 1995) presents an approach which looks at the absolute value of nondischarge alternative rather than at comparisons. The approach separates projects into two basic types: publicly and privately financed. The approach assumes that publicly financed projects provide a public service by a non-profit public entity, and that privately financed projects are proposed by persons or private-sector entities which require certain profit margins to stay in business.

For public proposals, which are being financed directly by public rate-payers or taxes, the criterion for cost-effectiveness in EPA's manual is the affordability of the project to the rate-payers. The actual criterion for affordability outlined in the manual is 1 percent of the median household income of the rate paying public. When projected annual rates are higher than 1 percent of the median income, secondary tests of affordability, including debt indicators (like bond ratings), socioeconomic indicators (like unemployment rate), and community financial management indicators (like property tax revenue collection rate) are factored into the determination. Criteria for these secondary tests are applied in a "scored" matrix.

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For private-sector proposals, the approach measures the impact which a nondischarge alternative would have upon profit and financial operation of a facility. The primary test estimates how much profits would decline due to the implementation of a nondischarge alternative. While no specific criterion is given, the approach involves comparing the reduced profit level to past operating profit levels shown in the same or similar type developments or industries, and to operating profit levels which would be maintained with utilization of other wastewater disposal alternatives. The approach implies that where reduction in projected profit level is small compared to industry standard or other alternatives, then the nondischarge alternative is deemed to be cost effective. The secondary tests described in EPA's manual involve more complicated financial factors including liquidity, solvency, and leverage. As with the profitability test, no specific criteria are given for these financial elements, other than their utility as subjective evaluation measures of a private-sector facility's financial status.

For example, in the evaluation of a public project, the 1 percent of median household income user-fee criteria can be applied as the first step of the cost-effectiveness evaluation by addressing the affordability question, even before direct cost comparisons are considered. Only if the user-fees exceed the screening criteria and secondary tests of affordability are failed would the direct comparison of the nondischarge alternative cost to the discharge alternative costs come into play. Likewise, for the private-sector projects, a primary screening test can be added to evaluate profit level. The test would require private developers or businesses to submit an analysis which estimated the profit levels resulting from the use of each alternative, and compare these to each other and to typical profit levels for the nature of the activity or business proposed. Only if a reduction in profits were deemed to be significant would the direct comparison of alternative costs be considered.

Step 2) Direct cost comparison of alternatives

The most direct method of evaluating the cost effectiveness of a nondischarge alternative is to compare its cost to the cost of a non-degrading discharge alternative. For proposed discharges on EV waters and HQ waters without SEJ, the only approvable discharge is one which meets the test for non-degradation of water quality. Thus, the level of technology and control which would be necessary to produce effluent quality meeting non-degradation standards set the basis for the cost estimate of the discharge alternative. This cost estimate is compared to that of each of the environmentally sound nondischarge alternatives, including combinations of seasonal discharge and other nondischarge wastewater management approaches.

The actual cost comparisons are typically performed on the basis of present worth calculations (or calculations of uniform annual cost, if the useful life of each alternative is different), using an applicable interest (discount) rate. The present worth calculation is a well-established method for integrating the up-front capital costs (and associated indebtedness) of a project with its ongoing annual costs of operation, and transforming the integrated costs to one equivalent value. The calculation yields the total equivalent dollars which would have to be invested at the beginning of a project in order to finance it for the life of the facility. The monetary costs considered in the calculations include the total value of the resources which are attributable to the wastewater treatment, control,

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and management systems and the component parts. To determine these values, all monies necessary for capital construction costs, operational costs, and maintenance costs should be identified.

Capital construction costs used in cost comparison analysis consist of estimates of the construction costs, including overhead and profit; costs of land (including land purchased for the treatment works site and land used as part of the treatment process or for ultimate disposal of residues), relocation expenses, and right-of-way and easement acquisitions; costs of design engineering, field exploration, and engineering services during construction; costs of administrative and legal services (including cost of bond sales); start-up costs such as operator training; financing costs and interest during construction; and the costs of any other site-related environmental controls, such as erosion and sediment control practices.

Operational and maintenance costs are usually considered on an annual basis and include operational staff salaries, cost of energy and fuels, cost of treatment chemicals, cost of routine replacement of equipment and equipment parts, and other expenditures necessary to ensure effective and dependable operation over the life of the facility. Annual operation and maintenance costs should be averaged to account for variations which might occur year-to-year due to varying production or wastewater volume.

The salvage value of equipment, tankage, and materials from the treatment works is part of the present worth calculation. Salvage value is estimated using straight-line depreciation during the useful life of the project, and can generally only be claimed for equipment where it can be clearly demonstrated that a specific market or re-use opportunity will exist. Salvage value estimation should also take into account the costs of any restoration or decommissioning of treatment units and final disposal costs. It is possible in some cases that these costs may be high enough that the net salvage value will be negative.

Land purchased for the treatment works site is also assumed to have a salvage value at the end of the project useful life equal to its market value at the end of the analysis period. The local inflation rate for land in the use area should be used to project the market value at the end of the analysis period.

It is also important to evaluate any opportunity cost associated with different alternatives. Opportunity costs should not be considered for speculative growth or production increases claimed by an applicant. Any costs claimed should be clearly associated with integral portions of projects which are realistically available, and are otherwise locally approvable.

The discount rate used in the present worth or uniform annual cost calculation for public sewerage projects should be that rate published by DEP and associated funding agencies for the planning review and evaluation of water resource projects. This "federal discount rate" is available by contacting the federal U.S. Department of Treasury or can be obtained by contacting DEP's BWSWM, Division of Municipal Financial Assistance. For private sector projects, the interest rate utilized should be that rate at which the applicant can borrow funds. Since the present worth calculation is being performed more

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to compare alternatives rather than to obtain a very accurate estimation of actual costs, the fact that the same interest rate assumption be utilized for each alternative is more important than the actual interest rate selected.

Cost estimates have an associated level of precision. The cost estimates prepared by the project sponsor must be based on a current data for prices, values or costs associated with components of the project. The applicant is responsible for documenting and defending all cost estimates used in the analysis.

Cost estimate equations

The equations below are the basic expressions of the present worth and equivalent annualized cost concepts. Additional mathematical factors and apportionment of costs are incorporated into the equations where appropriate.

(1) The basic present worth calculation should be performed in accordance with the following equation:

$$P = C + O + [A * (P/A,d,n)] - S - L$$

where,
P = present worth
C = capital cost
A = annual operating costs
(P/A,d,n) = equal series present worth factor $[(1 + d)^n - 1] / [d (1 + d)^n]$
d = discount rate
n = useful life in years
S = present worth of salvage value of facilities
L = present worth of salvage value of land
O = opportunity costs (if any)

A gradient factor may be added into the equations to account for inflation of annual operating costs, as opposed to using an average value throughout the project life, by simply adding the additional following term onto the right hand side of the above equation :

$$[G*(P/G,d,n)]$$

where,
G = uniform increase in annual costs
(P/G,d,n) = present worth factor for a gradient =
$[(1- nd)[(1 + d)^n - 1] / [d^2 * (1 + d)^n]$.

(2) If the nondischarge alternative and the discharge alternative have different useful lives, the cost comparison may be performed using the Equivalent Uniform Annual Cost Method. The equation for this method is:

$$EUA = (C + O) * (A/P,d,n) + A - [(S + L) * (A/F,d,n)]$$

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where,
EUA = equivalent uniform annual cost
(A/P,d,n) = capital recovery factor $[(1+d)^n - 1] / [d (1 + d)^n]$
(A/F,d,n) = uniform series sinking fund factor $d / [(1 + d)^n - 1)]$

To add a gradient factor, the following additional term is simply added to the right hand side of the above equation:

$$[G*(A/G,d,n)]$$

where,
(A/G,d,n) = EUA factor for a gradient =
$[(1+d)^n - 1 - nd] / d * [(1 + d)^n -1]$.

Additional cost factors

Opportunity costs, while presented above as one-time present losses, may also have an annual lost revenue component, which could be accounted for by apportioning the costs as both up-front and annual costs.

In general, it is the responsibility of the applicant for a permit or approval to prepare detailed cost estimates for all appropriate and approvable discharge, nondischarge, and combination discharge/nondischarge alternatives. The cost estimates may be prepared by a licensed professional engineer, accountant, an economist, or other professional qualified in the field.

The sources and rationale for all data and assumptions must be clearly indicated. DEP will review the cost estimates for completeness, accuracy, and validity of assumptions. Where deficiencies are discovered, DEP will either request additional information or clarification from the applicant within the context of the permit application review process, or obtain the information on its own, or both. For sewage projects, this process generally occurs in the Act 537 planning review. Following the review process, DEP will advise the project sponsor on which nondischarge alternatives (or combination discharge/nondischarge alternatives) are cost-effective, and processing of an Act 537 plan review or permit application will proceed on that basis.

d. Selection of an Environmentally Sound and Cost-Effective Nondischarge Alternative

Each proposal on an HQ or EV watershed will have its own unique environmental sensitivities and cost considerations, and because of this, standardized criteria may not always fit the case. The preceding portions of this section described some of the environmental factors and cost tests which should be considered in an evaluation of alternatives. In most cases, it will be appropriate to look at all such factors, and to make a determination based on the overall picture. In other cases, there may be one over-riding environmental factor or cost consideration which is critical to the determination. In order to most effectively encourage applicant and public attention to nondischarge alternatives,

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where they would best serve the environment and constitute effective use of the applicant's resources, DEP will use an interactive decision-making process with the project proponents. The process follows these steps:

(1) As a first step in the evaluation process, a preliminary screening of alternatives will be performed by the applicant in consultation with DEP. This screening will remove from detailed evaluation those alternatives which are obviously cost prohibitive, technically infeasible, or environmentally unsound. This screening can be most effectively accomplished in a pre-application conference between the applicant and DEP. Alternatively, it may occur as part of the first technical review of the permit application package.

For public and private sewerage projects, the process will start in the first phases of Act 537 planning. In this process, the list of potential discharge, nondischarge, and combination discharge/nondischarge alternatives will be reduced to those which are reasonable, technically implementable, and not obviously cost prohibitive. Also, at this step of the process, the applicant and DEP will agree upon which environmental and cost factors should be further analyzed in detail for the remaining alternatives, and upon a method for comparison. The level of detail in this screening step will be scaled to the size and nature of the proposed activity.

(2) In the next step of evaluation, the environmental and cost factors for each of the remaining alternatives must be developed in detail, and a general ranking of the alternatives presented.

At a minimum the following environmental factors must be considered:

- Sensitivity of stream uses
- Need for low-flow augmentation of stream flow
- Sensitivity of groundwater uses in the area
- Potential to induce secondary water quality impacts (physical habitat alteration)
- System reliability, potential for upsets/accidents

Examples of cost factors to be considered are these:

- Direct comparison of present worth costs or equivalent annual costs
- User fees in relationship with ability to pay (public sector projects)
- Profit margin implications (private sector projects)

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(3) Rankings are to be done separately for the environmental factors pertinent to the case and for each applicable cost factor. Where a group of alternatives have equivalent cost estimates, the ranking should be judged to be equal. An overall rank should also be described for each alternative. Based upon these rankings and consideration to the preferences of the applicant and to public input as described below, DEP will select the allowable alternative or alternatives. Processing and review of plan approvals and permit applications will proceed on the basis of the selection.

e. Public Involvement in the Alternative Evaluation and Selection Process

Input from the public is encouraged as early as possible in the alternative evaluation process. DEP advises applicants to meet with public officials, local and regional planning agencies, economic development agencies, and watershed groups as part of the pre-application planning process. DEP will participate in these information exchanges, and may seek public input independently. In the case of public and private sewerage projects, this process should occur in the initial stages of Act 537 planning.

The early involvement of the public and local government is important because it can provide early identification of local and regional environmental and economic issues, so that they can be considered in the alternative screening and evaluation steps. Also, it will be useful to the applicant to learn which alternatives are most likely to be supported by the public during the official public comment period. The early receipt of information and ideas from the public can minimize the time and resources which may confront the applicant, while maximizing public acceptance of the project.

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CHAPTER 8

NON-DEGRADING DISCHARGES

1. Background

The purpose of this section is to provide a framework for discussion of concepts and approaches dealing with the test for non-degradation. This test, applied to proposed point source discharges to HQ and EV waters, is the criteria or screening process by which a determination is made as to whether or not a discharge will cause degradation. The test for non-degradation, in the context of Pennsylvania's antidegradation regulations, is applied simultaneously with the evaluation of nondischarge alternatives (see Chapter 7).

For discharges to HQ waters, if no cost-effective and environmentally sound nondischarge alternatives exist, the project sponsor must consider discharge treatment processes that will "...maintain and protect the existing quality of receiving surface waters..." including the use of "... the best available combination of cost-effective treatment, land disposal, pollution prevention and wastewater reuse technologies (ABACT)." This aspect of project review is discussed in detail in Chapter 9.

For discharges to EV waters, where no degradation of water quality is allowable, the criteria for the non-degradation test are critical. Pennsylvania's regulations and guidance recognize the possibility of discharges which do not cause degradation, and allows that such discharges, after passing extensive inter-governmental and public evaluation of their degradation potential, may be permittable on HQ or EV waters. Thus, it is necessary to develop objective criteria for a non-degradation test which are clear and workable.

2. Discussion

The definition of degradation and application of the non-degradation test have been the subject of considerable technical and analytical discussion. This section will provide some background information on the main approaches that have been used.

In the previous *Special Protection Waters Implementation Handbook* (1992), a strictly chemical interpretation defined degradation as "any adverse measurable change in the long-term average instream concentration of a chemical parameter of concern, caused by the discharge." This definition depended upon the interpretation of the term "measurable" and over the years, DEP's interpretation evolved from one based on the sensitivity of analytical methods to one based on evaluation of the statistical significance of the projected change. Both interpretations require a very accurate chemical characterization of the long-term average quality of the receiving stream as the baseline for evaluation of the measurable change.

Another version of a non-degradation test is called the "de minimis" test. This test identifies a percentage of the receiving stream's assimilative capacity that may be consumed before a pollutant load in the discharge is considered to be degrading. Thus, if each of the pollutants of concern uses less than the established "de minimis" percentage of assimilative capacity, as predicated by the water quality criteria, then the discharge meets the test and does not have to

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undergo further antidegradation review procedures. The "de-minimis" concept was used by EPA's Region VIII in its 1993 Antidegradation Manual, wherein a level of 5 percent is suggested as a "de minimis" guideline, rather than criteria, subject to other qualifications.

Other criteria, such as ratio of stream flow to discharge flow (dilution ratio), and duration of discharge, have also been used by states to serve as additional non-degradation test criteria. Some states have evaluated these criteria quantitatively (for example, determining that a dilution ratio of >100/1 is sufficient to assimilate an effluent without impact), while others apply such factors in a more subjective manner, on a case-by-case basis, eventually arriving at a "finding" of degradation or non-degradation.

EPA's Region VIII Antidegradation Manual supports this "finding" type process, but recommends that guidelines be established, and that all relevant information (dilution ratio, duration, degree of change in instream quality, nature of pollutants – conservative vs. non-conservative vs. persistent, percentage of assimilative capacity taken, degree of confidence in evaluation procedures, etc.) be considered. This type of evaluation is applied at the Tier 2 (HQ) level as a tool to screen out minor discharges which would pass antidegradation reviews.

Section 4.6 of EPA's Water Quality Standards Handbook (1994) provides that no new or increased discharges are allowed in Tier 3 waters (Outstanding National Resource Waters or ONRW) except for limited activities that result in temporary and short-term changes in the water quality of the ONRW. During the time of the "temporary degradation," according to this guidance, all practical means of minimizing such degradation shall be implemented.

After having considered a means of practical application of these possible approaches, DEP will use the following process to determine if a discharge is non-degrading.

3. DEP's Test for Non-Degradation of Water Quality

This evaluation is used to determine if a new or expanded discharge to an HQ or EV water will cause degradation or demonstrates a high potential to cause degradation. DEP uses a two-part test that evaluates all facets of the discharge's potential effect on the receiving stream to make this determination. The first part of this test evaluates each pollutant of concern that is contained in the discharge using statistical and water quality modeling procedures for appropriate parameters. The second part of this test evaluates other considerations, such as the nature of the pollutants, treatment reliability, discharge duration, and physical/location concerns. Together, these two evaluations provide a comprehensive basis for DEP's determination of whether or not the proposed discharge will maintain the quality of the receiving water. The following describes both parts of this evaluation in detail.

a. Part 1 Evaluation

This section describes the water quality modeling component of this evaluation. There are two conditions that must be satisfied: 1) existing quality must be maintained, and 2) instream water quality criteria must be met at the critical design condition. Two separate analyses must be conducted to make this determination. Both are discussed in detail later in this section.

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The assessment of whether or not a point source discharge together with any nonpoint sources will affect water quality is directly related to the technical and scientific ability to discern whether a change in stream quality will take place as a result of the discharge. The natural quality of surface waters is constantly changing and the use of long-term data assures that these variations are accounted for in the antidegradation permit review process. A change is adverse if it results in lower water quality. A change is measurable if the instream concentration of a pollutant exceeds the upper 95 percent confidence limit of the median value in the data set used to determine the instream water quality objective. The confidence limit and the statistical analysis used for this evaluation are explained below.

The median value is determined by ranking the available data on concentration values and choosing the middle value. This median value is used to define the instream concentration of a pollutant upstream from a proposed discharge. The minimum data set that can be used for this purpose is 24 samples collected over a 12 month period (see Chapter 5). However, data collected over multiple years at a lower sampling frequency can be used if DEP is assured that the complete stream hydrograph is represented and that adequate quality assurance measures were applied to collection and analysis of samples. A one-tailed confidence limit above the median specifies an upper boundary that, with some degree of certainty, is not exceeded by the median. DEP uses a 95 percent confidence limit to establish this upper boundary which represents a value that captures the median 95 percent of the time. With the exception of pH, this upper boundary of the median represents the instream water quality objective for defining the total allowable instream concentration of a pollutant after adding in the discharge.

The next step in the process is to develop instream goals protective of existing quality using a steady state model at a specified design stream flow condition. DEP uses the harmonic mean flow (Q_{HM}) condition to evaluate water quality characteristics representative of long-term average conditions over the range of natural flow variations. Q_{HM} is a statistically derived mean flow available from the USGS which calculates Q_{HM} data for all of its stream gauge stations. These values are posted on the website (pc13dpahrb.er.usgs.gov/flowstats/). If the website is not current, users are encouraged to contact the Information Specialist at the Pennsylvania District Office of the USGS at (717) 730-6916. Where no gauge exists on the stream in question, flows may be estimated using a gauge from a waterbody of similar size and geomorphology by translating the flow using a unit area basis (determine flow (CFS)/square mile at gauge and multiply that value by the watershed area above the point of proposed discharge). It can also be estimated based on default low-flow groundwater yield and translated to the harmonic mean flow (see technical guidance document, *PA Single Discharge Wasteload Allocation Program for Toxics and Other Substances*, DEP ID: 391-2000-011 available on DEP's website).

In order to perform the nondischarge alternatives analysis required in §93.4c(b) and to properly evaluate the feasibility of a non-degrading discharge (see Figure 3, Chapter 6), the project sponsor must receive preliminary effluent limits from DEP that are designed to protect the existing quality of the HQ receiving waters. DEP regional office staff will develop these limits based upon the more stringent of water quality modeling using data

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representing existing receiving water quality (as described above) or ABACT (as described in Chapter 9 and Appendices B-E).

Data used to describe instream quality may be derived from DEP reference stations, sampled over multiple years, or site-specific data collected as described above and in Chapter 5. DEP has analyzed water quality reference data for selected parameters at numerous reference stations throughout the Commonwealth. This process sets default water quality objectives for use as existing quality for these parameters in antidegradation waters state-wide. These default water quality objectives are listed in Table 3 and are to be used in the absence of valid, site-specific data. Because these default values were derived from very large, state-wide data sets with low variability, they are based on mean, rather than median concentrations. Since Table 3 does not represent an all-inclusive list of naturally occurring substances and reference station data is not site-specific, project sponsors may, at their discretion, collect site-specific data to develop instream water quality objectives for use in developing effluent limits. For naturally occurring parameters not listed in Table 3, the project sponsor must collect site-specific data to develop the appropriate water quality objective. In addition to the project sponsor, any interested party may submit timely data in support of development of a site-specific water quality objective. In all cases, sample collection and analysis must be conducted using protocols approved by DEP to ensure the generation of good quality information.

Where sufficient, site-specific, historical data exists, it must be used in lieu of default values.

TABLE 3
DEFAULT WATER QUALITY OBJECTIVES FOR HQ AND EV WATERS

SUBSTANCE	UPSTREAM CONCENTRATION (mean of data set) $C_{upstream}$	WATER QUALITY OBJECTIVE (upper bound on 95% conf. limit of mean) C_{Total}
Total Aluminum	107 µg/L	115 µg/L
Ammonia Nitrogen	0.027 mg/L	0.029 mg/L
C-BOD5	0.88 mg/L	0.91 mg/L
Total Copper	4.5 µg/L	4.6 µg/L
Total Iron	199 µg/L	230 µg/L
Total Lead	1.2 µg/L	1.4 µg/L
Nitrate/Nitrite Nitrogen	0.49 mg/L	0.51 mg/L
Phosphorus	0.023 mg/L	0.024 mg/L
Sulfate	22 mg/L	25 mg/L
Suspended Solids	8 mg/L	9 mg/L
Total Dissolved Solids	91 mg/L	96 mg/L
Total Zinc	8.2 µg/L	8.7 µg/L

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Evaluation of Discharge Impact on Existing Stream Quality

As part of an NPDES permit application the discharger must provide DEP a list of parameters that are known or suspected to be present in the discharge. As part of this list the discharger must also provide the expected influent and effluent concentrations of these pollutants, based on the technology they propose to install. These effluent values will be evaluated through DEP water quality analysis models to determine if they would degrade the stream. The water quality analysis modeling will be carried out at the Q_{HM} stream flow condition. All pollutants will be evaluated using water quality objectives derived from: 1) existing site-specific data, 2) a regional DEP reference site, 3) default values listed in Table 3, or 4) site-specific data collected by the applicant. These water quality objectives will be applied as the criteria that must be met instream. The discharge flow used for these evaluations is the hydraulic design capacity of the treatment facility.

The following mass balance equation illustrates how the data used in the statistical analysis are applied in the water quality modeling process.

$$(Q_{discharge} \times C_{discharge}) + (Q_{upstream} \times C_{upstream}) = (Q_{total} \times C_{total})$$

Solving for C_d we have:

$$C_d = \frac{(Q_{Total} \times C_{Total}) - (Q_{upstream} \times C_{upstream})}{Q_{Discharge}}$$

Variable	Definition
$Q_{discharge}$	Discharge Flow (permitted discharge flow or the maximum hydraulic design capacity of the treatment system)
$C_{discharge}$	Discharge Concentration (This is the factor solved for in the equation)
$Q_{upstream}$*	Instream flow above the point of discharge (appropriate design stream flow condition, i.e. Q_{HM})
$C_{upstream}$	Instream Concentration above the point of discharge (mean concentration value of the data set)
Q_{total}	Combined flow of the discharge and the stream below the point of discharge. (Sum of the discharge flow and upstream flow)
C_{total}	Concentration in the stream below the point of discharge (the water quality objective, which is the concentration represented by the upper bound of the 95 percent confidence of the data set)

*This value must be adjusted to reflect any water withdrawal (ground or surface) that reduces the stream flow above the point of discharge.

The value obtained when this equation is solved for discharge concentration represents the long-term allowable water quality limit that must be attained by the discharge. This value (except for dissolved oxygen) must be translated from a long-term average value to a monthly value for comparison with the anticipated effluent quality of the proposed

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treatment system to determine if the proposed discharge will meet existing, long-term, instream quality. Dissolved oxygen limits will be expressed as a minimum value not to be violated and need not undergo the above conversion.

The long-term average value is converted to a monthly value using a statistical approach found on page 103 of the EPA document "Technical Support Document for Water Quality Based Toxics Control." The formula for this conversion is shown along with a table. DEP uses the 99th percentile z value, assumes that the coefficient of variation is equal to 0.5, and the number of samples that would be taken on a monthly basis is 4. This produces a default Multiplier of 1.72 and is used in the equation shown below.

AML = LTA * Multiplier

AML - Average Monthly Limit
LTA - Long-Term Average
Multiplier - determined from table or equation shown below

$$\text{Multiplier} = e^{*}(z^{*}\sigma_n - 0.5^{*}\sigma_n^2)$$

$$\sigma_n^{2=}\ln(CV2/n+1)$$

CV = coefficient of variation = Standard Deviation/Mean

The formula shown above, or the table below can be used to determine the correct multiplier to use.

Multipliers used to translate Long-term average values to average monthly values.			
CV	**Multiplier**	**CV**	**Multiplier**
0.1	1.22	1.1	2.897
0.2	1.255	1.2	3.114
0.3	1.399	1.3	3.335
0.4	1.554	1.4	3.559
0.5	1.720	1.5	3.784
0.6	1.896	1.6	4.009
0.7	2.081	1.7	4.235
0.8	2.275	1.8	4.459
0.9	2.476	1.9	4.682
1	2.684	2	4.903

Evaluation of Discharge for Compliance with Water Quality Criteria

In addition to meeting the requirements for existing quality, all discharges must meet water quality criteria for the pollutants evaluated. This analysis is completed using DEP's models and the design flows listed in Chapter 96, Section 96.4(g). For NPDES permitting of sewage and industrial wastewaters, DEP uses the Q_{HM} for carcinogens and the $Q_{7\text{-}10}$ flow condition to evaluate the assimilative capacity of a stream for most pollutants which could affect aquatic life and for threshold human health pollutants. The

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$Q_{7\text{-}10}$ flow condition represents low-flow conditions which could be expected to occur once in 10 years. Use of these flows represents a 99 percent protection level, as specified in Chapter 96.3(c) relating to implementation of water quality standards.

These guidelines and the example analysis presented above are applicable to a single source discharge. If there is more than one source of the same pollutant in the stream reach, it may be necessary to evaluate the cumulative impacts of these sources. This is referred to as a multiple source/discharge analysis. The impacts of multiple sources on a stream reach will be handled on a site-specific, case-by-case basis.

If degradation is detected, the discharger will be required to implement corrective actions including modifications to treatment systems or installation of BMPs. In addition, the discharger may be subject to any administrative, civil or criminal actions deemed appropriate by DEP.

b. Part 2 Evaluation

The part 2 evaluation is a more subjective evaluation that is designed to account for factors other than the existing concentrations of pollutants in the stream. It is a sliding scale evaluation that considers the following factors:

(1) Nature of Pollutants
(2) Dilution Ratio/Assimilative Capacity
(3) Discharge Duration
(4) Treatment Reliability/Technology
(5) Siting and Other Environmental Considerations
(6) Beneficial Impact of Discharge

These topics are addressed below.

Nature of Pollutants

New or expanded discharges may not adversely impact the existing quality, or the chemical, physical, or biological integrity of EV or HQ waters absent SEJ. To that end, DEP's goal is zero discharge of non-naturally occurring substances or naturally occurring substances not documented to be present in the receiving stream. Documentation of existing receiving stream conditions prior to discharge and compliance with the "zero discharge" goal described above will be accomplished using the most sensitive analytical method approved by DEP. A list of commonly occurring natural parameters is shown in Table 4. Parameters listed in this table, and any other naturally occurring parameter documented to occur in the receiving stream, can be discharged in accordance with the permitting procedures outlined earlier in this chapter.

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TABLE 4
NATURALLY OCCURRING PARAMETERS

Alkalinity	Fecal Coliforms	Nickel	Selenium
Aluminum	Fluoride	Nitrate/Nitrite Nitrogen	Dissolved Oxygen
Ammonia Nitrogen	Hardness	Arsenic	Sulfate
5-day CBOD	Iron	Cadmium	Suspended Solids
Chloride	Lead	Phenols	Total Dissolved Solids
Copper	Manganese	Phosphorus	Zinc

Any pollutant not listed in Table 4 and introduced to the wastewater through the manufacturing or treatment process, or resulting from stormwater emanating from the site must be removed before discharge unless the applicant can demonstrate the substance is actually a naturally occurring component of the waterbody in question. The demonstration of non-degradation should document adequate treatment and control reliability/redundancy and contingency procedures. These provisions should be incorporated into the permit issued for such a proposal. The greater the degree of control, the more likely a discharge would be non-degrading. In the absence of an adequate control and reliability demonstration by the project sponsor, the potential for impact will disqualify the discharge as non-degrading.

Dilution Ratio/Assimilative Capacity

The dilution ratio is a measure of the surface water flow directly above a pollutant source divided by the pollutant source flow. The dilution ratio is taken into account when performing the mass balance model calculations that are used by DEP. The larger the dilution ratio, the greater is the available assimilative capacity and the likelihood that a discharge will be non-degrading. The smaller the dilution ratio, the greater the likelihood that physical impacts resulting from factors such as water depth, volume of flow or water velocity will exert negative impacts on the receiving stream or its biota.

Discharge Duration

For this evaluation, duration defines the length of time that the discharge would exist, as opposed to whether or not the discharge would be continuous or sporadic based on the type of treatment system. This draws a distinction between a temporary discharge (example: groundwater clean-up project or earth disturbance) vs. planned long-term discharges (sewage treatment plant, industrial discharge). The shorter the duration of the discharge, the more likely it will be considered non-degrading. Long-term discharges will not be precluded solely because of their duration as long as it can be demonstrated that they will not degrade water quality in the receiving stream.

Treatment Reliability/Proposed Technology

This is an evaluation of the treatment system's ability to operate reliably at a maximum efficiency with little chance of failure. The project sponsor must demonstrate, to DEP's satisfaction, the reliability and safeguards built into the process. The project sponsor

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must demonstrate that adequate steps have been taken to identify and minimize risks associated with the project. The more stable and reliable the treatment system, the more likely that the discharge would be considered non-degrading.

Siting and Other Environmental Considerations

The siting evaluation is based on the physical location of the treatment system and its surroundings. It focuses on a potential environmental impact such as a plant upset, chemical spill, accessibility of emergency response staff to the site, or proximity to other significant resources.

Other environmental considerations include impacts on instream aquatic habitat from physical inputs such as high volumes or velocity of discharge, the actual location and configuration of the outfall, or the physical impact of wastewater parameters like suspended solids as they deposit on the substrate. These and any other appropriate considerations will be included in the evaluation of whether a discharge is non-degrading or degrading.

If it is determined, during the evaluation of a permit application, that the effluent concentrations derived from the Part 1 evaluation described earlier in this Chapter and/or one or more of the factors considered in the Part 2 evaluation outlined above may not satisfy the goal of protecting the physical, chemical and biological integrity of the receiving waterbody, DEP will consider alternative approaches to establishing requirements for a non-degrading discharge. These may include establishing minimum dilution ratios, requiring treatment component redundancy, reducing or eliminating criteria compliance time or modeling using long-term average in-stream quality at $Q_{7\text{-}10}$ design stream flow.

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CHAPTER 9

ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES (ABACT)

1. Background

Section 93.4c.(b)(1)(i)(A) of the antidegradation regulations, pertaining to point source discharge proposals on HQ or EV waters, contains the following requirement:

"...If a nondischarge alternative is not environmentally sound and cost-effective, a new, additional or increased discharge shall use the best available combination of cost-effective treatment, land disposal, pollution prevention and wastewater reuse technologies."

This regulatory language provides a basis for antidegradation best available combination of technologies (ABACT) for point source discharges, applied by DEP as one of the "tests" of acceptability for proposed discharges to HQ or EV waters. The concept ensures that any proposed point source discharge to HQ or EV waters, allowable under all other conditions established in the regulation, meets stringent minimum technology-based standards of quality reflective of the best available combination of practices like land disposal, pollution prevention, wastewater reuse and others. It may also represent an appropriate level of treatment acceptable in HQ waters where SEJ has been demonstrated.

As evidenced in the citation above, the ABACT requirement for discharges to HQ or EV waters is applied in conjunction with the antidegradation requirement to utilize cost-effective and environmentally sound nondischarge alternatives (land disposal, wastewater recycle, wastewater minimization, etc.) when they are available. Other chapters of this guidance explain how DEP evaluates the feasibility (cost-effectiveness and environmental soundness) of nondischarge alternatives, and at what point in the generalized antidegradation review process these determinations are made (see Chapters 6, 7, and 8). These chapters also explain that, even if a total nondischarge alternative is not feasible, any partial nondischarge alternative (combination of nondischarge and discharge wastewater management) which is feasible must be utilized. If there are no nondischarge alternatives which are feasible, or if there is only a partial nondischarge alternative which is feasible, then the discharge alternative, or the discharge portion of the partial nondischarge alternative, may be further evaluated (see Figures 3 and 4 of Chapter 6).

2. Discussion

The first step in the evaluation of discharge alternatives is to evaluate the affordability of a non-degrading discharge (Figure 3). If this alternative is affordable, the project sponsor must ensure that the discharge will meet the more stringent water quality-based effluent limits or standards of technology established as ABACT for the type of discharge under consideration. This section provides a discussion of the general standards and guidelines for ABACT requirements for such proposals.

Because the goal of DEP's Antidegradation Program is to protect and preserve existing water uses and the quality of Pennsylvania's HQ and EV waters, the technologies required by ABACT

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reflect levels of reliability and effectiveness which are better than those in common use. Accordingly, the degree of treatment required under ABACT will generally be higher than regulatory minimums established in state and federal regulations for dischargers to waters which are not HQ or EV waters.

Examples of typical technology-based standards are the secondary treatment standards for sewage discharges established in 40 CFR Part 133, the NPDES federal effluent limit guidelines (ELGs) for industrial waste discharges established in 40 CFR Parts 400 through 471, or the standards for surface mining discharges in Title 25 Pa. Code Section 87.102. These standards were developed to meet less stringent criteria for cost and quality, because these standards have universal applicability. They are not, therefore, generally appropriate as ABACT standards for HQ or EV waters, and should not be confused with ABACT. Nevertheless, these effluent quality standards are useful "measuring sticks" for determining whether proposed discharges meet the higher levels of technology of ABACT.

ABACT is specific to discharge type and wastewater characteristics. Subsequent program specific appendices to this guidance present ABACT, as well as unique parameters and considerations to be evaluated for the other antidegradation requirements for each of the major discharge types (sewage, industrial wastes, mining, oil and gas, and municipal/residual wastes). In establishing program specific ABACT, or for cases which do not clearly fall into one of the above categories, DEP applies the following general principles:

- ABACT must generally provide a higher degree of water quality protection than that provided by technology-based effluent limits alone without employing technology that causes unacceptable adverse environmental impacts.

- ABACT must have a high degree of reliability and demonstrated effectiveness. Experimental or innovative methods may be acceptable if the proponent can demonstrate to DEP's satisfaction their appropriateness.

- ABACT should account for pertinent pollutants and water quality parameters associated with the discharge type under consideration.

- ABACT may be established as a list of required unit treatment processes and management practices, as treatment process performance expectations, or as a combination of both. Effluent limits are expressed in NPDES permits and unit treatment processes/management practices are outlined in Water Quality Management permits.

- ABACT should be flexible enough to account for case-specific or site-specific unique characteristics.

- ABACT should be cost-effective. The technology required should not be unaffordable to rate payers or cost prohibitive to the financial capability of the proposed activity.

Given these considerations, it is evident that the ABACT determinations must be made on a case-by-case basis, subject to the program specific guidelines included as Appendices to this

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guidance document. They will vary in flexibility depending on the program but in all cases, the general principles stated above must be met and all other antidegradation requirements must be satisfied.

As illustrated in the flowcharts depicting the generalized antidegradation process (Figures 3 and 4 in Chapter 6) meeting ABACT may not justify approval of a request to discharge to HQ or EV waters. Additional antidegradation tests must also be applied and met. In EV waters, a discharge at ABACT quality must meet the test for non-degradation of water quality. In HQ waters, a discharge at ABACT quality must meet either the test for non-degradation of water quality or have demonstrated SEJ for the degradation that will occur.

Appendices B-E contain the program specific guidelines and standards by which DEP will determine ABACT for individual proposals, including:

Appendix B – Wastewater Discharge
Appendix C – Waste Management
Appendix D – Mining
Appendix E – Oil & Gas

As the Antidegradation Program continues to evolve, DEP intends to expand and update this list of ABACT based upon emerging science and experience with new technologies.

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CHAPTER 10

SOCIAL OR ECONOMIC JUSTIFICATION (SEJ)

1. Background

The antidegradation requirements relating to SEJ are very important components of water quality protection for HQ waters. For proposed discharges to HQ waterbodies, if it has been determined that there are no cost-effective and environmentally sound nondischarge alternatives, or this alternative can only accommodate a portion of the wastewater, the discharge must either meet a test of non-degradation, or, when it cannot meet that test, demonstrate that the proposed degradation is socially or economically justified. In all cases, a discharge shall use ABACT and protect applicable Tier 1 water uses.

The regulatory requirements are established in §93.4c.(b)(1)(i)(B) which states:

> ***"(B) A person proposing a new, additional or increased discharge to High Quality or Exceptional Value Waters, who has demonstrated that no environmentally sound and cost-effective nondischarge alternative exists under clause (A), shall demonstrate that the discharge will maintain and protect the existing quality of receiving surface waters, except as provided in subparagraph (iii)."***

and in subparagraph §93.4c(b)(1)(iii) which states, in part:

> ***" (iii) Social or economic justification (SEJ) in High Quality Waters. The Department may allow a reduction of water quality in a High Quality Water if it finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the Commonwealth's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located…"***

Finally, the regulations establish some special provisions relating to SEJ for sewage facilities proposed in HQ waters, in §93.4c(c)(1) and (2):

> ***"(1) SEJ approval in sewage facilities planning and approval in High Quality Waters. A proponent of a new, additional, or increased sewage discharge in High Quality Waters shall include an SEJ impact analysis as part of the proposed revision or update to the official municipal sewage facilities plan under Chapter 71 (relating to administration of sewage facilities planning program). The Department will make a determination regarding the consistency of the SEJ impact analysis with subsection (b)(1)(iii). The determination will constitute the subsection (b)(1)(iii) analysis at the National Pollutant Discharge Elimination System (NPDES) permit review stage under Chapter 92 (relating to National Pollutant Discharge Elimination System), unless there is a material change in the project or law between sewage facilities planning and NPDES permitting, in which case the proponent shall recommence sewage facilities planning and perform a new social or economic justification impact analysis.***

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(2) SEJ for sewage facilities in High Quality Waters correcting existing public health or pollution hazards. A sewage facility, for which no environmentally sound and cost-effective nondischarge alternative is available under subsection (b)(1)(i)(A), proposed to discharge into High Quality Waters, which is designed for the purpose of correcting existing public health or pollution hazards documented by the Department, and approved as part of an official plan or official plan revision under §71.32 (relating to Department responsibility to review and act upon official plans), satisfies the SEJ requirements in subsection (b)(1)(iii)."

Important information and explanation is also included in the preamble to DEP's regulations, as published in the *Pennsylvania Bulletin* on July 17, 1999 (29 Pa.B. 3720). The preamble explains that by tracking the language of the federal antidegradation regulations (40 CFR §131.12) which contain the phrase "important economic or social development," and in light of the interpretation which has been given to that phrase in federal guidance and policy, the SEJ analysis should be a "balancing" type evaluation. In such an evaluation, the asserted beneficial social or economic development must be viewed in light of, and weighed against, the degree of water quality degradation that the discharge and the proposed activity are projected to cause.

Historically, DEP guidance for the evaluation and review of SEJ has consisted of a checklist of economic and social factors to be considered on a case-by-case basis. Guidance used in other states is similar to DEP's in that it generally consists of various social and economic factors which are to be taken into account, subjectively, on a case-specific basis. EPA's *Interim Economic Guidance for Water Quality Standards, 1995, Appendix M to the Water Quality Standards Handbook*, also reinforces this type of approach, as evidenced by these excerpts from the antidegradation chapter: "There are no economic ratios per se that determine whether a development would be considered important" and "While there are no explicit criteria, it is recommended that changes in the socioeconomic indicators be considered."

Given this brief background, the following chapter will outline the process, including public participation, for the evaluation of SEJ demonstrations in Pennsylvania.

2. SEJ Evaluation Process Overview

Figures 3 and 4 in Chapter 6 illustrate the planning/permitting process used by DEP to review applications for discharges to HQ and EV waters. The importance of public participation in this process is recognized by inclusion of early and frequent opportunities for public review and comment. This aspect of the process is discussed in Chapter 12. It should also be noted that the evaluation of the siting of the project, other nondischarge alternatives and, if necessary, the evaluation of non-degrading discharge alternatives occurs early in the process and may obviate the need for submission of an SEJ by finding a viable alternative to a degrading discharge to an HQ water. These factors are discussed in Chapter 7.

a. Factors to consider in determining the need for and subsequent development of SEJ

Definition of affected area for social or economic impact

If it is concluded that a degrading discharge to an HQ water is the only option for the proposed project/activity, DEP "*...may allow a reduction of water quality*" if it finds "*...that allowing lower water quality is necessary to accommodate important economic*

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or social development in the area in which the waters are located (see page 1 of this Chapter and §93.4c(b)(1)(iii) of DEP regulations)." This language suggests DEP define a geographic area in which it will focus its SEJ evaluation. Since most discharges to HQ waters involve the construction of housing, small businesses, or retail operations, it is reasonable to define "area" using the distance most people are willing to travel to work or to shop as the radius of a circle of influence for the project. However, since most information sources readily available to DEP are organized by political subdivisions (county or local), a reasonable approach to this circle of influence is to define the area as the county or counties in which the HQ waters are located plus all contiguous counties.

This approach accommodates projects located near the boundary with a neighboring county and will be the method applied by DEP unless the applicant can demonstrate that a larger or smaller area is appropriate for the complete and accurate consideration of all social or economic factors involved with the permit application.

If an applicant seeks a SEJ and submits a request for a degrading discharge on behalf of important development projected to occur in the area where the HQ waters are located, a balancing type of evaluation is conducted by DEP. Criteria described later in this chapter are used to assess the relative weight of the social or economic benefits of the proposal against the degree of degradation it is expected to cause. The burden of proof is on the project/activity sponsor to document and demonstrate that the benefits of the proposal outweigh the environmental impacts of lower water quality.

If a degrading discharge to HQ waters is ultimately approved, the permit will be issued to ensure that the amount of degradation is minimized and specifically limited through enforceable permit conditions and the implementation of best available technologies and management practices. The new or expanded discharge will be required to comply with the more stringent of ABACT or water quality-based effluent limits designed to protect applicable (Tier 1) water uses, whichever is more protective.

The factors listed in the following section must be considered in the analysis. The attached SEJ submission guideline (Table 5) is included to assist the applicant in submitting a complete request as well as to aid DEP staff in evaluating these factors.

The table is divided into two parts, Water Quality Considerations and Social or Economic Considerations. Each section lists a series of factors to be considered in evaluating the positive or negative impacts of a proposed project. Only those factors applicable to a given project are considered and each is reviewed with respect to its positive or negative impact on the decision. After all the listed factors and any additional case-specific issues have been considered, a brief narrative summary is developed by DEP's review staff to document the rationale supporting approval or denial of the SEJ submission. It should be noted that, in some cases, selected impacts or benefits may be more important than others. Review and concurrence on each SEJ evaluation by the Division of Water Quality Assessment and Standards will ensure statewide consistency.

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b. Factors to consider in the balancing of social or economic development against potential water quality impact

The next step in the SEJ evaluation process is to weigh the social or economic benefit of the action against the water quality degradation that may result. This detailed review considers the effects on water quality from wastewater discharges, stormwater discharges, water withdrawal, solid waste sources, and any other potential effects of development associated with the proposal. As stated above, under the regulation, DEP decides when proposed economic or social development is important enough to justify allowing lower water quality in HQ waters. The regulation provides for balancing the environmental impact against the social or economic benefits of a proposed discharge. It is intended to allow some lowering of water quality in HQ waters only under those circumstances where the economic or social need for a project outweighs the benefit of maintaining the existing water quality, and both cannot be achieved. Under no circumstances can water quality be degraded below the water quality standards established for uses other than HQ or EV set forth in Chapter 93.

Table 5 list illustrates the kinds of factors to be considered in evaluating SEJ. It should be noted that this list is not all inclusive and additional factors will be considered on a case-by-case basis. Applicants must address the appropriate categories listed in Table 5 in their SEJ submittal.

c. Review and decision responsibility for SEJ determinations

In the Water Management Program, responsibility for review of SEJ submissions rests with a statewide SEJ review team comprised of one representative from each of DEP's six regional offices and one staff member from the Division of Water Quality Assessment and Standards in central office. The members are selected to insure that the following programs areas are represented:

- Surface water quality monitoring (biological, physical, chemical)
- Groundwater protection (quality and quantity)
- Wastewater treatment plant operation (process technology/reliability)
- Wastewater management (planning and permitting)
- Surface water management (nonpoint source controls, hydraulics, channel morphology)
- Antidegradation Program Policy and Procedures

These persons will review all SEJs submitted in the Water Management Program throughout the state and will make recommendations to the Regional Water Quality Manager who has final decision authority. Each team member reviews the SEJ submission independently before the team is assembled to discuss the factors relevant to the review. The result of the team's deliberations are then summarized in a memorandum

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to the Regional Water Quality Manager with a recommendation to approve or deny the request for SEJ. Coordination with other program areas such as solid waste and environmental clean-up is effected as needed.

SEJs submitted in support of oil and gas well operations will be reviewed by regional staff in the Bureau of Oil and Gas Management program area as part of the NPDES permit application. The Regional Oil and Gas Program Manager is responsible for making the final decision in consultation with the Regional Water Quality Manager.

Because the mining program is located in a separate set of District Mining Offices, analysis of SEJs submitted for mining discharges is conducted independently by district mining office staff. They make recommendations to the District Mining Manager who is responsible for making the final decision on mining projects, in consultation with the Regional Water Quality Manager.

Staff in BWSWM are available for consultation on all SEJs, as needed, and all SEJ determinations must receive a consistency review and concurrence by the Chief of the Division of Water Quality Assessment and Standards before DEP's decision can be made public. The Division Chief will maintain a file of all SEJs for historical purposes. This lends statewide consistency to SEJ decision-making and helps ensure compliance with policy or procedure relating to this aspect of the Antidegradation Program.

Public notice that SEJ has been demonstrated is published with the draft NPDES permit notification.

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TABLE 5
SEJ EVALUATION FACTORS

The following questions must be fully and accurately addressed in the SEJ submission. All required information must be typed or legibly printed. Each attached sheet used to answer the questions below must include the item number and the date prepared. Items not applicable to the proposed project must be so noted. The "affected area" referenced in social and economic considerations consists of the county in which the project will exist and all contiguous counties. All statements in support of social or economic considerations must include reference to the magnitude and duration of the purported benefit.

General References: Title 25 Pa. Code Section 93.4c(b)

Applicant/permittee:
Location of point source:

WATER QUALITY CONSIDERATIONS

1. **Sensitivity of Water Use**

   Discuss whether the waterbody and its uses are vulnerable to the proposed discharge. Will the discharge impact recreational water uses as defined in Chapter 93 or use of the waterbody as a source of drinking water? If so, how? What aquatic life use will be affected by the proposed project and to what extent? Does a search of the Pennsylvania Natural Diversity Inventory indicate that the waterbody supports threatened or endangered species or provide critical habitat for those species?

2. **Nature of Pollutants**

   Identify proposed pollutants and describe the potential impact they are likely to have on the waterbody. Are the pollutants substances that will be introduced to the waterbody for the first time? Are they toxic to humans or fish and aquatic life? Discuss whether the pollutants are long-lived in the environment or whether they will concentrate in sediments, or aquatic plant/animal tissues.

3. **Proposed Degree of Change in Water Quality**

   Based on the wastewater treatment technology proposed, discuss the degree of change the proposed discharge is likely to cause in instream quality. Meet with DEP regional office permitting staff to determine if all the assimilative capacity available for assignment to this proposed discharge will be utilized or if the proposed treatment process will produce an effluent better than the minimum allowable to protect water uses.

4. **Proximity to Wetlands or Floodplains**

   Describe the potential hydrologic and biologic impact of the proposed project with respect to any wetlands present within the proposed permit area. Wetlands must be identified using the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual. Current wetland identification and delineation procedures are available from DEP regional offices. A determination must also be

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made as to whether the wetlands are EV according to Chapter 105. Identify the functions and values of the wetlands as defined in §§105.1. Will the floodplain be reduced in size or function because of the proposed project?

5. **Discharge Characteristics**

Identify any potential long-term impacts from the proposed project. Discuss whether the proposed discharge will be short-term or permanent. Will the discharge originate from a facility that produces wastewater continuously, except for shutdowns to accommodate maintenance or process changes, or will the discharge be intermittent such as discharges induced by activities such as boiler blow-down, batch operations, prophylactic use of therapeutic chemicals (fish cultural facilities) or the use of anti-biofouling additives in cooling waters?

6. **Reliability of Treatment Technology**

Describe the proposed treatment system and its expected performance and reliability. Is the technology mechanical or natural? If mechanical, is it an experimental technology? Has the technology been proven to work in other applications? If yes, identify successful applications. Describe the energy or maintenance requirements of the technology.

7. **Additional Impacts**

Discuss other positive or negative impacts that could result from the proposed project. Will the proposed discharge result in an environmental improvement such as the release of cool water from a quarry into a trout fishery or a stream that is losing surface flow in karst geology? Will the proposed discharge be to waters not currently receiving wastewater discharges? Will the proposed project affect previously undisturbed lands or result in reclamation or clean-up of previously disturbed or polluted lands? Describe how the project will affect groundwater recharge/stream base flow, receiving stream hydrology/morphology, nonpoint source loading, and instream temperatures? Discuss any cumulative impacts on the waterbody caused by this proposed project in conjunction with other existing activities.

8. **Compliance Record**

a. Does the applicant operate other facilities authorized by an NPDES permit in Pennsylvania? If yes, identify those facilities and indicate whether they are in compliance with effluent limits and other permit conditions.

b. If noncompliance is indicated above, explain the nature and impact of the violations including information describing whether the violations are current or historical.

9. **Other Factors**

Identify any other information pertinent to the water quality impacts of this project.

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SOCIAL OR ECONOMIC CONSIDERATIONS

1. **Effect on Public Need/Social Services**

   Identify any public services, including social services, that will be provided to or required of the communities in the affected area as a result of the proposed project. Explain any benefits that will be provided to enhance health/nursing care, police/fire protection, infrastructure, housing, public education, etc.

2. **Effect on Public Health/Safety**

   Identify any health and safety services that will be provided to or required of the communities in the affected area as a result of the proposed project. Explain any benefits that will be provided to enhance food/drinking water quality, control disease vectors, or to improve air quality, industrial hygiene, occupational health or public safety, including the benefits resulting from reclamation of abandoned mine land hazards.

3. **Effect on Quality of Life**

   Describe the impacts of the proposed project on the quality of life for residents of the affected area with respect to educational, cultural and recreational opportunities, daily life experience (dust, noise, traffic, etc.) and aesthetics (viewscape).

4. **Effect on Employment**

   Explain the impacts of the proposed project on employment practices in the affected area. Identify the number and type of jobs projected to be gained or lost as a result of the proposed project. Will the proposed project improve employment or mean household income in the affected area? Explain.

5. **Effect on Tax Revenues**

   Explain the impact of the proposed project on tax revenues and local or county government expenditures in the affected area. Will the project change property values or the tax status of properties? If yes, explain whether that change is a beneficial or detrimental to residents/businesses in the affected area.

6. **Effect on Tourism**

   Discuss the effects the proposed project may have on the economy of the affected area by creating new or enhancing existing tourist attractions. Conversely, describe any impacts resulting from the elimination of or reduction in existing attractions.

7. **Other Factors**

   Provide any other information that would explain why it is necessary to lower water quality to accommodate this proposed project. This category should be used to address any social or economic factors not considered above.

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CHAPTER 11

NONPOINT SOURCE CONTROLS

1. Background

The regulation at Title 25 Pa. Code §93.4c(b)(2) provides that:

"The Department will assure that cost-effective and reasonable best management practices for nonpoint source control are achieved."

Nonpoint source pollution is a pervasive problem, affecting surface and groundwater quality in both urban and rural areas. It is diffuse and is caused primarily when rain water and snowmelt flow over (and through) the ground that has been disturbed by some sort of land use, such as farming, logging operations, urban development, solid waste disposal, and other similar activities. This "runoff," if not properly controlled, can carry pollutants from these sites and deposit them in nearby surface waters and/or the groundwater. Nonpoint source pollution can also come from leaking storage tanks or septic systems and atmospheric (dry and wet) deposition. Nonpoint sources, like air deposition which causes impacts far outside watershed boundaries, cannot be directly managed in the water quality program and are not discussed in this guidance.

DEP regulations at §93.1 define a nonpoint source as "- a pollution source which is not a point source discharge." The same section of the regulation defines a point source discharge as "- a pollutant source regulated under the National Pollutant Discharge Elimination System (NPDES)." Some activities that have traditionally been considered nonpoint sources have, in recent years, been incorporated under federal regulation into the NPDES program as regulated point source discharges. This includes construction activities between one and five acres with a point source discharge, all construction activities disturbing greater than five acres, concentrated animal feeding operations (CAFOs) and other industrial stormwater discharges. DEP will continue to regulate and manage these activities using a BMP approach in the context of these permits.

The pollutants that arise from precipitation induced sources are as varied and numerous as the sources themselves and can have significant economic and recreational impacts on a community. These impacts can be expressed in terms of lower property values, loss of fisheries, loss of wildlife habitat, loss of flood control potential, closed swimming beaches, and expensive treatment of drinking water. To minimize these impacts, Pennsylvania requires the implementation of erosion and sediment control, nutrient management and stormwater management BMPs under the federal Clean Water Act, the Pennsylvania Clean Streams Law, the Nutrient Management Act, and the Stormwater Management Act. The following discussion provides a brief overview of DEP's nonpoint source program. As changes are made, text will be added to this guidance to keep pace with those program developments.

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2. Discussion

Nonpoint Source Control - Construction Activities (including Waste Disposal and Resource Extraction)

Chapter 102 (Erosion and Sediment Control) requires persons conducting earth disturbance activities to develop, implement, and maintain BMPs in order to minimize the potential for accelerated erosion and sedimentation and to protect, maintain, reclaim, and restore water quality and existing and designated uses of waters of the Commonwealth. In particular, under Section 102.4(b), earth disturbance activities other than agricultural activities, regardless of size, which may result in a discharge to HQ or EV waters shall use Special Protection BMPs to maintain and protect the water from degradation. Persons planning or conducting such activities must consider minimizing the amount of disturbance, maintaining (or installing) riparian buffer strips, and implementing other water quality protective measures including installation of multiple or redundant BMPs in an effort to enhance overall performance and maximize water quality protection. Special Protection BMPs (§102.4(b)(6)) which are required, unless a suitable alternative is proposed and approved, include, but are not limited to: (1) adopting special sediment basin requirements, (2) lining channels, collectors, and diversions with vegetation, rock, geotextile, or other nonerosive materials, and (3) immediately stabilizing disturbed areas upon completion or temporary cessation of an earth disturbance activity. Persons proposing earth disturbance activity which may discharge into an HQ or EV water may propose alternative BMPs to those specified in Section 102.4(b) on a case-by-case basis as long as the BMPs will maintain and protect existing water quality and existing and designated uses. These alternative BMPs can be utilized if approved by DEP or a delegated county conservation district.

Nonpoint Source Control - Agricultural Activities

All agricultural operations in HQ or EV watersheds must be conducted in compliance with the requirements of the Pennsylvania Clean Streams Law, the Nutrient Management Act, the Stormwater Management Act, and DEP rules and regulations listed in Chapter 102 relating to erosion and sediment control, Chapter 83 relating to nutrient management, Chapter 91 in sections relating to land application of manure, Chapter 92 in sections relating to requirements for concentrated animal feeding operations, and Chapter 105 relating to dam safety and waterway management. Information on the development or updating of conservation plans to meet the requirements of Chapters 83 and 102 can be obtained from county conservation districts as well as local Natural Resource Conservation Service offices. Compliance assistance and information on regulations can be obtained from DEP regional offices.

Nonpoint Source Control - Post Construction Activities

In HQ and EV watersheds, the post-construction stormwater management plan required by DEP should be based upon a comparative pre- and post-construction stormwater management analysis. Using this analysis, planners and applicants can ensure that existing water quality will be protected and maintained by demonstrating that post-construction infiltration equals or exceeds pre-construction infiltration and that any post-construction discharge will not degrade the physical, chemical, or biological characteristics of the HQ or EV water. In these special protection watersheds, infiltration BMPs should be used to the maximum extent possible. To the extent that planners and applicants cannot totally infiltrate stormwater to pre-construction

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volumes due to site conditions or limitations, off-site compensation projects in the same watershed and preferably upstream of the project site should be evaluated and employed to protect and maintain water quality. Additionally, water quality treatment BMPs must be employed where necessary to ensure the protection and maintenance of water quality. Finally, the volume and rate of stormwater discharges must be managed to prevent the physical degradation of receiving waters, such as scour and streambank destabilization (Appendix F).

For nonpoint sources, DEP along with other agencies and organizations, will provide technical, financial, and educational assistance opportunities as described in *Pennsylvania's Nonpoint Source Management Program*, DEP ID: 394-2000-002, available on DEP's website. Follow-up monitoring and compliance activities will be conducted by DEP and selected county conservation districts.

Program Specific Considerations

In addition to the general considerations listed above, the following references provide additional, program-specific information relating to BMPs for various activities frequently pursued in Pennsylvania. These practices, or acceptable substitutes, should be employed in all HQ and EV watersheds. It should be recognized that some of the activities for which program-specific guidance has been developed may constitute point sources for which a permit is required under the NPDES program. These activities may be subject to the requirements and controls of that program in addition to, or in lieu of, direction discussed in the following program guidances. The listing of and reference to the program guidances below does not excuse a person from any requirements specified in applicable federal or state laws or regulations. All documents listed below with a DEP ID number can be found on DEP's website at www.dep.state.pa.us .

General Construction/Land Development
Erosion and Sediment Pollution Control Program Manual, DEP ID: 363-2134-008.

Pennsylvania Handbook of Best Management Practices for Developing Areas, Pa. Association of Conservation Districts, Keystone Chapter; Soil and Water Conservation Society, PA DEP and NRCS, 1998. Available at www.pacd.org .

Pennsylvania's Nonpoint Source Management Program, DEP ID: 394-2000-002.

Comprehensive Stormwater Management Policy, DEP ID: 392-0300-002, (see Appendix F).

Timber Harvesting
Controlling Erosion and Sediment from Timber Harvesting Operations, publication 3930-BK-DEP2322 available on DEP's website.

Resource Extraction
Engineering Manual for Coal Mining Operations, DEP ID: 563-0300-101.

Oil and Gas Operators Manual, DEP ID: 550-0300-001.

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Waste Management
Engineering Field Manual for Conservation Practices, U.S. Department of Agriculture, Natural Resources Conservation Service, 1984 (w/amendments). Available at www.nrcs.usda.gov .

Agricultural Practices
Pennsylvania Soil and Water Conservation Technical Guide, *Natural Resource Conservation Service, 1991.* Available at www.nrcs.usda.gov .

Manure Management for Environmental Protection, DEP ID: 361-0300-001.

Field Application of Manure, DEP ID: 361-0300-002.

Pennsylvania's Nutrient Management Act Program Technical Manual, State Conservation Commission, October 1998. Available at www.psu.edu .

BMP Manual for Pennsylvania Livestock and Poultry Operators, State Conservation Commission. Available at www.agriculture.state.pa.us .

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CHAPTER 12

PUBLIC PARTICIPATION

1. Background

The antidegradation regulation offers opportunities for public participation at several pivotal times in the process. The purpose of this chapter is to provide a single reference for persons who are interested in remaining informed of changes in the existing and designated uses of waters of the Commonwealth and who wish to know the appropriate times in the process at which to provide data and comments to DEP. The public comment opportunities are also noted in the individual chapters of this guidance that address particular phases of assessment, existing use determinations, the permitting process, and designation of uses by the EQB. DEP is committed to seeking and using public input in carrying out all program responsibilities.

The antidegradation regulation provides the following with regard to public participation:

25 Pa. Code §93.4c. Implementation of antidegradation requirements.

"(a)(1) (i) Existing use protection shall be provided when the Department's evaluation of information (including data gathered at the Department's own initiative, data contained in a petition to change a designated use submitted to the EQB under §93.4d(a) (relating to processing of petitions, evaluations and assessments to change a designated use), or data considered in the context of a Department permit or approval action) indicates that a surface water attains or has attained an existing use.

(ii) The Department will inform persons who apply for a Department permit or approval which could impact a surface water, during the permit or approval application or review process, of the results of the evaluation of information undertaken under subparagraph (i).

(iii) Interested persons may provide the Department with additional information during the permit or approval application of review process regarding existing use protection for the surface water.

* * * * *

(b)(1)(ii) Public Participation requirements for discharges to High Quality or Exceptional Value Waters. The following requirements apply to discharges to High Quality or Exceptional Value Waters, as applicable:

(A) The Department will hold a public hearing on a proposed new, additional, or increased discharge to Exceptional Value Waters when requested by an interested person on or before the termination of the public comment period on the discharge.

(B) For new or increased point source discharges, in addition to the public participation requirements of §§92.61, 92.63 and 92.65 (relating to public notice of permit application and public hearing; public access to information; and notice to other government

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agencies), the applicant shall identify the antidegradation classification of the receiving water in the notice of complete application in §92.61(a).

(iii) Social or economic justification (SEJ) in High Quality Waters. The Department may allow a reduction of water quality in a High Quality Water if it finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the Commonwealth's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. A reduction in water quality will not be allowed under this subparagraph unless the discharger demonstrates that the High Quality Water will support applicable existing and designated water uses (other than high quality and exceptional value uses) in §93.3, Table 1 (relating to protected water uses).

* * * * *

(c)(3) Public participation requirements for official sewage facilities plans or revisions to official plans in High Quality or Exceptional Value Waters. A proponent of a sewage facility in High Quality or Exceptional Value Waters seeking approval of an official plan or revision shall comply with the public participation requirements in §71.53(d)(6) (relating to municipal administration of new land development planning requirements for revisions).

25 Pa Code §93.4d. Processing of petitions, evaluations and assessments to change a designated use.

(a) Public notice of receipt of evaluation, or assessment of waters, for High Quality or Exceptional Value Waters redesignation. The Department will publish in the Pennsylvania Bulletin and in a local newspaper of general circulation notice of receipt of a complete evaluation which has been accepted by the EQB recommending a High Quality or Exceptional Value Waters redesignation, or notice of the Department's intent to assess surface waters for potential redesignation as High Quality or Exceptional Value Waters. The assessments may be undertaken in response to a petition or on the Department's own initiative. The notice will request submission of information concerning the water quality of the waters subject to the evaluation, or to be assessed, for use by the Department to supplement any studies which have been performed. The Department will send a copy of the notice to all municipalities containing waters subject to the evaluation or assessment.

(b) Combined public meeting and fact-finding hearing. As part of its review of an evaluation or performance of an assessment, the Department may hold a combined public meeting and fact finding hearing to discuss the evaluation or assessment, including the methodology for the evaluation or assessment, and may solicit information, including technical data, to be considered in the Department's evaluation or assessment.

(c) Submission to EQB to alter designated use. Upon the completion of its assessment or review of a complete evaluation, and the satisfaction of the other applicable requirements of this section, the Department will submit the results of its assessment or review to the EQB for proposed rulemaking following review and comment by the petitioner, if

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applicable, in accordance with Chapter 23 (relating to Environmental Quality Board policy for processing petitions—statement of policy)."

2. Submittals to Change the Designated/Existing Use of a Waterbody

Persons or organizations may request evaluation of a waterbody by DEP in the following way:

- **Petition to the EQB**: A person, group, organization, or local government may at any time submit a petition for redesignation of a waterbody to the Secretary of DEP (who serves as the Chairman of the EQB) as provided in Chapter 23, the EQB policy for processing petitions—statement of policy. Chapter 23, which is available for viewing on the website at www.pacode.com or from DEP, lists the elements needed to complete a petition. Chapter 4 of this guidance discusses the requirements. As part of a petition, if a person or group gathers sufficient, quality data, they may submit a complete evaluation of the water quality of a watershed or segment of a stream to the EQB. The evaluation report must document all required elements and meet DEP's criteria for completeness and quality assurance, as provided for in Chapter 93 of DEP regulations. These elements are described in DEP's quality assurance project plan for HQ/EV evaluations available upon request.

- DEP may also initiate actions to assess waters for possible redesignation on its own or in response to requests from another agency.

All assessments and evaluations which are performed by DEP for the purpose of determining the appropriate classification of a waterbody are subject to the public notice provisions of the regulations which provide broad opportunities for public input.

3. Public Participation in Assessment/Evaluation of Existing Uses

The evaluation of the existing use of a waterbody considers the nature, quantity, and quality of all existing and readily available data which DEP gathers (see Appendix A) or receives. Submittals containing complete support for an existing use determination must contain all the required information and follow the procedures outlined in DEP protocols. Agencies, organizations, and individuals may provide data to support the position that the existing use differs from the designated use, or provide enough information to recommend that a waterbody warrants an existing use evaluation.

DEP Notice: As part of the planning process for an assessment or evaluation and in accordance with §93.4d(a), DEP publishes a notice in the *Pennsylvania Bulletin* and in a local newspaper, and notifies all municipalities, county planning commissions and, when applicable, petitioners in the watershed. The notice solicits technical data on water quality, instream habitat, or the biological condition of the stream for use in the DEP assessment (see Chapters 4 and 5, and Appendix A).

DEP may also hold public meetings and/or fact-finding hearings to share information and solicit more data, as provided by §93.4d(b). Notice of meetings and hearings is also published in the *Pennsylvania Bulletin* and in a local newspaper.

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In response to the notice, persons may submit data to DEP for consideration in the evaluation of a waterbody.

Draft Stream Evaluation Reports: Following evaluation of all valid data, DEP prepares a draft evaluation report. DEP distributes the draft report to all potentially affected municipalities, county planning commissioners and, if applicable, to the petitioner, providing 30 days to comment. The draft report is also put on DEP's website for public comment. This is another opportunity for persons to submit comments and data in support of a stream's uses.

Existing Use List: DEP maintains a publicly accessible list of surface water segments where data has been collected or evaluated which indicates that the existing use differs from the designated use (including those segments which are HQ or EV). The list is maintained on DEP's website by BWSWM. This listing will be used by the public in preparation of permit applications, and by DEP and county conservation district staff with responsibility to protect surface water quality in reviewing requests for permits and approvals. The public may also access the list for current information on streams of interest.

Waterbodies on this list are compiled into rulemaking actions for the EQB to consider DEP's recommendation on the designated use of the water. These rulemakings are subject to extensive public notice and input opportunities before finalization, as discussed below.

DEP considers all comments and prepares a report and recommendations to the EQB for proposed rulemaking on redesignation. If any changes are made to the original draft, the revised report is sent to the petitioner, local municipalities, county planning commissioners, and it also replaces the previous draft report on DEP's website. If no changes are made, the report remains on the website until the Board concludes its action.

4. Public Participation During Permit or Approval Requests

Act 537 Plans: Section 93.4c(c)(3) reiterates the requirement of §71.53(d)(6) that an applicant or his agent provide proof of publication in a local newspaper of a sewage facility plan or revision if sewage facilities are proposed to discharge into HQ or EV waters. The newspaper notice shall notify the public where the plan is available for review, indicate the location of the planning area, and include the antidegradation classification of the receiving water. The notice includes the plan's major recommendations, including a list of the sewage facilities alternatives considered, and provides for a 30-day public comment period. A copy of written comments received and the municipal response to each comment shall be submitted to DEP with the plan.

NPDES Application: An applicant for a new permit to discharge treated industrial wastes is asked to identify the antidegradation classification of the receiving water in a notice published in a local newspaper for four consecutive weeks prior to submittal of an NPDES application. Applicants for new sewage discharges and sewage and industrial waste permit renewals are required to provide notification to county and local governments that permit action is pending. The application for and authorization of general permits for construction stormwater are published simultaneously in the *Pennsylvania Bulletin*. Individual construction stormwater permit applications and final decisions are published in the *Pennsylvania Bulletin* as separate actions.

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NPDES Permit: Under the provisions of §92.61, notice of a draft NPDES permit containing, among other things, the antidegradation classification of the receiving waterbody, is published in the *Pennsylvania Bulletin* with a minimum 30-day public comment period. During this period, persons may submit data regarding the water segment or the draft permit. A public hearing on the draft permit will be scheduled if one is requested for a proposed discharge to an EV water. A public hearing will be held on draft permits proposing to discharge to other waters if there is sufficient public interest. A notice of the hearing will be advertised in the *Pennsylvania Bulletin* and a local newspaper at least 30 days before the hearing. Persons may offer testimony at the hearing regarding the proposed discharge as well as the stream uses. Sections 92.63 and 92.65 list other public participation provisions relating to NPDES permits. Draft individual permits for construction stormwater are also handled in this manner.

DEP will consider all pertinent data submitted during the permit review process in making its final decision on the existing use classification of the waterbody. The final permit is based on the existing use determination if it is more restrictive than the designated use.

Persons may also comment on other issues during the comment period on a draft permit, including issues regarding T&E species and SEJ when applicable. At this time, issues not previously considered may be brought to DEP's attention for consideration.

Other Permits and Approvals: Interested persons and applicants may also submit existing use information on other permit applications and requests for DEP approval that may impact a surface water. In addition to NPDES discharges and the sewage facilities planning (Act 537) process, these may include resource extraction activities such as surface and underground mining and oil and gas extraction; requests for permits or other approvals of water obstructions, encroachments, and dams; stormwater management planning (Act 167) activities; water withdrawal requests; and other activities which require a DEP permit or approval and may impact a surface water.

The permit or approval decision is based on the existing use determination if it is more restrictive than the designated use.

Appealing existing uses: At the time that DEP takes a final action on an application for a permit or approval, an existing use determination may be appealed before the EHB.

5. Public Participation During Environmental Quality Board (EQB) Redesignation Process

In response to a petition to the EQB or DEP's initiative, DEP undertakes assessment of a waterbody or evaluation of data to determine the existing uses as discussed above. One or more stream reports that support the existing uses of the waterbodies and that have incorporated the comments received to that point in time are grouped into recommended redesignation packages prepared for the EQB's consideration.

Proposed rulemaking: DEP presents recommendations to the EQB for proposed rulemakings regarding redesignation of streams. Following approval by the EQB for proposed rulemaking, the package is submitted to the Environmental Resources and Energy Committees of the House and Senate and the Independent Regulatory Review Commission (IRRC) and published in the *Pennsylvania Bulletin* with a public comment period, generally of 45 days. In addition to the

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opportunity for written comments, public meetings may be held and persons may request a formal public hearing on a proposed redesignation. Oral testimony presented at a public hearing is transcribed into an official record of the proceedings and all comments are considered in the final rulemaking.

Other public input opportunities: Even after a rulemaking is completed, persons may submit a petition to the EQB or assemble data for submittal to DEP that supports a change in use of a waterbody. The EQB generally does not reconsider a recently finalized regulation for 2 years unless new data is introduced that was not available or considered earlier.

The following table summarizes the opportunities for public participation during the antidegradation process.

TABLE 6
SUMMARY OF PUBLIC PARTICIPATION OPPORTUNITIES IN THE ANTIDEGRADATION PROGRAM

Process of assessment/evaluation of streams: 1. Submit petition for redesignation to EQB. May include complete stream evaluation. 2. Submit data or request meeting or hearing in response to DEP's notice of intent to assess or evaluate a waterbody. 3. Refer to DEP's "DEP Existing Use" on DEP's website for current information. 4. Submit comments on draft stream evaluation reports available on DEP's website.
Permit or approval process: 1. Applicant includes antidegradation classification in permit application to DEP. 2. Submit data or request hearing in response to DEP publication of draft permit. 3. Review and comment on Act 537 submittals in HQ or EV water in response to notice published by applicant. 4. Submit data on other DEP permit or approval actions.
EQB stream redesignations: 1. Submit comments on proposed stream redesignation rulemakings in response to publication by EQB.

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APPENDIX A

AQUATIC RESOURCE ASSESSMENT METHODS

Section 1
Mesh Size and Taxa Identification

The following excerpts are taken from DEP's *Standardized Biological Field Collection and Laboratory Methods*.

The net mesh size and level of identification will be used in the antidegradation biological assessments as stated below:

Net Mesh Considerations - Benthic macroinvertebrates have historically been defined as animals large enough to be retained by a U.S. Standard No. 30 sieve (595 micron openings). A review of sampling equipment currently in use and commercially available indicates that the 595 micron criterion is very seldom met. Standard D-frame nets have 800 x 900 micron openings. It is apparent, from the above discussion, that the common mesh size is in the 800-900 micron range. Consequently, this size range has been adopted as the standard.

Identification - Taxonomic Level. The level of identification for most aquatic macroinvertebrates will be to genus. Some individuals collected will be immature and not exhibit the characteristics necessary for confident identification. Therefore, the lowest level of taxonomy attainable for these specimens will be sufficient. Certain groups are routinely identified to a higher taxonomic level, as follows:

Snails (Gastropoda) - Family

Moss animacules (Bryozoa) - Phylum

Clams, mussels (Bivalvia) - Family

Proboscis worms (Nemertea) - Phylum

Flatworms (Turbellaria)

- identifiable planarids - genus or Family Planaridae
- others - Phylum Turbellaria

Roundworms (Nematoda) - Phylum

Water mites (Hydracarina) - Class

Segmented worms (Annelida)

- aquatic earthworms & tubificids - Class Oligochaeta
- leaches - Class Hirudinea

The identification of midges (Chironomidae) - Family

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Section 2
Semi-Quantitative Method (DEP-RBP)

The following excerpts concerning sample collection are taken from DEP's *Standardized Biological Field Collection and Laboratory Methods*.

Sample Collection - Riffle/run habitats are sampled using the D-frame net method described earlier in this document. Each sample consists of two D-frame kicks, one collected from an area of fast current velocity and the other from an area of slower current velocity. The two kicks are composited into one sample jar, preserved, and returned to the lab for processing. Taxonomic data are not recorded in the field.

Sample Processing - The following procedure adapted from EPA's RBP methodology is used to process qualitative D-frame samples so that the resulting data can be analyzed using benthic macroinvertebrate biometric indices (or "metrics"). Equipment needed to process benthic samples includes: a large laboratory pan gridded into 28 equal sized squares, magnesium sulfate, illuminated magnifying viewer, slips of paper (numbered from 1 to 28) for drawing random numbers, and forceps (or any tools that can pick floating benthic organisms).

a. Only larger rocks, detritus, and other debris are removed while in the field before the sample is preserved.

b. Samples are rinsed in a standard USGS No. 35 (500 microns - mesh) sieve to remove fine materials and residual preservative and then placed in a pan to be sorted.

c. A saturated solution of magnesium sulfate (Epsom salts) is added to the pan. This causes most organisms to float making it easier to separate them from the detrital and mineral materials. Enough solution should be used to allow complete dispersion of the sample.

d. The sample is stirred to spread the contents evenly throughout the pan.

e. The floating organisms are removed and retained. The materials on the bottom of the pan are inspected until the investigator is satisfied that all organisms have been removed. Ideally, the same person should "float and pick" all the samples for a survey, unless technique and consistency with the technique of other samples can be assured.

f. The organisms are placed in a clean gridded pan with enough water to cover the organisms and stirred to spread them evenly throughout the pan.

g. An individual grid is selected by any conventional random number method and all organisms within that grid are removed. Any organism which is lying over a grid line is considered to be in the square containing its head. Any grid chosen must be picked in its entirety.

h. Repeat the process of selecting squares and removing organisms until the sub-sample yields at least 100 organisms (EPA's methodology allows for larger sub-samples). The "100 organism" count is the minimum number required for valid computations of the recommended RBP biometric indices. Record the number of grids picked to yield the "100 organism" sample.

i. The sample should be preserved unless identification will be done immediately.

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Section 3
Habitat Assessment

DEP has adopted the habitat assessment methods outlined in EPA's *Rapid Bioassessment Protocols* (Plafkin, et al., 1989) and subsequently modified. It should be noted that the habitat assessment method is qualitative and subject to the experience and training of the biologist performing the assessment. The following excerpts concerning habitat are taken from DEP's *Standardized Biological Field Collection and Laboratory Methods*, and present an overview of DEP's habitat assessment procedures.

The matrix used to assess habitat quality is based on key physical characteristics of the waterbody and surrounding lands. All parameters evaluated represent potential limitations to the quality and quantity of habitat available to aquatic biota. These, in turn, affect community structure and composition.

The main purpose of the habitat assessment is to account for physical limitations that exist due to instream conditions. In order to minimize the effects of habitat variability, every effort is made to sample similar habitats at all stations. The habitat assessment process involves rating 12 parameters as excellent, good, fair, or poor, by assigning a numeric value (ranging from 20 - 0), based on the criteria included on the Habitat Assessment Field Data Sheets (Riffle/Run and Glide/Pool), available from DEP.

The 12 habitat assessment parameters used in the DEP-RBP evaluations for Riffle/Run prevalent (and Glide/Pool prevalent) streams are discussed below. The Glide/Pool parameters that differ from the Riffle/Run parameters are shown in italics. The first four parameters evaluate stream section conditions in the immediate vicinity of the benthic macroinvertebrate sampling point:

- **Instream Fish Cover** - evaluates the percent makeup of the substrate (boulders, cobble, other rock material) and submerged objects (logs, undercut banks) that provide refuge for fish.

- **Epifaunal Substrate** - evaluates riffle quality, i.e. areal extent relative to stream width and dominant substrate materials that are present. (In the absence of well defined riffles, this parameter evaluates whatever substrate is available for colonization.)

- **Embeddedness** - estimates the percent (vertically) of the substrate covered with fine sediments. (*Pool substrate* characterization**:** evaluates the dominant type of substrate materials, i.e. gravel, mud, root mats, etc., that are more commonly found in glide/pool habitats.)

- **Velocity/Depth Regime** - evaluates the presence/absence of four velocity/depth regimes - fast-deep, fast-shallow, slow-deep, and slow-shallow. (*Pool variability***:** describes the presence and dominance of several pool depth regimes.)

The next four parameters evaluate a larger area surrounding the sampled riffle. As a rule of thumb, this expanded area is the stream length defined by how far upstream and downstream the investigator can see from the sample point:

- **Channel Alteration** - primarily evaluates the extent of channelization or dredging but can include any other forms of channel disruptions that would be detrimental to the habitat.

- **Sediment Deposition** - estimates the extent of sediment effects in the form of islands, point bars, and pool deposition.

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- **Riffle Frequency (pool/riffle or run/bend ratio)** - estimates the frequency of riffle occurrence based on stream width. (Channel sinuosity: the degree of sinuosity to total length of the study segment.)

- **Channel Flow Status** - estimates the horizontal extent of exposed substrates due to water level or flow conditions.

The next four parameters evaluate an even greater area. This area is usually defined as the length of stream that was electroshocked for fish. It can also take into consideration upstream land-use activities in the watershed:

- **Condition of banks** - evaluates the extent of bank failure or signs of erosion.

- **Bank vegetative protection** - estimates the extent of stream bank that is covered by plant growth providing stability through well-developed root systems.

- **Grazing or other disruptive pressures** - evaluates disruptions to surrounding land vegetation due to common human activities, such as crop harvesting, lawn care, excavations, construction projects, and other intrusive activities.

- **Riparian vegetative zone width** - estimates the width of protective buffer strips or riparian zones. This is a rating of the buffer strip with the least width.

It is best to conduct the habitat assessment after sampling since the investigator has observed all conditions in the sampled segment and immediate surrounding watershed. After all parameters in the matrix are evaluated and scored, the scores are summed to derive a habitat score for that station. The "optimal" category scores range from 240-192, "suboptimal" from 180-132, "marginal" from 120-72, and "poor" is 60 or less. The gaps between these categories are at the discretion of the investigator's best professional judgment.

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Section 4
Metric Scoring and Selection

Scoring - The current DEP procedure compares five metrics from a candidate site to the same five metrics from a single reference site matched by type (riffle/run or glide/pool), size (stream order), gradient, and pH (alkalinity). Each metric uses a different scoring scale, so they must first be converted to the same scale using the normalizing scores listed in the table below. All five of both the candidate and reference metrics must be normalized using this table.

Biological Condition Scoring Criteria

Biological Condition Score	Taxa Richness (Candidate/ Reference)	*Modified EPT (Candidate/ Reference)	**Modified Hilsenhoff Index (Candidate-Reference)	% Dominant (Candidate-Reference)	%Modified Mayflies (Reference-Candidate)
8	>80.0%	>80.0%	<0.71	<11.0%	<12.0%
7	80.0 – 77.2%	80.0 – 75.8%	0.71 – 0.79	11.0 – 12.5%	12.0 – 15.9%
6	77.1 – 74.4%	75.7 – 71.5%	0.80 – 0.87	12.6 – 14.0%	16.0 – 19.9%
5	74.3 – 71.5%	71.4 – 67.2%	0.88 – 0.97	14.1 – 15.6%	20.0 – 23.9%
4	71.4 – 68.7%	67.1 – 63.0%	0.98 – 1.04	15.7 – 17.2%	24.0 – 27.9%
3	68.6 – 65.8%	62.9 – 58.7%	1.05 – 1.13	17.3 – 18.8%	28.0 – 31.9%
2	65.7 – 63.0%	58.6 – 54.4%	1.14 – 1.21	18.9 – 20.3%	32.0 – 35.9%
1	62.9 – 60.0%	54.3 – 50.0%	1.22 – 1.31	20.4 – 22.0%	36.0 – 40.0%
0	<60.0%	<50.0%	>1.31	>22.0	>40.0

* Pollution tolerant taxa removed
** Pollution tolerances modified from original publication

Taxa Richness = Total number of taxa.
Modified EPT Index = Total number of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) minus EPT genera considered to be pollution tolerant.
Modified Hilsenhoff Index – An index that reflects macroinvertebrate tolerance to organic pollution with zero the least tolerant and ten the most tolerant. The original Hilsenhoff tolerance scores have been modified and some added to reflect the behavior of taxa found in Pennsylvania.
Percent Dominant – The percent of the total abundance made up by the single most abundant taxon.
Percent Modified Mayflies – The percent of the total abundance made up by the total abundance of mayflies minus the pollution tolerant mayfly genera.

The numbers in the above table normalize the metrics to the same scoring scale (8 to 0). Each metric has equal weighting so the five can be summed to obtain a total score. The highest total score is eight (highest metric score) times five (number of metrics), or 40. The final step is to divide the candidate total score by 40 and multiply by 100 to obtain a percentage. This percentage determines the antidegradation status of the stream according to the values in the following table.

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%Comparison of Candidate Score to Reference Score	Stream Classification Category
>=92%	EV
83-92%	HQ
<83%	Existing use or designated use (Non-HQ or EV)

To attain an EV classification, the percent comparison of the candidate to the reference must be equal to or greater than 92 percent.

In order to attain an HQ classification, the percent comparison of the candidate score to reference score must be between 83 and 92 percent. DEP believes that these criteria assure that the best streams in the Commonwealth receive either EV or HQ protection.

Example: The following table shows how the entire scoring system would work for a hypothetical candidate stream.

	Taxa Richness	Modified EPT	Modified Hilsenhoff	%Dominant	%modified mayflies
Reference	28	12	1.23	25%	40%
Candidate	23	9	1.57	37%	32%
Difference	82%	75%	.34	12%	8%
Score	8	6	8	7	8

The summed score of the candidate stream is 8 + 6 + 8 + 7 + 8 = 37. Thirty-seven is 93 percent of the 40 possible points, putting the candidate in the 92-100 percent range. The candidate stream is EV.

Metric Selection and Derivation of Scores - The metrics used in the comparison were carefully selected using the "box and whisker plot" process now outlined in *Rapid Bioassessment Protocols For Use in Streams and Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Barbour et al.; EPA 841-B-99-002; July, 1999). Box and whisker plots are simply graphical representations of frequency distributions. The "boxes" represent the 25th, 50th (median), and 75th quartiles while the whiskers represent the range of more extreme values. The frequency distributions of 41 metrics were analyzed to determine their discriminatory power in identifying HQ and EV waters.

The available RBP samples were first divided into three groups depending upon the stream they were taken from. The three groups were EV, HQ, and non-antidegradation. For each metric, three side-by-side box and whisker graphs, each representing one of these groups, were plotted on a page. When the box and whisker plots are far apart on the vertical scale (little or no overlap), the metric has good discriminatory power. In other words, the values of the metric are noticeably different in EV, HQ, and non-antidegradation streams. Metrics where the three side-by-side box and whisker plots overlapped were eliminated because they did not differentiate between antidegradation and non-antidegradation samples.

The last consideration is the elimination of one metric from pairs of correlated metrics. If the Simpson Index and percent dominant metric have a correlation coefficient of 0.95, they convey the same information. Including them both in the final set of metrics means that the same information (in this case diversity of taxa) is counted twice. Deleting one of the metrics prevents this double counting. The

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existing data indicated that the metrics (a) taxa richness, (b) modified EPT index, (c) modified Hilsenhoff Index, (d) percent dominant, and (e) modified percent mayflies were the best indices.

EPA and other state agencies across the country have consistently found taxa richness, EPT, modified Hilsenhoff, percent mayfly, and percent dominant metrics to be useful. The percent mayfly metric is also used by many agencies, including states in EPA Region III. In discussions with other states' biologists and EPA's contractor working on the RBP protocols, the modified versions (removal of pollution tolerant taxa from the indexes) of our EPT and percent mayfly index are considered good improvements over the original versions.

A modification to the percent dominant metric became necessary when some unusual conditions occurred. A benthic community dominated by a single taxa is usually considered bad. However, on occasion this single taxon is a sensitive one, intolerant of pollution. To account for such cases, the percent dominant metric is given the maximum score when the dominant taxa has a low pollution tolerance value (3 or less) even though the metric would normally receive a low score when a single taxon dominates the community.

The five metrics utilize different measurement scales. For example, the modified Hilsenhoff Index ranges from 0 to 10 while the percent dominant ranges from 0 to 100. The metrics had to be normalized to the same scoring scale so that each has the same weight when they are summed. The normalization starts by selecting a scoring interval. DEP selected a scoring interval of 6, 4, 2, and 0. Six is the best and zero the worst score.

After the scoring interval is selected, the next step is to determine the scoring ranges that are assigned a 6, 4, 2, or 0 for each metric. Taxa richness is used in the following paragraphs as the example of how the scoring ranges were derived.

The EV, HQ, and non-special protection samples were further subdivided into ecoregions. All possible comparisons between the EV samples within an ecoregion were calculated. As an example, assume there are three EV samples in ecoregion 62 with taxa richness of 25, 27, and 30. All possible comparisons give percentage differences of 25/27 = 92 percent, 25/30 = 83 percent, and 27/30 = 90 percent. The data were always arranged lowest to highest to avoid percentage differences greater than 100 percent. This process was repeated for all the available EV samples in all the ecoregions. The percentage differences from all the ecoregions were combined into a single frequency distribution. The distribution showed that 95 percent of the time the percentage difference between EV samples in the same ecoregion were never less than 80 percent. As a result, any taxa richness percentage difference between a candidate and reference sample equal to or greater than 80 percent was assigned a score of six.

The same process was repeated comparing all the EV samples to all the HQ samples in the same ecoregion. Again, all the percentage differences were combined into a single frequency distribution. This distribution showed that 95 percent of the time the percent difference between EV and HQ streams in the same ecoregion was never less than 70 percent. A taxa richness percent difference between a candidate and reference sample equal to or greater than 70 percent, but less than 80 percent, was assigned a score of four.

Finally, the EV samples were compared to the non-special protection samples in the same ecoregion. The frequency distribution showed that 95 percent of the time the percent difference is not less than

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60 percent. A candidate taxa richness compared to a reference with a percent difference equal to or greater than 60 percent and less then 70 percent is assigned a score of two. Any comparison that is less than 60 percent is assigned a score of zero.

With slight modifications, this same scoring procedure is applied to the other metrics. The difference between the candidate and reference was expressed as a difference, rather than a percentage, for percent dominant (candidate minus reference) and percent modified mayflies (reference minus candidate) because these metrics are already expressed as percents. The Hilsenhoff Index is also expressed as a difference (candidate minus reference) because a small change in the index reflects a large difference in instream conditions. The importance of small changes in the Hilsenhoff Index would be lost if the differences were expressed as percentages.

The final scoring range was based upon the graph on page 8-1 of *Rapid Bioassessment Protocols For Use in Rivers And Streams – Benthic Macroinvertebrates and Fish* (Plafkin, et al; EPA/444/4-89-001; May, 1989) which compared the relationship between biological condition and habitat quality. An analysis of Pennsylvania RBP III sampling data in the metric selection process showed that 83 percent is a number which clearly differentiates between average streams and those deserving of Special Protection. DEP selected 92 percent as a break between HQ and EV waters based on best professional judgment. Experience with this number has proven that it does reflect outstanding waters of ecological significance.

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APPENDIX B

ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES FOR WASTEWATER DISCHARGES

For wastewater discharges to HQ and EV waters the most effective treatment/disposal (T/D) technologies consist of a hierarchy of preferred methods which take technical and economic feasibility as well as expected water quality impacts into consideration. The goal of this hierarchy is to reduce or eliminate surface water discharges and minimize degradation of both surface and groundwater by providing advanced wastewater treatment and/or soil renovation prior to discharge to groundwater. However, for methods which involve a stream discharge, there also exist treatment performance standards defined as ABACT. ABACT in this context refers to treatment and disposal methods designed to help maintain existing water quality. One or more of the following technologies or alternatives suggested by the applicant and agreed upon by DEP should be applied to sewage or selected industrial waste discharges in HQ or EV waters.

A. The most preferred technology for wastewater discharges is to eliminate the discharge through a variety of land application options (including year round spray irrigation, drip irrigation, and land spreading) or extension of existing collection systems to convey wastewater to an existing sewage treatment system outside the HQ or EV watershed. Land application includes the installation of a treatment system providing a minimum of secondary treatment prior to release of the effluent onto the land. Sufficient storage to prevent any stream discharge during wet or cold weather periods when land application is not technically feasible is also required. Year-round spray irrigation or conveyance to an existing treatment plant outside of the watershed is required whenever it is technically feasible and cost effective. SEJ is not required for proposals in HQ watersheds which do not involve a discharge to surface waters. Year-round land application is the preferred alternative because it provides the added advantage of groundwater recharge within the watershed.

An equivalent technology for wastewater discharge is subsurface disposal. This disposal method may consist of either conventional or *alternate* onlot systems or a permitted groundwater discharge system as long as its review and approval is consistent with DEP regulations and policies for the protection of both surface and groundwater. Onlot disposal systems with domestic sewage flows of 10,000 gpd or less are permitted by local sewage enforcement officers under Act 537. For domestic flows of more than 10,000 gpd and industrial wastes, subsurface disposal options are more limited but, where appropriate, can be approved by DEP through issuance of a Water Quality Management (WQM) permit. Since there is no discharge to surface waters, SEJ is not required in HQ waters.

Collection and conveyance of sewage to existing treatment facilities outside the watershed or stream segment is another option because it eliminates the discharge of treated wastes to HQ or EV waters. One possible disadvantage is the export of water out of the basin and potential disruption of the existing hydraulic balance. This will be considered in the context of the evaluation. In this scenario, there is no discharge to surface or groundwaters outside the context of the existing NPDES permit issued to the facility receiving the wastewater and consequently,

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there is no need for a new NPDES permit. Depending upon the circumstances, planning (Act 537) approval and/or a WQM permit may be required.

B. Where year-round land application, subsurface disposal, or collection/conveyance outside the basin are not technically or economically feasible, the next preferred treatment/disposal alternative is seasonal and/or partial land application. The chief difference between year-round and seasonal land application is that a stream discharge is permitted for the portion of the year when soils cannot attenuate the wastewater. The advantages lie in the fact that: 1) the discharge occurs during wetter portions of the year (usually November through April) when stream flows and waste assimilation capacities are higher and therefore, the impact of a stream discharge is less significant, and 2) the portion of the effluent that is land applied helps recharge groundwater. Where seasonal land application is employed, minimum wintertime stream discharge requirements are set using the more stringent of ABACT or water quality-based effluent limits (WQBELs). Seasonal land application is required whenever it is technically feasible and cost effective. Seasonal land application requires both an NPDES permit and a WQM permit. Since there will be a stream discharge for at least a portion of the year, SEJ is also required if the discharge would result in degradation of HQ waters. (See Chapter 10.)

Partial land application consists of disposing of a portion of the wastewater effluent onto soils on either a year-round or seasonal basis. Partial land application is required whenever it is technically feasible and cost effective. Generally, permit requirements for the portion of wastewater to be discharged are the same as for a system based on year-round stream discharge. The advantage to partial land application is that it reduces the total annual volume of wastewater discharged to the stream while increasing groundwater recharge. Partial land application requires both an NPDES and WQM permit. Since there is a stream discharge, SEJ is also required if degradation occurs in the receiving stream.

C. The final technology option is the year-round discharge of treated wastes. This technology is only employed when nondischarge alternatives are not environmentally sound and cost-effective. Where this technology is employed, a discharger must provide, as a minimum, the more stringent of ABACT or treatment technology that will achieve water quality-based effluent limitations (WQBELs). WQBELs are developed to assure compliance with water quality criteria at a specific design stream flow. Where the proposed activity/project is socially or economically justified, the appropriate design flow from Chapter 96.4(g) is used. For proposed discharges to HQ waters where the proposed activity is not socially or economically justified, the effluent requirements are established to maintain existing water quality and are calculated using the procedures outlined in Chapter 8.

ABACT requirements, such as those defined below for sewage discharges, are designed to help maintain existing water quality. Requirements for industrial waste discharges will be determined by DEP on a case-by-case basis after review of the proposed activity and its associated pollutants. All treatment/disposal facilities must be enhanced with pollution prevention technologies applied to the raw waste streams as well as water conservation or water reuse technologies designed to minimize the volume of wastewater discharged.

ABACT for municipal, non-municipal, and small flow sewage discharges is defined below. This listing is intended to represent the desired long-term performance level of constructed treatment facilities. It does not represent an exact statement of effluent limitations as they would appear in

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a NPDES permit, where DEP may also require short-term effluent limitations as well as other controls or practices such as minimum treatment requirements established by Interstate River Basin Compacts or the EPA Chesapeake Bay Program.

Parameter	***Treatment Process Performance Expectations (mg/l)***		
	<2,000	***2,000 to 50,000 gpd***	***>50,000***
$CBOD_5$ (May 1, - Oct. 31)	*10*	*10*	*10*
$CBOD_5$ (Nov. 1, - Apr. 30)	*20*	*20*	*10*
Suspended Solids	*20*	*10*	*10*
NH_3-N (May 1 - Oct. 31)	*5.0*	*3.0*	*1.5*
NH_3-N (Nov. 1 - Apr. 30)	*15.0*	*9.0*	*4.5*
Effective Disinfection	*- - - See footnote below - - - **		
Other Parameters as needed	*- - - Determined by the size and characteristics of the proposed discharge, may include - NO_2/NO_3-N, Total Phosphorus, Copper, Lead, Zinc - - -*		

* Disinfection should be accomplished using a method that leaves no detectable residual. Disinfection using ultra-violet light or other non-chlorine based systems is encouraged and must be considered.

These values are expressed as average monthly values and represent a higher degree of treatment than conventional BAT. Additional treatment requirements for nutrients may be evaluated if necessary to comply with nutrient removal goals of programs such as those established for the Chesapeake or Delaware Bays. (See Tables B-3 and B-4 for treatment methods). Year-round discharge requires both an NPDES and WQM permit as well as SEJ, if the discharge causes measurable change in an HQ receiving stream. Selected point source control technologies from Tables B-1 and B-2 are appropriate to apply to the year-round discharge of treated wastes.

EV Waters: For wastewater discharges (sewage or selected industrial wastes) to EV waters treatment technologies center on the use of pollution prevention technologies to reduce pollutant loads on treatment systems followed by the use of the soil/geologic matrix to remove some or all of the wastewater constituents as an alternative to surface water discharge. Except in the case of individual onlot sewage systems, land application preceded by varying degrees of advanced chemical, physical, and/or biological treatment will be required for treatment/disposal of wastewaters in EV waters if cost effective. The use of land application minimizes or eliminates surface water discharge and the associated water quality degradation. In addition, these combined technologies offer the highest likelihood of producing an effluent that will not degrade the protected stream. Treatment and discharge of wastewater to EV waters can only be permitted if the maintenance or enhancement of existing surface and groundwater quality can be demonstrated.

Treatment/Disposal Methods: Tables B-1 through B-4 list treatment, land application, and nutrient removal methods that could be combined to provide wastewater management that satisfies the requirements of the Antidegradation Program. A more detailed discussion of various land application methods can be found in DEP's *Manual of Land Application of Treated Sewage and Industrial Wastewater*, DEP ID: 362-2000-009. Technically feasible combinations

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of treatment/disposal processes from these tables may be approved if DEP determines that the proposal meets all antidegradation requirements.

The processes in Tables B-1 through B-4 are not intended to represent a comprehensive list nor are they presented in any preferred order based on treatment removal efficiency. Many factors such as unit construction and combination or modification of processes will determine the ultimate treatment efficiency on a case-by-case basis. Because of the sensitivity of antidegradation waters, filtration units, constructed wetlands, flow equalization, treated effluent storage, or other protections against the release of untreated or inadequately treated wastewater should be an integral component of any treatment process approved by DEP for a direct stream discharge. In addition, DEP will encourage the use of wastewater conveyance, management, and treatment/disposal systems which have the highest reliability and which are the least maintenance intensive.

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Table B-1

Treatment Processes For Discharges

Type	Processes	Benefits/ Limiting Factors
Physical	Screening, mixing, flocculation sedimentation, flotation, filtration	Lowest cost/Lowest degree of treatment; Lowest nutrient removal
Chemical	Chemical precipitation, gas transfer, adsorption, disinfection	High degree of treatment/High cost for chemicals; Increased sludge production; High operation and maintenance costs
Biological (Trickling Filter Activated Sludge)	Aeration, coagulation, settling	Most cost effective/Increased sludge production; High operation and maintenance costs
Wastewater Stabilization Ponds	Aerobic, anaerobic facultative	Low capital cost; Low operation and maintenance costs/Large area required
Constructed Wetlands	Marsh, pond, and/or meadow	Low capital cost; Low operation and maintenance costs/Weather dependent treatment efficiencies
Natural Treatment Systems	Intensely managed biological populations or complete ecosystems	Low capital cost; Minimal sludge production; Production of usable by-products/Labor intensive operation and maintenance

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Table B-2

Land Application Systems for Discharges

Land Application Method	Benefits/Limiting Factors
Individual onlot disposal system (treatment tanks, soil absorption system).	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/Soils requirements in Chapter 73; NO_3-N discharge of 45 ppm from each unit resulting in a density factor of less than one equivalent dwelling unit per acre.
Community onlot disposal system or equivalent individual onlot disposal system of less than 10,000 gpd.	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/Soils requirements in Chapter 73; NO_3-N impact on groundwater and development of a groundwater plume which may affect surface water.
Large volume onlot disposal system (treatment tank and soil absorption field for systems exceeding 10,000 gpd).	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/Soils requirements in Chapter 73; NO_3-N impact on the groundwater and plume development which may affect surface waters.
Treatment and slow rate infiltration (spray irrigation).	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/Soils requirements in spray irrigation manual; Large area required; NO_3-N impact on groundwater and plume development which may affect surface waters; Metals build up in soils; Need for advanced secondary or tertiary treatment prior to spraying; Need for winter storage.

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*Treatment and rapid infiltration	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/Deep-highly permeable deposits of sand or sandy loam required; Large area required; Long resting periods needed; Potential for groundwater pollution; NO_3-N impact on the groundwater and plume development which may affect surface waters; Metals build-up in soils; Need for winter storage; Need for advanced secondary or tertiary treatment prior to land application; Unsuitable for steep slopes and/or high groundwater table.
*Treatment and overland flow	Eliminates stream discharge; Provides groundwater recharge to support stream baseflow/soils with low permeability required; Large area required; NO_3-N impact on groundwater and plume development which may affect surface waters; Metals buildup in soils; Winter storage may be needed; Advanced secondary or tertiary treatment needed prior to land application; Distribution may clog or freeze; Runoff collection required; Variable quality of run-off; Some additional method of ultimate disposal required; Unsuitable for steep slopes.

The systems described in this table all depend upon the soil as an integral part of the effluent treatment process. However, when treatment processes are proposed which claim to treat effluent to the degree that additional attenuation by the soil is not needed, the approval process requires documentation that disposal of the hydraulic load from the system will be designed to prevent a nuisance, runoff or other water related problems on the site or adjoining properties. One method of disposal is the use of an absorption area sited and designed using criteria similar to the requirements for onlot treatment and disposal systems. When such systems are proposed, they are not classified or reviewed as onlot systems but are reviewed as disposal systems under the WQM permitting process. While these systems do not depend upon the soil for treatment, the designer should consider factors such as soil permeability (hydraulic conductivity), depth to perched or seasonal high water table, hydrology, and hydrogeology when designing these systems. These factors will determine if the hydraulic load to be applied to the absorption area can be handled by the system proposed without significant groundwater mounding.

DEP will evaluate these proposals on the basis of the documentation submitted in support of the treatment technology and its capability to adequately treat sewage to protect groundwater without the use of soils for renovation. Where such documentation is lacking, additional treatment using soils may be necessary and compliance with the standards for onlot systems will have to be met.

* May be considered experimental and not permitted if insufficient operational data is available.

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Table B-3

Treatment Processes for Nitrogen Removal

Treatment Method	Benefits/Limiting Factors
Biological Activated Sludge (Suspended or attached growth)	Most cost effective; Highest removal of all three nitrogen species/Complex operational control
Breakpoint Chlorination	Ammonia nitrogen concentration reduced to near zero/Nitrate and nitrite are not removed; Chlorine toxicity to aquatic life
Selective Ion Exchange (Natural and synthetic)	Good ammonia removal/Prior filtration required; Operation and maintenance problems (resin binding - carbonate deposits); Difficult to dispose of carbonate deposits and backwash from regeneration
Air Stripping	Good ammonia removal/Nitrate and nitrite are not removed; Inefficient in cold weather; Increased sludge production; Requires pH adjustment
Land Application	Reduces or eliminates direct stream discharge; Supports stream baseflow/Metals build-up in soil; NO_3 impact on groundwater; Plume development which may affect surface waters
Constructed Wetlands	Low capital cost; Low operation and maintenance costs/Poor efficiency in cold weather

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Table B-4

Treatment Processes For Phosphorus Removal

Treatment Method	Benefits/Limiting Factors
Biological (luxury uptake) Sequential Batch Reactor Operationally Modified Activated Sludge Land Application	Most cost effective/High initial cost; Process control difficult; High operation and maintenance costs; Moderate sludge production
Chemical Addition	
Aluminum and Iron Salts	Responsive to rapidly changing wastewater flows; Easiest to retrofit to existing facilities; Low initial cost/High chemical cost; Poor sludge dewatering; Higher sludge production
Lime	Responsive to rapidly changing wastewater flows; Easiest to retrofit to existing facilities; Low initial cost/High chemical cost; High operation and maintenance costs; Process control difficult; Highest sludge production
Polymers (In conjunction with lime and alum)	Responsive to rapidly changing wastewater flows; Easiest to retrofit to existing facilities; Low initial cost/Highest chemical cost
Land Application	Reduces or eliminates direct stream discharge; Supports stream baseflow; Buffers receiving stream from treatment plant malfunctions/Metals buildup in soils; NO_3 impact on groundwater; Plume development which may affect surface waters
Constructed Wetlands	Supports stream baseflow; Buffers receiving stream from treatment plant malfunctions; Low capital cost; Low operation and maintenance costs/Poor efficiency in cold weather

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APPENDIX C

ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES FOR WASTE MANAGEMENT ACTIVITIES

Waste management facilities include a variety of processing, storage, and disposal activities designed to deal with hazardous, municipal, and residual wastes. Due to the variety of these facilities, discharges may be highly variable in quality and quantity. Point source discharges from waste management facilities are generally limited to treated leachate and discharges from erosion control devices. The potential for nonpoint source discharges exists at storage, processing, and disposal facilities.

Waste management facilities sited in watersheds not designated as HQ or EV waters are required by DEP regulations (Chapters 283 and 297) to operate under the following general conditions.

> *Processing facilities typically have impervious pads to facilitate collection of leachate or other wastewaters. The leachate can be treated and discharged through an NPDES permit, collected and transported to a treatment facility, or discharged to a publicly owned treatment works (POTW).*
>
> For storage facilities, wastes may not be stored in a manner that causes groundwater degradation and collection of any leachate generated is required. If leachate is generated, it is typically treated *on-site* and discharged through an NPDES permit, transported to a treatment facility, or discharged to a POTW.
>
> Landfills for the disposal of municipal, hazardous, and some residual wastes are required to have a double liner system, one of which is a composite liner, with leachate collection and treatment. Other residual waste landfills may be designed with a single composite liner system or be unlined depending upon the characteristics of the waste. The option for unlined landfills is extremely narrow in scope and new facilities are not anticipated. All landfills must be designed with a minimum isolation distance of 8 feet to the regional groundwater table in accordance with Chapter 273.252(b) of DEP regulations. All leachate collected at the lined facilities is treated and either discharged to a stream through an NPDES permit or discharged to a POTW.

Although the regulations for municipal, residual, and hazardous waste do not prohibit the siting of processing, storage, or disposal facilities in HQ or EV watersheds, an environmental assessment is required to evaluate potential impacts. In addition, the following requirements also apply:

> Solid waste processing facilities must discharge collected leachate or wastewaters to an existing POTW or transport the liquids off-site for disposal in a non-HQ/EV watershed if the estimated net present value cost of these treatment/disposal technologies is equal to or less than the estimated cost of a stream discharge alternative that causes no adverse measurable change.
>
> Solid waste storage facilities must be designed to ensure containment of any leachate or wastewaters generated. The collected leachate or wastewaters *must* be transported off-site for disposal in a non-HQ/EV watershed or discharged to an existing POTW.

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Landfills must be lined facilities with leachate collection and treatment. The leachate *must* then be discharged to an existing POTW or to a stream through an NPDES permit since *long-term* transportation of leachate is prohibited. Siting of landfills will be prohibited in areas where connection to an existing POTW or issuance of an NPDES discharge permit are not possible.

For discharges from waste management facilities in HQ or EV watersheds, the most effective technologies consist of a hierarchy of preferred methods which take technical and economic feasibility as well as expected water quality impacts into consideration. The goal of this hierarchy is to minimize or eliminate surface water discharges while protecting both surface and groundwaters from degradation. However, for methods which involve a stream discharge, there also exist technology-based effluent limitations defined as *A*BACT. In this context, *A*BACT refers to treatment and disposal methods designed to help maintain water quality.

1. The preferred technology for leachate management is on-site pretreatment followed by discharge to an existing POTW or other permitted treatment facility outside the watershed. This option must be considered and found not to be environmentally sound or economically feasible before DEP will approve any other option. Practicability considerations include:

   a. Ability of the POTW to accept and treat the leachate and still meet NPDES requirements;

   b. Proximity of an adequate size sewer line or the availability of the necessary right-of-way to construct one;

   c. Degree of pretreatment needed to enable the POTW to accept the leachate;

   d. Problems the contents of the leachate may create in sludge disposal.

   This option has several on-site requirements including sufficient storage capacity at least equal to the maximum expected production of leachate for any 30-day period for the life of the facility, or 250,000 gallons, whichever is greater. No more than 25 percent of the total leachate storage capacity may be used for flow equalization on a regular basis. Pretreatment requirements vary with the size and capabilities of the POTW and its NPDES limitations. Minimal requirements for pretreatment include biological treatment with gravity separation of solids. In cases where POTW circumstances are more limiting, carbon absorption or ion exchange treatment may be indicated.

2. The next preferred technology is to minimize, to the greatest extent possible, the volume of leachate discharged. This can be accomplished, for example, through the application of alternative technologies such as leachate evaporation and/or recirculation.

3. The least preferred technology is the year-round discharge of treated leachate. This technology is only employed when non-discharge alternatives are not environmentally sound and cost-effective. Where this approach is employed, the discharger is required to meet as a minimum the more stringent of ABACT or treatment technology that will achieve water quality-based effluent limits (WQBELs). WQBELs are developed to assure compliance with water quality criteria at a specific design stream flow. Where the proposed activity/project is socially or economically justified, the appropriate design flow from Chapter 96.4(g) is used. For proposed discharges to HQ waters, where the proposed activity <u>is not</u> socially or economically justified, the effluent

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requirements are established to maintain existing water quality using the procedures outlined in Chapter 8.

ABACT requirements, such as those defined below for leachate, are designed to help maintain existing water quality. Requirements for other types of waste management discharges will be determined on a case-by-case basis.

ABACT for leachate discharges is defined below. This listing is intended to represent the desired long-term performance level of constructed treatment facilities. It does not represent an exact statement of effluent limitations as they would appear in an NPDES permit, where DEP may also require short-term effluent limitations as well as other controls or practices.

Parameter	***Treatment Process Performance Expectations (mg/l)***
$CBOD_5$	*10*
Suspended Solids	*10*
NH_3-N (May 1 to October 31)	*1.5*
NH_3-N (November 1 to April 30)	*4.5*
Total Iron	*1.5*
Dissolved Oxygen	*6.0*
Effective Disinfection	*---See footnote below---**
Other Parameters as needed	*- - - Determined by the size and characteristics of the proposed discharge, may include: TDS, NO_2/NO_3-N, Total Phosphorus, Chlorides, Sulfate, heavy metals - - -*

*Disinfection should be accomplished using a method that leaves no residual. Disinfection using ultra-violet light or other non-chlorine based systems is encouraged and must be considered.

These values are expressed as average monthly effluent limitations and additional parameters may be evaluated if necessary.

When discharge to a permitted POTW or other permitted treatment facility has been proven "not practicable," the landfill operator *is* required to obtain an NPDES permit for discharge of the leachate and a WQM permit for construction and operation of a treatment facility. DEP regulations require a 30-day minimum storage/equalization ahead of the treatment. Treatment requirements include, at a minimum, biological treatment with gravity separation of solids, carbon adsorption, and ion exchange followed by disinfection. SEJ is required if the proposed discharge is projected to cause a measurable change in an HQ receiving stream.

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APPENDIX D

ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES FOR MINING ACTIVITIES

1. GENERAL

Mining involves a wide variety of activities that disturb the surface of the land. Mining activities such as coal surface mines and small industrial minerals surface mines are temporary and may exist for a year or two at any one location. Large quarries and underground mines can be considered permanent since they may exist for 10 years or longer. Consequently, water discharged from mining activities can be intermittent or continuous and, before treatment, highly variable in quality. Effects of mining activities on streams include changes in both water quality and physical habitat (including stream flow) which can change the composition of the aquatic biological community.

Water from mining operations can be characterized as:

- **Stormwater discharge from earth disturbances:** This is runoff from up-slope undisturbed and disturbed areas and reclaimed areas.
- **Stormwater discharge from permanent facilities:** This is runoff from areas containing permanent facilities.
- **Pumped stormwater discharge:** This is water from precipitation that is collected in pits, excavations, and sumps. This water may include permanent or intermittent inflows of groundwater. These discharges are generally associated with surface mining sites.
- **Pumped groundwater discharge:** This is water that is pumped from underground mine workings or excavations, including surface mine sites that receive a continuous inflow of groundwater.
- **Process water:** This is water used in the processing and cleaning of minerals and rocks, including coal.

2. TREATMENT TECHNOLOGIES

Mining activities routinely employ a number of technologies that influence the quantity and quality of discharges and protect the overall ecosystem. These technologies are required on all mine sites and include:

Diversions

Stream buffers

Acid-forming materials controls

a. Diversions

Surface water from undisturbed areas is intercepted and diverted away from areas disturbed by mining. Operations in HQ and EV watersheds should minimize the amount

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of water that enters the mine site by installing upslope diversions as close to disturbed areas as possible. DEP's *Engineering Manual for Mining Operations*, DEP ID: 563-0300-101 available on DEP's website, recommends that diversions be constructed to provide positive drainage across their entire length, preferably with a slope of 1 percent to 2 percent. The ditch should be lined with permanent vegetation, durable rock, geotextile, or other nonerosive materials. The outlet for a diversion ditch should be a rock-lined energy dissipater, a level spreader, or a stable existing drainage way. Diversions constructed in HQ or EV watersheds will meet the more protective standards for Special Protection BMPs as outlined in §102.4(b)(G).

b. Stream buffers

Areas authorized for coal and industrial minerals surface mining activities are required to maintain a minimum 100-foot buffer along perennial and intermittent streams. In HQ or EV watersheds variances to the 100-foot buffer are only allowed if the mining activity will result in a demonstrated environmental enhancement or for minor construction activities like ditches or stream crossings. Such variances take the form of a Chapter 105 authorization or an order of DEP. Streams in HQ or EV watersheds may not be relocated to accommodate coal or noncoal surface mining activities unless the relocation results in environmental improvement. For example, environmental improvement can occur by relocating a stream to prevent it from flowing into abandoned mine areas or onto coal refuse. Relocation can occur only after issuance of a permit in accordance with the requirements of Chapter 105 and only if existing uses are maintained or protected.

c. Acid-forming materials control

Each proposed mine site is evaluated for its potential to produce pollution. Because of the wide variety of geologic conditions in Pennsylvania, the evaluation is site-specific. If there is any potential for the mining activities to encounter acid-forming material, the evaluation includes analysis of the overburden material for the volume and chemical character of acid and alkaline strata. It also includes a review of drainage from similar mines in the general area. This information is used to design the site to maximize the potential that no pollutional discharges will occur. Typical BMPs for managing acid-forming materials are isolation through proper management of earthen materials during mining, backfilling, and grading, the addition of alkaline material to prevent the formation of acid drainage; or, if the amount of acid material is small, removal of the acid material and disposal at an approved site.

DEP's *Alkaline Addition for Surface Coal Mines*, DEP ID: 563-2112-217 available on DEP's website, prohibits issuance of permits in special protection watersheds if overburden quality would require the addition of alkaline material. Special protection watersheds are watersheds with streams designated as wilderness trout, HQ and EV, and watersheds and streams that serve as public water supplies. Exceptions may be considered, on a case-by-case basis, where alkaline addition on a remining permit will result in water quality improvement.

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3. STORMWATER DISCHARGE FROM EARTH DISTURBANCES

Stormwater discharges from earth disturbances occur when precipitation-induced runoff from disturbed areas, including areas that have been reclaimed but not yet stabilized with permanent vegetation, is collected and then discharged from erosion and sedimentation control structures. The best available technologies for this type of discharge involve removal of suspended and settleable solids using the Special Protection BMPs described in the erosion and sediment control regulations at §102.4(b)(6) and DEP's *Engineering Manual for Mining Operations*, DEP ID: 563-0300-101 available on DEP's website. The following are required for erosion and sedimentation controls in antidegradation watersheds:

- Protect the area down-slope from sediment basins with hay bales or filter fence before construction and until vegetation is established.

- Construct collection ditches to encompass all areas disturbed by mining, including areas where topsoil, subsoil, and mine spoil are stored.

- Line channels, collectors, and diversions with permanent vegetation, durable rock, geotextile, or other nonerosive materials and design these structures with a minimum capacity to convey the peak discharge from a 5-year frequency storm, as required by §102.4(b)(6).

- Design sedimentation impoundments to have a capacity of 8,600 cf/acre or be able to contain the 10-year, 24-hour precipitation event without flow through the emergency spillway and with a flow length to width ratio of 4:1 or greater as specified in §102.4(b)(6).

- Design sedimentation impoundments with a manual dewatering device to allow additional settling before releasing water or so that it dewaters in at least 4 days and no more than 7 days when at full capacity as described in §102.4(b)(6).

- Mulch with hay or straw immediately after backfilling and topsoil distribution.

- Stabilize all discharge points to prevent bank erosion or channel scouring in the receiving stream.

4. STORMWATER DISCHARGE FROM PERMANENT FACILITIES

Stormwater discharges from permanent facilities are discharges of precipitation-induced runoff from stabilized areas on which long-term structures and buildings are situated. These discharges are typically associated with surface facilities at underground mines and industrial mineral processing plants. Land cover in these areas may include impermeable roofs, pavements, and grassy areas. Runoff from these areas is discharged through sediment basins.

a. If contaminants in the runoff are limited to sediment and suspended solids, the Special Protection BMPs for transient stormwater discharges are applied. See Section 3 of this Appendix. Dust and clays from quarry operations are also handled in this way.

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b. If the runoff comes in contact with acid-forming materials, such as coal, coal refuse, or dust from coal and coal refuse, the best available technologies for the collected runoff will be the best technologies for pumped stormwater discharges. See Section 5 below.

c. If the runoff contains contaminants other than those identified in paragraphs "a" and "b" such as oils and greases, the best available technologies for stormwater from industrial sites will be applied. See Appendix F.

5. PUMPED STORMWATER DISCHARGES

Pumped stormwater discharges are normally intermittent in nature. These are discharges of water that periodically accumulate in surface mine or quarry pits and excavations due to precipitation events or the inflow of groundwater. The water is collected, pumped, and treated before it is discharged. In all cases, this accumulated water must be pumped to treatment facilities. No gravity flow of contaminated water is permitted from pits and excavations. The ABACTs for these discharges are described below.

a. Nondischarge

Because precipitation is inevitable, only a few small mining operations can easily achieve a nondischarge state. These operations are usually small sand and gravel mines where all water within the confines of the mine boundary drains to one or more internal sumps and then percolates into the groundwater. A few larger industrial minerals operations may achieve this through the use of specially designed infiltration beds if geologic conditions are conducive to a high percolation rate. This option is acceptable for coal mining operations if the pumped water is treated to the technology-based standards in Title 25 Pa. Code §§87.102, 88.92, 88.187, 88.292, 89.52, and 90.102 prior to infiltration. Another nondischarge option is to pipe the treated mine water overland and discharge it to a stream that is not HQ or EV.

b. Overland Flow

The ABACT involving overland flow requires the water to be treated to the technology-based standards in Title 25 Pa. Code §§87.102, 88.92, 88.187, 88.292, 89.52, and 90.102 for coal or §77.522 for industrial minerals mining. After treatment the water may be discharged directly to the surface of the land as sheet flow or by spraying. Overland flow must be directed to undisturbed, level, or gently sloping ground. Care must be taken to prevent the sheet flow from forming rills and gullies.

c. Discharge to Surface Waters

In circumstances where a surface water discharge is the only viable approach, a discharger must meet, at a minimum, the more stringent of ABACT or treatment technology that will achieve WQBELs.

(i) WQBELs are developed to assure compliance with water quality criteria at a specific design stream flow. Where the project proponent has demonstrated that the proposed activity/project is socially or economically justified, the appropriate

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design flow from Chapter 96.4(g) is used. For proposed discharges to HQ waters, where the proposed mining activity is not socially or economically justified, the effluent requirements are established to maintain existing water quality using the procedures outlined in Chapter 8.

(ii) The ABACT for pumped stormwater discharges consists of treatment as described below followed by a surface water discharge at a minimum dilution ratio (stream flow: discharge) of 6:1. This dilution ratio may be increased if necessary to protect instream water quality. If adequate dilution ratios cannot be maintained, the extent of surface mining in the watershed will be restricted. Other effluent control technologies may also be required, such as enhanced physical/chemical treatment or effluent polishing via additional ponds or wetland systems. The ABACT performance goals for coal and industrial minerals mining listed below represent the desired long-term performance level of constructed treatment facilities. It does not represent an exact statement of effluent limitations as they would appear in an NPDES permit, where DEP may also require short-term effluent limitations, as well as other controls or practices.

Parameter	***Treatment Process Performance Expectations (mg/L)***
Acidity	*< Alkalinity*
Suspended Solids	*10*
pH	*6.5-9.0 (units)*
Total Iron	*1.5*
Total Manganese	*1.0*
Other Parameters as needed	*- - - Determined by the size and characteristics of the proposed discharge, may include: TDS, Sulfate, Aluminum, Copper, Zinc - - -*

These limitations are expressed as average monthly values. Limitations on additional parameters may be assigned if necessary to preserve ambient stream quality.

6. PUMPED GROUNDWATER DISCHARGES

Discharges of groundwater pumped from underground mines and large excavations that intercept regional groundwater are typically long-term, high-volume, and continuous. Discharges from underground coal mines often contain relatively high levels of iron, manganese, acidity, and total dissolved solids. Discharges from industrial minerals mines frequently contain high levels of suspended solids.

Mine operators proposing pumped groundwater discharges to HQ or EV waters are encouraged to consider conveying the discharges to a non-antidegradation stream or otherwise locating the discharge outside of the watershed or stream segment as long as that practice is environmentally sound and does not degrade the HQ or EV water by reducing baseflows or available aquatic habitat. If such a discharge is permitted to an HQ or EV water, the discharge must meet the WQBEL or ABACT requirements outlined in Section 5, Pumped Stormwater Discharges.

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7. PROCESS WATER

Process water is the water used in the cleaning and processing of coal and other rocks and minerals. The process water from coal preparation plants generally contains high concentrations of the constituents in mine drainage, including very high levels of total dissolved solids. Process water may also contain detectable amounts of metals. If a coal preparation plant is proposed in an antidegradation watershed, the appropriate technology is nondischarge. These plants will be expected to operate a closed-system with collection, treatment, and reuse of the process water. If process water must be discharged periodically, the discharge will be conveyed to a non-HQ/EV stream. Solids from the cleaning process and treatment sludge must also be disposed of outside the watershed. The ABACT for stormwater runoff that may come in contact with acid-forming and toxic materials on the site is the ABACT for pumped stormwater discharges described in Section 5.

Process water from most industrial mineral processing facilities is high in suspended solids and occasionally high in dissolved solids. The ABACT for these waters consists primarily of collection, settling, and reuse. Excess water is given enhanced physical/chemical treatment or effluent polishing, which may include additional ponds. The water is then discharged to infiltration ponds or wetland systems or discharged via overland flow depending on the geologic and topographic characteristics of the site.

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APPENDIX E

ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES FOR OIL AND GAS ACTIVITIES

Technologies for discharges of wastewaters from oil and/or gas development to HQ or EV waters consist of a hierarchy of preferred treatment/disposal techniques which consider technical and economic feasibility as well as projected water quality impacts. This hierarchy is designed to minimize or eliminate surface water discharges, maintain existing surface water quality, and achieve the ultimate goal of DEP's *Principles for Groundwater Pollution Prevention and Remediation*, DEP ID: 383-0800-001 available on DEP's website, which is to prevent groundwater contamination whenever possible. For methods which involve a stream discharge, effluent limits developed as part of ABACT also apply (see Section 3 of this Appendix). One of the following technologies or a DEP approved equivalent must be applied to oil and/or gas discharges in HQ or EV waters.

1. Disposal Wells

The most preferred T/D technology for HQ or EV waters is deep well injection because it returns oil and gas development fluids to geologic strata that approximate their point of origin. There is no discharge to surface or groundwaters and consequently no need for an NPDES permit. If properly done, this method should not degrade existing water quality and therefore no SEJ would be required.

The best opportunity for developing a successful disposal well in Pennsylvania exists in the many depleted oil and gas reservoirs scattered throughout the Commonwealth. Depleted gas reservoirs that have sufficient permeability to accept large volumes of water can make ideal disposal reservoirs when the wells that open to the reservoir can be located and monitored or plugged.

Two permits are required before a disposal well may be constructed and operated: a well permit (or registration) under the Oil and Gas Act; and an underground injection control (UIC) permit from EPA. For a description of the requirement for obtaining these permits, refer to DEP's *Oil and Gas Wastewater Permitting Manual*, DEP ID: 550-2100-002 available on DEP's website. Prior to preparation and submittal of a disposal well application, it is recommended that the applicant and/or the design engineer arrange a preliminary technical conference with the Regional Oil and Gas Manager. For a listing of the federal requirements of the Underground Injection Control program contact the EPA's Drinking/Groundwater Protection Branch, Region III, 1650 Arch Street, Philadelphia, PA 19103 (215/814-5445).

2. Collection and Discharge to Existing Treatment Facility

If deep well injection is not technically feasible, the next most preferred technology is collection and discharge to an existing industrial waste or sewage treatment facility on a stream that is not designated HQ or EV. The existing NPDES permit for the receiving facility must be amended to accommodate the new wasteload if the current permitted capacity of the treatment plant is exceeded. However, no SEJ is required unless the existing treatment plant discharges to HQ waters.

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This method involves collecting the wastewater and hauling it to an industrial waste or sewage treatment facility which is approved to accept brines and fluids from oil and gas exploration and development operations. These facilities operate under an NPDES and WQM permit issued by DEP. They treat the wastewater to the point where it is suitable for discharge to surface waters. The wastewaters must be collected in tanks or pits that are impermeable and any pit used for the storage of production fluids must have an identification number issued by DEP.

For more information on brine, sewage, and industrial waste treatment facilities that accept wastewaters from oil and gas operations, contact DEP's Bureau of Oil and Gas Management regional office in Pittsburgh (412) 442-4000 or Meadville (814) 332-6860.

3. Treatment and Discharge to Surface Water

The least preferred oil and gas T/D technology in HQ waters is on-site treatment and discharge of production fluids from stripper wells to surface waters. These discharges require NPDES and WQM permits. The NPDES permit establishes appropriate effluent limitations, monitoring and reporting requirements, and compliance schedules and in HQ watersheds may be applied only to production fluids. SEJ is required if the discharge causes a measurable change in existing quality of the receiving stream. The treatment and discharge of drilling, fracing, and servicing fluids is prohibited in HQ and EV watersheds. The WQM permit authorizes the construction and operation of the treatment plant for treating the wastewaters being discharged.

Where this technology is employed, a discharger must provide, as a minimum, the more stringent of ABACT or WQBELs. WQBELs are developed to assure compliance with water quality criteria at a specific design stream flow. There are two evaluations needed for these situations, except where the proposed activity is SEJ. The first analysis is performed using standard DEP models at the appropriate design flow conditions listed in Table 1 of Chapter 96.4(g). These analyses would be performed for any discharge to surface waters of the Commonwealth. The second analysis is the evaluation of the discharge/activity to determine if it meets existing quality. This procedure is outlined in Chapter 8 and is carried out at the harmonic mean stream flow condition.

ABACT performance goals for oil and gas activities are defined below. This listing is intended to represent the desired long-term performance level of constructed treatment facilities. It does not represent an exact statement of effluent limitations as they would appear in an NPDES permit where DEP may also require short-term effluent limitations as well as other controls and practices.

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Parameter	***Treatment Process Performance Expectations (mg/l)***
Acidity	*< Alkalinity*
Suspended Solids	*10*
pH	*6.5-9.0 (units)*
Total Iron	*1.5*
Dissolved Oxygen	*6.0*
Oil and Grease	*10*
Benzene, Toluene, Xylene and Ethylbenzene	*not detectable with the most sensitive analytical method described in Chapter 16 of Title 25 of the Pa. Code.*
Other Parameters as needed	*- - - Determined by the size and characteristics of the proposed discharge, may include: chlorides, phenolics, TDS, heavy metals - - -*

These values are expressed as average monthly effluent limitations and additional parameters may be evaluated if necessary.

The following treatment processes are suggested to achieve ABACT:

a. Chemical addition for pH control and metals removal.

b. Aeration (or equivalent technology) to reduce volatile hydrocarbons and oxidize metals.

c. Gravity separation and surface skimming (or equivalent technology) for oil and grease removal.

d. Settling or filtration for removal of solids and oxidized metals.

e. Treatment to remove MBAS.

f. Flow equalization to ensure optimal treatment efficiency.

All of the above T/D technologies can be enhanced with procedures designed to minimize wastewater volume and properly contain all fluids and wastes produced. A list of fluid management alternatives is included below. As many of these procedures as are technically feasible must be implemented on oil and gas operations in HQ watersheds in an effort to reduce wastewater volume.

(1) On-site Fluids Handling and Storage

Proper control and storage of fluid and waste produced during drilling, operation, servicing, and plugging of the well are essential to the protection of surface and groundwater. Pollutional substances and wastes resulting from these operations must be contained in a pit or tank or a series of pits and tanks. This includes brine, drill cuttings, drilling muds, oils, stimulation fluids, well treatment and servicing fluids, drilling fluids other than gases, and other pollutional substances. During production, tanks are required for containing brine and production fluids unless permission is granted by DEP to use a

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lined pit under the provisions of Chapter 78.57. Pits and tanks must be impermeable, structurally sound, reasonably protected from unauthorized acts of third parties, and have sufficient capacity to contain the fluids and wastes. For detailed information on the requirement for on-site control and disposal of wastes and pollutional substances refer to DEP's *Oil and Gas Operator's Manual*, DEP ID: 550-0300-001 available on DEP's website.

(2) Fluid Volume Reduction and Reuse

One of the most efficient waste fluid management alternatives is fluid volume reduction and fluid reuse. Any fluid that can be reused or recycled represents a savings in disposal costs and a benefit to the environment. Although the procedures listed below may not be appropriate for all operations, every operator must, where appropriate, incorporate selected techniques to reduce waste fluid generation in HQ watersheds. A number of suggested alternative practices follow.

(a) Recycling of Produced Fluids

Perhaps the best example of efficient reuse of produced water is in recycling or closed-loop enhanced recovery operations. Waterfloods, when operationally feasible, should be set up to collect the water produced from the wells and reinject the fluid back through the system. Under this concept, no discharge to surface or groundwater occurs. In some situations, it may be possible to use produced fluids generated at one location as make-up water at a closed-loop recycle operation.

Another example for the reuse of produced fluids is for pressure maintenance at an enhanced gas recovery operation. In this case, the brine is collected from the other gas wells in the area and transported to the injection well. The brine is injected into the gas reservoir at specific locations to maintain pressure on the gas reservoir and enhance gas production.

(b) Drilling and Completion Procedures that Reduce Fluid Volumes

The following procedures have been demonstrated to be effective in fluid volume reduction in Pennsylvania during well drilling and completion phases:

- **Groundwater Protective Casing (Surface Casing)**

  The major purpose for installing groundwater protective casing is to keep groundwater out of the well during drilling and production. This protects groundwater quality and avoids dewatering shallow aquifers. Groundwater protective casing must be set deep enough to shut off all fresh groundwater and cemented in accordance with Title 25 Pa. Code Section 78.81-78.86.

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- **Continuous Air Drilling**

  When water, saline or fresh, is encountered during drilling, the well should be completed as rapidly as possible to minimize the time water is being blown back to the surface. Drilling on a 24-hour schedule to eliminate daily blow-off of water accumulated in the well bore and doing everything possible to reduce the likelihood of an extra "trip" can result in substantial savings in terms of water blown to the pit.

- **Cable Tool Drilling**

  In some situations cable tool drilling may be preferred to air rotary drilling to limit the volume of water brought to the surface. Although the fresh groundwater zone is exposed for a longer time, the only surface discharge expected during cable tool drilling occurs when the cuttings are bailed out of the hole.

- **Intermediate Strings**

  In some areas, while drilling below the surface casing, specific geologic horizons or zones produce large quantities of brine during air drilling. While it is sometimes possible to overcome this water with large air volumes or pressures, it may be desirable to shut these zones off with intermediate strings of casing. In this procedure the formation or zone is fully penetrated, a string of pipe is placed in the hole, and a seal established at the bottom of the pipe. The seal may be made permanent by cementing the annular space between the well bore and the intermediate casing back to the surface, or spotting cement over the salt water producing zone.

- **Plugging Water Bearing Zone**

  In this procedure, cement or another water blocking material is placed over the water producing zone. This may be done under elevated pressure to promote penetration of the formation with the water blocking material. This technique is usually not as successful as using intermediate casing.

- **Fluid or Mud Drilling**

  For deep wells or in areas where it is anticipated that the operator will encounter large volumes of water, drilling with fluid or mud can be very effective in reducing the volume of wastewater produced. When a closed loop system is used, the drilling fluid is continuously recycled down the hole to remove cuttings to the surface. The high hydrostatic head in the well bore prevents large inflows of formation water that might otherwise be blown to the surface during air drilling. Although mud or fluid drilling represents an effective water control alternative for drilling, this practice results in the additional problem of mud disposal.

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(c) Stimulation Procedures that Reduce Fluid Volumes

A number of techniques are available to reduce the waste-fluid volume generated by hydrofracturing. Several of these involve use or re-use (recycling) of previously-generated fluids. Other methods involve reduction of fluid volumes required to treat the well.

- **Re-Use of Frac Water**

  By containing the flow back from a well after hydrofracturing, it is possible to re-use some of the water on successive stages of the same job or on other wells. On-site pretreatment such as flocculation, settling, or filtration may be necessary to re-use the water. This activity has a dual advantage in that: 1) flow-back water is carefully controlled and not allowed to spill onto the land surface or discharge to streams and 2) the total volume of water required is reduced. The re-use of frac water has caused formation plugging and may not be acceptable for every operation.

- **Use of Production Brines in Frac**

  In some situations it is possible to utilize production brine to hydrofracture wells. The use of brines in this manner reduces the total volume of wastewater generated. Again, pretreatment may be necessary as formation plugging can result.

- **Use of Pit Water to Frac**

  Like production brine, pit water which consists of drilling and perhaps frac water may in some applications, be used for stimulation. Again, pretreatment may be necessary.

- **Use of Efficient Frac Fluids**

  Recently developed hydrofracturing fluid systems are so efficient in transporting and depositing the propping agent in the created fracture that smaller volumes of fluid can achieve excellent results. One example is the foam frac which consists of a gas and water phase with large concentrations of surfactants. This system can reduce the water requirements by more than 75 percent over conventional gel or water fracs. Sand concentrations in excess of 15 pounds per gallon of water are possible. While this system is not used in open hole completions because of the danger involved, it is an effective fluid reduction technique in cased wells. Although it is a more expensive method, great reductions in spent fracturing fluid, water handling, clean-up and storage, and reservoir damage are definite benefits. The results of this type of fracturing may be unsatisfactory in some formations.

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(d) Water-Oil Ratio Improvement Chemicals

Water-oil ratio improvement chemicals consist of polymeric materials which decrease the relative permeability of the rock to water as compared to oil. They are introduced into the formation by pumping under pressure. Thus, a more favorable water-to-oil ratio is achieved. This practice reduces the amount of produced water and is only approved for use in closed loop systems.

(e) Evaporation

Natural evaporation from open holding ponds as a waste fluid disposal alternative is not viable year-round in Pennsylvania. The average yearly precipitation throughout the state exceeds evapotranspiration by 10 to 24 inches. As a result, uncovered impoundments that may be utilized to evaporate wastewater would increase in fluid volume from precipitation rather than decrease in volume through evaporation. Only during selected months does evaporation occur at a significant rate in Pennsylvania. However, even during these months, precipitation may exceed the reported evaporation rate.

Innovative systems that enhance evaporation artificially, however, may be viable methods of wastewater reduction or disposal. Such systems, using waste heat at compressor stations, exist in Pennsylvania today and have proven to be effective.

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APPENDIX F

DEP COMPREHENSIVE STORMWATER MANAGEMENT POLICY

This policy document describes DEP's update of its stormwater management programs, using existing authority to improve water quality, sustain water quantity including groundwater recharge and stream base flow, and to implement federal stormwater management obligations.

This policy provides a framework for the integration of all DEP stormwater management programs and promotes a comprehensive watershed approach to stormwater management in the Commonwealth. This policy identifies and integrates existing legal requirements and post-construction stormwater management planning goals, objectives, and recommended procedures into the various DEP stormwater management programs.

Unmanaged or poorly managed stormwater can result in stream bank scour, stream destabilization, sedimentation, loss of groundwater recharge, loss of base flow, localized flooding, habitat modification, and water quality and quantity impairment. Conversely, properly managed stormwater through properly constructed and maintained BMPs can remove pollutants, facilitate groundwater recharge through retention and infiltration, provide base flow for surface waters, and maintain the stability and the environmental integrity of waterways and wetlands. To provide long-term protection and sustainability of ground and surface water resources, stormwater should be managed at the source or origin as an environmental resource to be protected rather than as a waste to be quickly discharged and moved downstream.

Fundamentally, the goals of the policy are to improve and sustain ground and surface water quality and quantity through the use of planning practices and BMPs that minimize the generation of stormwater runoff, provide groundwater recharge and minimize the adverse effects of stormwater discharges on ground and surface water resources. This policy also supports the fulfillment of the state's obligation under Title 25 Pa. Code Section 93.4a to protect and maintain existing uses and the level of water quality necessary to protect those uses in all surface waters and to protect and maintain water quality in "special protection" waters. Special protection waters are Pennsylvania's highest quality surface waters and include EV and HQ waters.

Recommended Post-Construction Stormwater Management Process to Meet Regulatory Standards

Procedurally, post-construction stormwater management plans required under the NPDES Stormwater Discharges Associated with Construction Activities permit program and the NPDES Municipal Separate Storm Sewer System (MS4) permit program, as well as stormwater management plans developed under the Act 167 program, must demonstrate compliance with the antidegradation requirements at Title 25 Pa. Code Section 93.4a to protect and maintain existing uses and the level of water quality necessary to protect those uses in all surface waters and protect and maintain water quality in special protection waters.

This policy recommends that in order to meet the regulatory requirements of Title 25 Pa. Code Section 93.4a, persons involved in the development of post-construction stormwater management plans should prepare a comparative pre- and post-construction stormwater management analysis.

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In watersheds other than special protection, based upon the comparative stormwater management analysis, planners and applicants should evaluate and utilize infiltration BMPs to manage the net change in stormwater generated or otherwise replicate to the maximum extent possible pre-construction stormwater infiltration and runoff conditions so that post-construction stormwater discharges do not degrade the physical, chemical, or biological characteristics of the receiving waters. Additionally, water quality treatment BMPs must be employed where necessary to ensure protection of existing uses and the level of water quality necessary to protect those existing uses. Finally, the volume and rate of stormwater discharges must be managed to prevent the physical degradation of receiving waters, such as scour and streambank destabilization.

In special protection watersheds, based upon the comparative stormwater management analysis, planners and applicants can ensure that existing water quality will be protected and maintained by demonstrating that post-construction infiltration equals or exceeds pre-construction infiltration and that any post-construction discharge will not degrade the physical, chemical, or biological characteristics of the special protection surface water. In these special protection watersheds, infiltration BMPs should be used to the maximum extent possible. To the extent that planners and applicants cannot totally infiltrate stormwater to pre-construction volumes due to site conditions or limitations, off-site compensation projects in the same watershed and preferably upstream of the project site should be evaluated and employed to protect and maintain water quality. Additionally, water quality treatment BMPs must be employed where necessary to ensure the protection and maintenance of water quality. Finally, the volume and rate of stormwater discharges must be managed to prevent the physical degradation of receiving waters, such as scour and streambank destabilization.

Overall, the implementation of these stormwater management approaches will meet the requirements of Title 25 Pa. Code Section 93.4a by reducing pollutant loads to streams, recharging aquifers, protecting stream base flows, preventing stream bank erosion and streambed scour, and protecting the environmental integrity of receiving waters.

Integration of Post-Construction Stormwater Management Planning into Existing Stormwater Programs

NPDES Stormwater Discharge Associated with Construction Activity Permit Program

Pennsylvania regulates stormwater impacts occurring during construction under the Erosion and Sediment Pollution Control Program. All earth disturbances of 5,000 square feet or greater require the development and implementation of an erosion and sediment control plan under Title 25 Pa. Code Chapter 102. Erosion and sediment control BMPs are used to minimize the potential for accelerated erosion and sediment pollution from these activities. DEP's *Erosion and Sediment Pollution Control Manual*, DEP ID: 363-2134-008 available on DEP's website, that identifies BMPs, provides recommended site design standards and specifications as well as their applicability to various situations. For HQ and EV watersheds, there are more protective BMP requirements contained in Chapter 102. Beyond these planning and implementation requirements persons conducting earth disturbance activities are required to secure the appropriate NPDES permit as follows:

Phase I Earth Disturbances 5 Acres or Greater

EPA regulations implementing the Clean Water Act require NPDES permits for construction activities of 5 acres or greater (Phase I). Using its existing authority pursuant to DEP's regulations found in

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Title 25 Pa. Code Chapters 92, 93, 96, and 102, Pennsylvania began to implement the Phase I Stormwater NPDES program in 1992. Under DEP's regulations, any earth disturbance 5 acres or greater (including earth disturbances of less than 5 acres that occur as a part of a larger common plan of development or sale consisting of 5 acres or more) requires a permit prior to the commencement of the earth disturbance. An individual NPDES permit is required for projects located in HQ and EV watersheds and in most circumstances a general permit is available for use in all other watersheds. DEP has delegated the primary functions and responsibilities of the program to County Conservation Districts under the authority contained in the Conservation District Law.

Phase II Earth Disturbance between 1 and 5 Acres

In 1999, EPA promulgated Phase II stormwater regulations establishing NPDES permit requirements for construction activities with between 1 and 5 acres of earth (including earth disturbances less than 1 acre that occur as part of a larger common plan of development or sale between 1 and 5 acres), with a point source discharge. Pennsylvania is required to implement the Phase II requirements by December 8, 2002.

An NPDES Phase II permit is not required for earth disturbance activities of between 1 and 5 acres unless there is point source discharge of stormwater to surface waters of the Commonwealth. For activities that do not have a point source discharge, the erosion and sediment pollution control plan requirements in Chapter 102 described above will be used as the substantive environmental control requirements for those projects. Earth disturbance activities of between 1 and 5 acres (small construction sites) that include a point source discharge and which are located in HQ and EV watersheds require an individual NPDES permit. In most circumstances a general permit is available for use in all other watersheds.

Integration of Post-Construction Stormwater Management Plans into NPDES Stormwater Discharge Associated with Construction Activity Permits

Since 1990, the Federal NPDES regulations have required the identification of post-construction stormwater management BMPs in the permit application or NOI for General Permit users. To further advance effective stormwater management and to support the regulatory requirements found at Title 25 Pa. Code Section 93.4a, DEP has amended the permit application and NOI for General Permits to require the identification of post-construction stormwater management BMPs within a site specific post-construction stormwater management plan. Post-Construction Stormwater Management Plans should be developed in accordance with the process described above and supported by references listed in Appendix A of this policy.

NPDES Municipal Separate Storm Sewer System (MS4) Discharge Permit Program

The federal Phase II stormwater regulations also established NPDES permit requirements for MS4 discharges from Municipal Separate Storm Sewer Systems (MS4s). Pennsylvania is required to implement these MS4 requirements by December 2002. Based on 1990 census data there are approximately 700 municipalities and other facilities within the Commonwealth that must meet the Phase II permit requirements.

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In general terms, the MS4 permit requirements are to develop, implement, and enforce a BMP based stormwater program with these six elements:

1. Implement a public education program;

2. Include public involvement in decision making;

3. Eliminate or treat discharges not composed entirely of stormwater;

4. Require erosion and sediment controls for construction activities;

5. *Require BMPs to manage post-construction stormwater for new development and redevelopment; and*

6. Require pollution prevention/good housekeeping for municipal operations.

EPA's Phase II regulations allow existing state and local regulatory programs to be used to meet the MS4 requirements. DEP will use a general permit to cover the required program elements in watersheds other than special protection. Pennsylvania will use the Stormwater Management Act (Act 167) Program as a centerpiece of the MS4 program for Pennsylvania. In general, municipalities that have developed and are implementing an Act 167 Plan developed on a watershed basis that includes the water quality protective measures, including an MS4 module, will be able to meet the EPA MS4 NPDES requirements through the Act 167 process.

Municipalities that are required to obtain an MS4 permit but which have discharges to watersheds without an approved Act 167 Plan that meets the water quality requirements of Title 25 Pa. Code Section 93.4a will be encouraged to work with their county to develop a stormwater plan that meets the requirements of Act 167 and the Phase II MS4 permit. Financial assistance for that effort is authorized under Act 167 and a special MS4 module is available for this purpose. Municipalities that do not want to participate in the Act 167 process will be required to develop a separate municipal plan to meet the MS4 requirements without the use of state cost-sharing funding under Act 167.

Integration of Post-Construction Stormwater Management Plans into Act 167 Stormwater Management Plans and MS4 Permits

Under the Stormwater Management Act (Act 167), counties are required to develop a watershed based stormwater management plan that is implemented by affected municipalities through municipal ordinances. Both the statute and implementation guidelines require these plans to include provisions to protect water quality, existing uses and the level of water quality necessary to protect those existing uses in all surface waters, and to protect and maintain water quality in special protection waters. Funding has generally been available from DEP to cover 75 percent of the cost to develop the plan. Act 167 also authorizes funding to support municipal implementation of ordinances adopted under the Act 167 plan.

This program has evolved since it began in 1979. Watershed based stormwater management plans developed under Act 167 approved by DEP will include water quality and quantity protection requirements to be implemented by municipalities at the local level as discussed above. Where Act 167 plans implement these water quality and quantity requirements, individuals and DEP may rely on those

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Act 167 plans and implementing municipal ordinances to meet the relevant MS4 NPDES permitting requirements for municipalities under the Clean Water Act Phase II stormwater program.

DEP will encourage the use of Act 167 plans to facilitate implementation of the new MS4 NPDES permit program described above by including an "MS4 module" in the planning process. In this way, municipalities required to meet the MS4 requirement will be able to do so using the watershed plans, cost-share funds, and municipal ordinances available under Act 167.

NPDES Industrial Stormwater Permit Program

The existing Phase I of the federal NPDES stormwater permitting regulations for industrial facilities includes 11 categories of industrial activity that are required to be permitted, including the construction activities discussed previously in this policy (5 acres or more).

A permit exception is incorporated in the Phase II program. This exception is referred to as the "no exposure certification" exception. The exception allows all but 1 (construction) of the 11 industrial activities to bypass the permitting process and requirements if their industrial activities and materials are not "exposed to stormwater." A similar exception under Phase I only applied to one industrial activity, commonly referred to as "light industry." "Light industry" operators were not required to submit any information supporting their claim for the exception.

The Phase II program covers the same industrial categories but expands the "no exposure" permit exception. The exception previously enjoyed by "light industry" activities is now available for all categories (except for construction activity) listed under the definition of "industrial activity." The new rule allows for a simple and cost-effective way to comply with permitting provisions when industrial activities and materials are completely sheltered from stormwater. Under the EPA rule, operators now have the option of either applying for a permit, or submitting a "no exposure certification" form, conditioned on the discharge not contributing "to the violation of, or interfering with the attainment or maintenance of, water quality standards, including designated uses."

DEP will implement the "no exposure certification" by amending its existing stormwater discharge general permit for industrial activities. The next permit revision will provide all permittees with an option to either submit the NOI for coverage under the statewide general permit, or to submit a "no exposure certification" statement. The certifications must be made on a facility-wide basis and are required every 5 years.

Flood Protection and Combined Sewer Overflow Programs

While stormwater management is related to flood protection, this policy is not intended to address major flood events on streams and rivers or modify existing flood protection programs and policies of DEP. Additionally, this policy is not intended to modify or otherwise affect existing policies and programs of DEP related to combined sewer overflows.

Technical Support and Guidance

There are numerous sources of technical support and guidance available in print and electronically which provide an array of development planning options and post-construction stormwater BMPs that can be used to meet the objectives of this policy and underlying legal requirements. A list of recently

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developed manuals and reference materials is included in Attachment A of this Appendix. DEP is in the process of developing a Pennsylvania specific post-construction stormwater BMP manual that is expected to be available in 2004.

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Attachment A

Stormwater Management BMP Manuals

Delaware Conservation Design For Stormwater Management Guidance Manual (1997)
Address: DNREC
Division of Soil and Water Conservation
Sediment and Stormwater Program
89 Kings Highway
Dover, DE 19901
Website: www.dnrec.state.de.us/dnrec2000/Divisions/Soil/Stormwater/Apps/DesignManualRequest.htm
Cost: $25

2000 Maryland Stormwater Design Manual (10/2000)
Address: Maryland Department of the Environment
Water Management Administration
Nonpoint Source Program
2500 Broening Highway
Baltimore, MD 21224
(410) 631-3543 or 1-800-633-6101
Website: www.mde.state.md.us/environment/wma/stormwatermanual/Manual_CD/Introduction.pdf
www.mde.state.md.us/environment/wma/stormwatermanual/publist2.htm
Cost: October 2000 edition, web download – free
April 2000 edition, printed version - $25

Revised Manual for New Jersey: Best Management Practices for Control of Nonpoint Source Pollution from Stormwater (5/2000, 5th draft)
Address: NJDEP
Division of Watershed Management
Sandra A. Blick
PO Box 418
Trenton, NJ 08625-0418
H2Oshed@dep.state.nj.us
Website: www.state.nj.us/dep/watershedmgt/bmpmanual.htm
Cost: web download - free

New York State Stormwater Management Design Manual (10/2001)
Address: New York State
Department of Environmental Conservation
625 Broadway
Albany, NY 12233
Webpage: www.dec.state.ny.us/website/dow/swmanual/swmanual.html
Cost: web download - free

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Pennsylvania Handbook of Best Management Practices for Developing Areas (1997)

Address: PACD
25 North Front St.
Harrisburg, PA 17101
(717) 236-1006
(717) 236-6410 - fax

Website: www.pacd.org/products/bmp/bmp_handbook.htm
www.pacd.org/products/bmp/bmp_orderform.htm

Cost: web download – free (limited browser version)
printed version - $20-30

Center for Watershed Protection

Address: 8391 Main Street
Ellicott City, MD 21043-4605
(410) 461-8323
(410) 461-8324 - fax

Website: www.cwp.org/

Pennsylvania Department of Environmental Protection

Address: Bureau of Watershed Management
Division of Waterways, Wetlands and Erosion Control
P. O. Box 8775
Harrisburg, PA 17105-8775
(717) 787-6827
(717) 787-5986 - fax

Website: www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/stormwatermanagement.htm
www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WWEC/StrmH2O_Home.htm

Address: Southeast Regional Office
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428
(610) 832-6130
(610) 832-6133 - fax

Website: www.dep.state.pa.us/dep/deputate/fieldops/se/stormwater.htm

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APPENDIX G

CHAPTER 23. ENVIRONMENTAL QUALITY BOARD POLICY FOR PROCESSING PETITIONS - STATEMENT OF POLICY

§23.1. Petitions.

(a) Petitions shall be submitted on forms supplied by DEP to the Secretary of the Department of Environmental Protection, Rachel Carson State Office Building, Post Office Box 2063, Harrisburg, Pennsylvania 17105-2063, and shall contain the following information:

(1) The petitioner's name, address and telephone number.

(2) A description of the action requested in the petition and one of the following:

(i) Suggested regulatory language if the petition requests that the EQB adopt or amend regulations.

(ii) A specific citation to the regulations to be repealed if the petition requests that the EQB repeal existing regulations.

(3) The reason the petitioner is requesting this action from the EQB, including factual and legal contentions as well as supporting documentation which establish the petitioner's justification for the requested action by the EQB.

(4) The types of persons, businesses and organizations likely to be impacted by this proposal.

(5) For petitions for redesignation of streams under Chapter 93 (relating to water quality standards) and The Clean Streams Law (35 P. S. §§691.1-691.1001), the petition shall include the following information to satisfy paragraph (3):

(i) A clear delineation of the watershed or stream segment to be redesignated, both in narrative form and on a map.

(ii) The current designated uses of the watershed or segment.

(iii) The requested designated uses of the watershed or segment.

(iv) Available technical data on instream conditions for the following: water chemistry, the aquatic community (benthic macroinvertebrates or fishes, or both) or instream habitat. If these data are not included, provide a description of the data sources investigated.

(v) A description of existing and proposed point and nonpoint source discharges and their impact on water quality or the aquatic community, or both. The names, locations and permit numbers of point source discharges and a description of the types and locations of nonpoint source discharges should be listed.

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vi) Information regarding any of the qualifiers for designation as High Quality Waters (HQ) or Exceptional Value Waters (EV) in §93.4b (relating to qualifying as HQ or EV waters) used as a basis for the requested designation.

(vii) A general description of land use and development patterns in the watershed. Examples include the amount or percentage of public lands (including ownership) and the amount or percentage of various land use types (such as residential, commercial, industrial, agricultural and the like).

(viii) The names of all municipalities through which the watershed or segment flows, including an official contact name and address.

(ix) Locational information relevant to subparagraphs (iv)-(viii) (except for contact names and addresses) displayed on maps, if possible.

(b) The general procedures in this chapter apply to petitions unless the EQB adopts specific procedures for a particular type of petition. Special procedures have been adopted for petitions requesting that the EQB designate an area as unsuitable for mining activity. These petitions are reviewed under Chapter 86 (relating to surface and underground coal mining: general).

§23.2. Departmental review.

DEP will examine the petition to determine if it meets the following conditions:

(1) The petition is complete as required by §23.1 (relating to petitions).

(2) The petition requests an action that can be taken by the EQB.

(3) The requested action does not conflict with Federal law.

§23.3. Notification.

DEP will notify the EQB and petitioner of its determination within 30 days of receipt of the petition. If DEP determines that the petition is not appropriate for submittal to the EQB because it does not meet each of the conditions in §23.2 (relating to Departmental review), DEP's notification shall state the reasons for its determination and give the petitioner 30 days to complete the petition or modify the request.

§23.4. Oral presentation.

At the next EQB meeting occurring at least 15 days after DEP's determination that a petition is appropriate for consideration by the EQB, the Chairperson of the EQB shall inform the EQB of the petition for rulemaking, the nature of the request and the petitioner. The Chairperson shall give the petitioner or the petitioner's representative the opportunity to make a 5-minute oral presentation on why the EQB should accept the petition. DEP will also make a recommendation on whether the EQB should accept the petition.

§23.5. Board determination.

The EQB may refuse to accept a petition if it determines that one or more of the following conditions exist:

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(1) The EQB has within the previous 2 years considered the issue addressed by the petition for rulemaking as part of an earlier decision concerning the adoption, amendment or deletion of a regulation.

(2) The action requested by the petitioner concerns a matter currently in litigation.

(3) The requested action is not appropriate for rulemaking by the EQB due to policy or regulatory considerations.

(4) The petition involves an issue previously considered by the EQB, and it does not contain information that is new or sufficiently different to warrant reconsideration of that decision. If a petition does present new or sufficiently different information, this information must have been either unavailable at the time of the EQB's previous decision or not contained in the record of the proceeding in which the previous decision was made.

§23.6. Notice of acceptance and Department report.

If the EQB accepts the petition, a notice of acceptance will be published in the *Pennsylvania Bulletin* within 30 days. In addition, a report will be prepared in accordance with one of the following procedures:

(1) *Petitions other than stream redesignation petitions.* DEP will prepare a report evaluating the petition within 60 days. If the report cannot be completed within the 60-day period, at the next EQB meeting DEP will state how much additional time is necessary to complete the report. DEP's report will include a recommendation on whether the EQB should approve the action requested in the petition. If the recommendation is to change a regulation, the report will also specify the anticipated date that the EQB will consider a proposed rulemaking.

(2) *Stream redesignation petitions.* DEP will publish notice of its intent to assess the waters subject to evaluation. The notice will include a request for submittal of technical data that interested persons have. Following the assessment and review of all technical data, DEP will prepare a draft evaluation report.

§23.7. Response to report.

Upon completing the report, DEP will send a copy of the report to the petitioner. Within 30 days of the mailing of the report, the petitioner may submit to DEP a written response to the report.

§23.8. Board consideration.

DEP will prepare a recommendation to the EQB based on the report and comments received from the petitioner. If regulatory amendments are recommended, DEP will develop a proposed rulemaking for EQB consideration within 6 months after DEP mailed its report to the petitioner. If regulatory amendments are not recommended, DEP will present its recommendation and basis to the EQB at the first meeting occurring at least 45 days after DEP mailed its report to the petitioner.

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