**To:** Rowe, Rosemary[Rowe.Rosemary@epa.gov]; Laidlaw, Tina[Laidlaw.Tina@epa.gov]
**Cc:** Habeck, Bob[BHabeck@mt.gov]; Coate, Carson[Coate.Carson@epa.gov]
**From:** Skubinna, Paul
**Sent:** Thur 7/18/2013 7:09:06 PM
**Subject:** Draft PW manual
MPDES PWM Draft September30 2009(r_ver).doc

Rosemary/Tina, Good to get a chance to visit with you today. This of course is draft and I'm not sure there is consensus here within DEQ that this is ready to be shared with EPA. None-the-less, in the interest of open good-faith staff-to-staff communication, see attached. Please share with discretion and do let me know what you think if you have time to take a look.

Tina, not sure if I got your email correct, let me know that you received this.

FYI – based on a cursory glance, there does not appear to be much description of how to determine if something is a "new or increased source," but there are a couple cursory litmus metrics laid out (see bottom of pg 103 and the preceding discussion, and also pp 37 and 82 for additional discussion).

Cheers,

--PS

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Paul Skubinna

Water Protection Bureau

MT Dept of Environmental Quality

406.444.3639

# Montana Pollutant Discharge Elimination System Implementation Policy and Procedures Manual

## ***September 30, 2009 UPDATED DRAFT***

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# Chapter 1. Introduction

The *Montana Pollutant Discharge Elimination System (MPDES) Implementation Policy and Procedures Manual* (Manual) reviews the statutory and regulatory framework of the MPDES program and technical issues that a permit writer should consider when developing MPDES permits for wastewater discharges. Where appropriate, this Manual includes the same guidance and information contained in the United States Environmental Protection Agency's (USEPA's) *National Pollutant Discharge Elimination System (NPDES) Permit Writers' Manual* (USEPA 2010 [anticipated]). In many cases, however, Montana's regulations, policy, and procedures are more detailed than the federal regulations and guidance.

The Manual is divided into 17 Chapters. The entire printed Manual is available in a binder. In addition, a file with the entire manual and separate files with each chapter are available on the Montana Department of Environmental Quality (Department) Website. This method of formatting the Manual serves two purposes. First, having the Manual and its individual chapters available online allows permit writers or other interested readers to readily access the entire document or a smaller searchable document focusing on a specific subject of interest. Second, printing the Manual in binder form allows it to remain a "living" document. As the MPDES program is affected by new statutes, regulations, or policies and as the program continues to develop, this format allows changes to the Manual to be incorporated more readily than if it were published as a single, bound document.

## 1.1. Purpose of This Manual

The Department developed this Manual as a basic reference for Montana permit writers. The Manual outlines and explains the core elements of the MPDES permit program. In addition, some sections of the Manual include step-by-step approaches for developing specific aspects of an MPDES permit (e.g., determining the need for water quality-based effluent limitations).

Throughout the Manual, the reader will find chapters that:

- Provide an overview of the scope and regulatory framework of the MPDES program and describe the essential components of a permit and the permitting process;
- Describe the different types of effluent limitations, the legal and technical considerations involved in developing effluent limitations, and the steps a permit writer takes to calculate effluent limitations;
- Describe the technical and legal considerations involved in developing other permit conditions including:
  - monitoring and reporting requirements;
  - special conditions; and
  - standard conditions;
- Describe other permitting considerations such as nondegradation and anti-backsliding; and
- Explain the administrative process for issuing, modifying, revoking and terminating MPDES permits.

This Manual is intended to be a thorough guide for permit writers, but cannot and does not stand on its own as a complete reference manual. Where appropriate, it identifies relevant regulations and other guidance documents that may be useful references for permit writers. Each chapter concludes with a list of references cited in the chapter or that further address subject matter covered in the chapter.

## 1.2. Additional MPDES Tools

In addition to this Manual, the Department has developed other tools to assist MPDES permit writers. The Department has created a spreadsheet tool that permit writers can use to assess the need for and calculate water quality-based effluent limitations and a permit template and fact sheet for individual MPDES permits.

The spreadsheet tool, called the MPDES e-Permit Tool, is referenced in text boxes marked by the computer symbol at right. The text boxes discuss how the MPDES e-Permit Tool is used to implement the procedures in this Manual.

**Permit X.X**

**Fact Sheet X.X**

The MPDES Permit and Fact Sheet Template outlines the major components of a permit and accompanying fact sheet and provides standard or sample permit text for particular permit requirements. As this Manual discusses the components of MPDES permits and considerations for developing permit requirements, it references the corresponding section and, if available, standardized or sample text in the templates as indicated by text boxes similar to the sample at left.

## *1.3. Other NPDES and MPDES Information*

Web sites and electronically stored publications and data are available to help permit writers draft MPDES permits. The electronic tools listed below apply to all aspects of permit development and serve as valuable references for the permit writer.

### 1.3.1. Web Sites and Tools

The Department has developed the MPDES Web site <http://www.deq.state.mt.us/wqinfo/MPDES/Index.asp> to present information to the public about the MPDES program and associated programs and activities.

The Water Permits Division (WPD) within the USEPA Office of Water, Office of Wastewater Management, has developed a comprehensive NPDES Web site <www.epa.gov/npdes> with technical and regulatory information about the NPDES permit program, information on related programs and initiatives, and documents published by WPD. WPD also has prepared tools to help permit writers draft permits.

- Overview of NPDES Permit Writers Management Tools <http://cfpub.epa.gov/npdes/pwmtools.cfm?program_id=45>
- NPDES Permit Program Basics: Regulations <http://cfpub.epa.gov/npdes/regs.cfm?program_id=45>
- View Individual and General Permits <http://cfpub.epa.gov/npdes/permitissuance/genpermits.cfm>
- NPDES Publications <http://cfpub.epa.gov/npdes/pubs.cfm?program_id=0>
- Water Quality and Technology-based Permitting <http://cfpub.epa.gov/npdes/generalissues/watertechnology.cfm?program_id=45>

USEPA Region 8 also has an NPDES Web Site that provides information on important aspects of the NPDES program in the Region. In addition, the Region's Water Quality Standards Web site includes a page with links to several guidance documents related to water quality standards and permitting. Some helpful USEPA Region 8 Web sites include:

- EPA Region 8 NPDES Program <http://www.epa.gov/region8/water/npdes/index.html>; and
- EPA Region 8 Water Quality Standards Guidance Documents <http://www.epa.gov/region8/water/wqs/wqsdocs.html>.

### 1.3.2. Hyperlinks in This Document

Where a Web site provides supplementary information or is referenced in this Manual, the actual site address appears inside the symbols "< >" so that readers will have a reference to the address even in a printed version of this document. In the electronic version of the Manual, the text in carats is also a hyperlink to the referenced Web site. Care has been taken to provide the correct Web addresses and hyperlinks; however, these references could change or become outdated following initial publication of this Manual.

### 1.3.3. Statutory and Regulatory Citations

There are a number of different conventions for legislative and regulatory citations. This Manual uses the following conventions:

When citing the United States Code, the abbreviation U.S.C. is used. The abbreviation is preceded by the Title of the U.S.C. and then followed by the section number.

*Examples*: 16 U.S.C. 1531 et seq. or 33 U.S.C. 1251 – 1387;

When citing the Clean Water Act, the abbreviation CWA is used. The abbreviation is followed by the word "section" and then the section number.

*Examples*: CWA section 402 or CWA section 402(o);

When citing the Code of Federal Regulations, the convention depends on the location of the reference. For first references in a chapter or section or when necessary to distinguish the federal regulations from State regulations, the abbreviation CFR is preceded by the Title of the CFR and then followed either by the word "Part" (if it is a Part) or the number of the sub-section (if it is a sub-part or sub-section).

*Examples*: 40 CFR Part 136 or 40 CFR 122.44.

When citing the Montana Code Annotated, the abbreviation MCA is used. The abbreviation is preceded by the Title, Chapter, Section, and Sub-Section number.

*Example*: 75-5-301(3) MCA

When citing the Administrative Rules of Montana, the abbreviation ARM is used. The abbreviation is followed by the Chapter, Sub-Chapter, and Rule number.

*Example*: ARM 17.30.619(g)

Where State of Montana regulations specify requirements that are the same as or more detailed than the federal regulations, the primary regulatory citation given is for the State of Montana regulations, though a citation to the federal regulations might be given as well. Where the State of Montana regulations incorporate federal regulations by reference, both regulatory citations are given.

## 1.4. References

USEPA, 2010 [anticipated]. U.S. Environmental Protection Agency. *U.S. EPA National Pollutant Discharge Elimination System (NPDES) Permit Writers' Manual*. EPA-833-B-09-003. U.S. Environmental Protection Agency, Office of Wastewater Management, Washington, DC. XXX 2010. <ENTER NEW WEB ADDRESS>

# Chapter 2. Overview of the MPDES Program

This chapter presents an overview of the statutory and regulatory framework for the Montana Pollutant Discharge Elimination System (MPDES) program, the different types of MPDES permits, the major permit components, and the permit development and issuance process. The permit process and the specific tasks identified in this chapter are described in detail in subsequent chapters.

## *2.1. The Clean Water Act*

The history of major water pollution control legislation in the United States dates back to the end of the 19th century. **Exhibit 2-1** presents a summary of key legislative and executive efforts in the history of clean water program development in the United States.

**Exhibit 2-1. Important milestones of national clean water program development**

1899 Rivers and Harbors Act
1948 Federal Water Pollution Control Act (FWPCA)
1965 Water Quality Act
1970 Executive Order–U.S. Environmental Protection Agency (USEPA) established
1970 Refuse Act Permit Program (RAPP)
1972 FWPCA Amendments
1977 Clean Water Act (CWA)
1987 Water Quality Act (WQA)

The 1899 Rivers and Harbors Act, established permit requirements to prevent unauthorized obstruction or alteration of any navigable water of the United States. Additional federal statutes that became law during the 20th century began to address water pollution control for public health and ecological protection (e.g., the Federal Water Pollution Control Act of 1948 and the Water Quality Act of 1965).

The Federal Water Pollution Control Act (FWPCA) Amendments of 1972 provided a comprehensive re-codification and revision of past federal water pollution control law and is the foundation for the present national clean water programs, including the National Pollutant Discharge Elimination System (NPDES) permit program. The FWPCA Amendments of 1972 established a series of goals and policies in section 101. One important goal was that the discharge of pollutants into navigable waters be eliminated by 1985. Although this goal was not met, it remains a principle underlying development of the technology-based standards that are implemented in NPDES permits through technology-based effluent limitations. Technology-based standards and effluent limitations are discussed in detail in Chapters 4-7. The 1972 FWPCA Amendments also set an interim goal of achieving "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water" by July 1, 1983, commonly referred to as the "fishable and swimmable" goal of the Act. They also established a national policy "that the discharge of toxic pollutants in toxic amounts be prohibited." The "fishable and swimmable" goal and the "no toxics in toxic amounts" policy underlie development of water quality standards which, in turn, are the basis for water quality-based effluent limitations in NPDES permits. Section 402 of Title IV of the FWPCA, Permits and Licenses, specifically created today's system for permitting wastewater discharges, known as the NPDES program. Under the requirements of this program, a point source may be authorized to discharge pollutants into waters of the United States by obtaining a permit (as discussed in **Section 2.4** below).

Since 1972, the FWPCA has been amended further, including the 1977 **Clean Water Act** (which gave the statute its current name) and the 1987 **Water Quality Act**. These amendments further advanced development of the NPDES program (e.g., placing an emphasis on toxic pollutants and water quality-based effluent limitations, clarifying requirements for storm water permitting).

**Exhibit 2-2** summarizes the titles and major provisions of the current Clean Water Act <http://epw.senate.gov/water.pdf> (CWA). Although the basic NPDES program requirements are found in Title IV,

several sections of the CWA have provisions related to the NPDES program (e.g., section 301 – Effluent Limitations).

Exhibit 2-2. Titles and major provisions of the CWA related to the NPDES program

| | |
|---|---|
| Title I | Research and Related Programs |
| Title II | Grants for Construction of Treatment Works |
| Title III | Standards and Enforcement<br>Section 301 - Effluent Limitations<br>Section 302 - Water Quality-Related Effluent Limitations<br>Section 303 - Water Quality Standards and Implementation Plans<br>Section 304 - Information and Guidelines [Effluent]<br>Section 305 - Water Quality Inventory<br>Section 307 - Toxic and Pretreatment Effluent Standards |
| Title IV | Permits and Licenses<br>Section 402 - NPDES<br>Section 405 - Disposal of Sewage Sludge |
| Title V | General Provisions<br>Section 502 - Definitions<br>Section 510 - State Authority<br>Section 518 - Indian Tribes |
| Title VI | State Water Pollution Control Revolving Funds |

## 2.2. *The Montana Water Quality Act*

Portions of the **Montana Water Quality Act** (MWQA) <http://data.opi.mt.gov/bills/mca_toc/75_5.htm>, found in Title 75, Chapter 5 of the Montana Code Annotated (MCA), were signed into law in 1967, but the Act has been amended several times since. The MWQA states in 75-5-101 MCA that:

It is the public policy of this state to:

(1) conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies, wildlife, fish and aquatic life, agriculture, industry, recreation, and other beneficial uses;
(2) provide a comprehensive program for the prevention, abatement, and control of water pollution; and
(3) balance the inalienable rights to pursue life's basic necessities and possess and use property in lawful ways with the policy of preventing, abating, and controlling water pollution in implementing the program referred to in subsection (2).

The remaining sections of the MWQA authorize or require the Board of Environmental Review (Board) and the Department of Environmental Quality (Department) to develop programs for attaining these goals. The MWQA is divided into 11 parts, with some reserved for future use, as summarized in **Exhibit 2-3**.

**Exhibit 2-3. Summary of the sections of the Montana Water Quality Act**

| Part | Title | Includes… |
|---|---|---|
| Part 1 | General Provisions | Definitions |
| Part 2 | Administrative Agencies | Provisions defining the roles and responsibilities of administrative agencies |
| Part 3 | Classifications and Standards | Requirements for adoption of water quality standards, pretreatment standards, and other effluent standards |
| Part 4 | Permits | Requirements for the Board to adopt rules for the MPDES program and for the Department to implement the program |
| Part 5 | Financial Provisions | Provisions allowing the Board and Department to accept grants and provisions governing the fees collected by the Department and rates charged by sewage system operators |
| Part 6 | Enforcement, Appeal, and Penalties | Authorization for the Department to require cleanup and monitoring and to conduct inspections and provisions regarding |

| | | |
|---|---|---|
| | | violations of statutory, regulatory, or permit requirements |
| Part 7 | Water Quality Assessment | Requirements for assessing the State's waters, listing impaired waters, and developing and implementing total maximum daily loads (TMDLs) |
| Part 8 | Concentrated Animal Feeding Operations | Permitting requirements, including fees and environmental review requirements, and adoption of federal regulations by reference |
| Parts 9-10 | Reserved | N/A |
| Part 11 | Water Pollution Control State Revolving Fund | Requirements for administering the State Revolving Fund Program |

## 2.3. Federal and State Regulations

While Congress' intent was established in the CWA, USEPA had to develop specific regulations to carry out the Congressional mandate for clean water programs. The regulations developed by USEPA to implement and administer the NPDES program primarily are found in Title 40 of the **Code of Federal Regulations (CFR) Part 122 (40 CFR Part 122)** <http://www.access.gpo.gov/nara/cfr/waisidx_00/40cfr122_00.html>.

The CFR is an annual codification of the general and permanent rules published in the **Federal Register** (FR) <http://www.gpoaccess.gov/fr/index.html> by the executive departments and agencies of the federal government. The CFR is divided into 50 Titles that represent broad areas subject to federal regulation. Title 40 covers protection of the environment and includes USEPA and Council on Environmental Quality (CEQ) regulations and Uniform National Discharge Standards for Vessels of the Armed Forces.

The FR is a legal "magazine" that contains federal agency regulations; proposed rules and notices; and executive orders, proclamations, and other Presidential documents. The National Archives and Records Administration (NARA), an independent federal agency responsible for managing all Federal records, publishes the FR and CFR.

The text of all final regulations is found in the CFR. The background and implementation information related to these regulations, however, are found in the preamble to the regulations contained in the FR. This information is important to permit writers because it explains the legal, technical, and scientific bases on which regulatory decisions are made. **Exhibit 2-4** summarizes the parts of 40 CFR that are related to the NPDES program.

**Exhibit 2-4. Federal regulations related to the NPDES program (40 CFR)**

| | |
|---|---|
| Part 121 | State certification |
| Part 122 | The federal NPDES permit program |
| Part 123 | State program requirements |
| Part 124 | Procedures for decisionmaking |
| Part 125 | Technology standards |
| Part 129 | Toxic pollutant effluent standards |
| Part 130 | Water quality planning and management |
| Part 131 | Water quality standards |
| Part 133 | Secondary treatment regulations |
| Part 135 | Citizen suits |
| Part 136 | Analytical procedures |
| Part 257 | State sludge disposal regulations |
| Part 401 | General effluent guidelines provisions |
| Part 403 | General pretreatment regulations |
| Parts 405-471 | Effluent limitations guidelines |
| Part 501 | State sludge management program requirements |
| Part 503 | Standards for use or disposal of sewage sludge |

The key rules for the MPDES program are found in **ARM Title 17, Chapter 30, Sub-Chapters 12 and 13** <http://www.deq.state.mt.us/dir/legal/Chapters/Ch30-toc.asp>. ARM 17.30.1303(1) states, "In accordance with the federal Clean Water Act, this subchapter of Title 17, Chapter 30 establishes a permit system (MPDES) which is essentially the

equivalent of the federal permit system (NPDES) administered by the EPA." Thus, MPDES permits for discharges from point sources to waters of the United States serve as the equivalent of NPDES permits under the CWA. **Exhibit 2-5** summarizes the key regulations that apply to the MPDES program.

**Exhibit 2-5. Key regulations applicable to the MPDES program**

| | |
|---|---|
| ARM 17.30.501-518 | Mixing Zones in Surface and Ground Water |
| ARM 17.30.601-670 | Montana Surface Water Quality Standards and Procedures |
| ARM 17.30.701-718 | Nondegradation of Water Quality |
| ARM 17.30.1001-1045 | Montana Ground Water Pollution Control System |
| ARM 17.30.1101-1117 | Storm Water Discharges |
| ARM 17.30.1201-1209 | Montana Pollutant Discharge Elimination System Standards |
| ARM 17.30.1301-1387 | Montana Pollutant Discharge Elimination System Permits |
| ARM 17.30.1401-1426 | Pretreatment |

In view of the CWA's requirement of equivalence with the federal NPDES program, and to simplify the rulemaking process, in many instances the State MPDES regulations restate the corresponding federal regulations or CWA sections verbatim or incorporate them by reference (see ARM 17.30.1303).

## 2.4. MPDES Statutory and Regulatory Framework

The MWQA required the Board to adopt rules governing the MPDES program. The Department issues MPDES permit to point sources discharging pollutants into State waters. Understanding how each of the terms permit, pollutant, State waters, and point source are defined is the key to defining the scope of the MPDES program.

### 2.4.1. Permit

A **permit** is a license, issued by the government to a person or persons granting permission to do something that would otherwise be illegal in the absence of the permit. An MPDES permit typically is a license for a point source to discharge a specified amount of a pollutant into a receiving water under certain conditions. A discharger does not have a right to receive a permit, and permits may be revoked for cause, such as noncompliance with the conditions of the permit

### 2.4.2. Pollutant

The terms **pollutant** is defined in CWA section 502(6), in the NPDES regulations at 40 CFR 122.2, and in the MPDES regulations at ARM 17.30.1304(42) (75-5-103 (25) MCA includes a definition of the term "pollution"). These provisions define "pollutant" very broadly. The definition includes any type of industrial, municipal, or agricultural waste (including heat) discharged into water. ARM 17.30.1304(42) also notes that the terms "sewage," "industrial waste," and "other wastes" as defined in 75-5-103 MCA, are interpreted as having the same meaning as "pollutant." For permitting and associated regulatory purposes, USEPA generally groups pollutants into three classes: conventional, toxic, and nonconventional.

- **Conventional** pollutants are those defined in CWA section 304(a)(4) and 40 CFR 401.16 ($BOD_5$, TSS, fecal coliform, pH, and oil and grease);
- **Toxic or priority** pollutants are those defined in CWA section 307(a)(1) (and listed in 40 CFR 401.15 and Appendix A of 40 CFR Part 423) and include 126 metals and manmade organic compounds (see **Appendix B** of this Manual for a complete list); and
- **Nonconventional** pollutants are those that do not fall under either of the above categories (conventional or toxic pollutants) and include such parameters as ammonia, nitrogen, phosphorus, chemical oxygen demand (COD), and whole effluent toxicity (WET).

Circular DEQ-7 <http://www.deq.state.mt.us/wqinfo/Standards/CompiledDEQ-7.pdf> which contains Montana's Numeric Water Quality Standards, classifies pollutants as toxic, carcinogenic, or harmful. These categories include pollutants from all three classes identified by USEPA.

Sewage from vessels and, under certain conditions, water, gas, or other material injected into wells to facilitate production of oil or gas or water derived in association with oil and gas production and disposed of in a well are specifically excluded from the definition of "pollutant" under the federal NPDES program; however, there is no parallel State exclusion. Underground injection is addressed through the federal Safe Drinking Water Act. The Montana underground injection control program for injection wells associated with oil and gas production is administered by the Montana Board of Oil and Gas Conservation. Under CWA section 312, USEPA, the Coast Guard, and states protect human health and the aquatic environment from disease-causing microorganisms that might be present in sewage from boats through standards for marine sanitation devices (MSD)—boat toilets or heads—and no-discharge zone designations for vessels. Under 23-2-522 MCA, a person may not discharge or cause, allow, or permit to be discharged any garbage, refuse, waste, or sewage from any vessel into, upon, or near the waters at a stream, river, or lake within the boundaries of the state of Montana.

### 2.4.3. State Waters

Under the NPDES program authorized by the CWA, any point source that discharges or proposes to discharge pollutants into **waters of the United States** (which generally include only certain surface waters) is required to obtain a NPDES permit, but an NPDES permit is not required if the discharge is not to a water of the United States. An MPDES permit is required, however, if the discharge is to **State waters**. The definition of State waters is broader than the definition of waters of the United States, so it is important to understand the differences between the two terms.

The term **waters of the United States** is defined in the NPDES regulations at 40 CFR 122.2 to include:

- All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters that could affect interstate or foreign commerce;
- All impoundments of waters of the U.S.;
- Tributaries of the above four categories of waters;
- The territorial sea; and
- Wetlands adjacent to waters (other than wetlands themselves) that fall into any of the categories identified above.

Under this definition, waters of the United States include a great variety of surface waters such as lakes, ponds, wetlands, intermittent streams, and ephemeral streams. As a general matter, groundwaters would not be considered waters of the United States; therefore, discharges to groundwater generally are not subject to NPDES requirements. Some federal courts, however, have determined that NPDES permits are required for discharges to groundwater where it can be shown that there is a "direct hydrologic connection" between the groundwater and a surface water that is a water of the United States.

Regardless of whether or not a specific groundwater source is a water of the United States, groundwater is included in the definition of Montana's State waters found in ARM 17.30.1304(59). According to this regulation, the term State waters is defined as "any body of water, irrigation system[1], or drainage system, either surface or under ground." Thus, discharges to any State waters that are not considered waters of the United States (e.g., discharges to most groundwaters) still might be required to obtain MPDES permits. These permits would not serve as the equivalent of NPDES permits, which are required only for discharges to waters of the United States, and are not addressed in this Manual. For more information on State permit requirements for such discharges to groundwater, see ARM 17.30.1001-1042.

### 2.4.4. Point Source

Pollutants can enter water via a variety of pathways including agricultural, domestic, and industrial sources. For regulatory purposes, these sources generally are categorized as either **point sources** or **non-point sources**. The

[1] This definition notes that the MPDES subchapter does not apply to irrigation waters where the waters are used up within the irrigation system and are not returned to any other State waters.

term **point source** as defined at ARM 17.30.1304(41) (40 CFR 122.2) includes any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. Typical point source discharges are from publicly owned treatment works (POTWs), industrial facilities, runoff conveyed through a storm sewer system, and concentrated animal feeding operations. Return flows from irrigated agriculture and agricultural storm water runoff specifically are excluded from the definition of a point source.

Pollutant contributions to State waters might come from both **direct** and **indirect** discharges. **Direct discharge** (which is synonymous with "discharge of a pollutant") is defined as any addition of any pollutant or combination of pollutants to a State waters from any point source (ARM 17.30.1304(16) and 40 CFR 122.2). An **indirect discharger** is defined as "a nondomestic discharger introducing pollutants to a publicly-owned treatment works (ARM 17.30.1304(28) and 40 CFR 122.2). MPDES permits are issued **only** to direct dischargers. The pretreatment program, administered by USEPA Region 8, controls industrial and commercial indirect dischargers.

## *2.5. Federal and State Responsibilities*

This section discusses the relationship between federal and State governments in the administration of the MPDES program.

### 2.5.1. State NPDES Program Authority

USEPA may authorize qualified state, territorial, or tribal government agencies to administer all or parts of the NPDES program. As outlined in 40 CFR Part 123, USEPA grants this authorization to a qualified agency if it can demonstrate that it has the legal authority, implementation procedures, and resources necessary to run the program. States, territories, or tribes may apply for the authority to issue one or more of the following five types of NPDES authorization:

- Basic Municipal and Industrial Permit Program;
- Pretreatment Program;
- Federal Facilities Program;
- General Permit Program; and
- Sludge Permit Program.

Montana has authority for the Basic Municipal and Industrial Permit Program (authorized on June 10, 1974); the Federal Facilities Program (authorized on June 23, 1981); and the General Permits Program (authorized on April 29, 1983).

### 2.5.2. Roles and Responsibilities of the Federal Authorities

Until a state, territory, or tribe's program is authorized, USEPA is the permitting authority that issues all permits, conducts all compliance and monitoring activities, and enforces all program requirements. If USEPA approves a program, the state assumes permitting authority in lieu of USEPA and new permit applications are submitted to the state agency for NPDES permit issuance. Certain permits issued prior to authorization might continue under USEPA administration as set forth in a memorandum of agreement between USEPA and the state. Even after a state receives NPDES authorization, USEPA continues to issue NPDES permits on tribal lands within the boundaries of the state (if the tribe is not administering its own approved NPDES program). If a state has only partial authority, as is the case in Montana, USEPA implements the program activities that the state has not been authorized to administer.[2] Montana has not received USEPA approval to implement the biosolids/sewage sludge permitting program or the pretreatment program; therefore, these programs are administered by USEPA Region 8.

#### 2.5.2.1. USEPA Review and Enforcement of State-Issued Permits

Once a state, territory, or tribe is authorized to issue NPDES permits, USEPA must be provided with an opportunity to review each permit issued by the state, territory, or tribe and may formally object to elements that

[2] One exception to this process is where an NPDES-authorized state is not approved to implement the general permit program. In these cases, EPA may not issue a general permit in that state, as clarified in the memorandum *EPA's Authority to Issue NPDES General Permits in Approved NPDES States* <www.epa.gov/npdes/pubs/owm0444.pdf>.

conflict with federal requirements (see further discussion of timeframes for review and objection in **Section 2.8** below). If the permitting agency does not address the points of objection, USEPA will issue the permit directly. Once a permit is issued, it is enforceable by approved agencies with legal authority to implement and enforce the permit (including USEPA). Private parties may also bring a civil action against an alleged violator or against a permitting authority for alleged failure to enforce permit requirements.

#### 2.5.2.2. Biosolids (Sewage Sludge) Program

CWA section 405(d) requires that USEPA regulate the use and disposal of sewage sludge (often referred to as biosolids) to protect public health and the environment from any reasonably anticipated adverse effects of these practices. In the CWA, Congress directed USEPA to develop technical standards for municipal sludge use and disposal options and enacted strict deadlines for compliance with these standards. Within one year of promulgation of the standards compliance was required unless construction of new pollution control facilities was necessary, in which case compliance was required within two years.

USEPA promulgated Part 503, Standards for the Use or Disposal of Sewage Sludge, on February 19, 1993 (58 FR 9248), with amendments on February 19, 1994 (59 FR 9095), and October 25, 1995 (60 FR 54764). These regulations address four sludge use and disposal practices: land application, surface disposal, incineration, and disposal in a municipal solid waste landfill. The standards for each end use and disposal method consist of general requirements, numeric pollutant limits, operational standards, and management practices, as well as monitoring, recordkeeping, and reporting requirements. Unlike technology standards, which are based on the ability of treatment technologies to reduce the level of pollutants, USEPA's sewage sludge standards are based on health and environmental risks.

Part 503 imposes requirements on four groups:

- Persons who prepare sewage sludge or material derived from sewage sludge;
- Land appliers of sewage sludge;
- Owners/operators of sewage sludge surface disposal sites; and
- Owners/operators of sewage sludge incinerators.

CWA section 405(f) requires the inclusion of sewage sludge use or disposal requirements in any NPDES permit issued to a Treatment Works Treating Domestic Sewage (TWTDS) and authorizes the issuance of sewage sludge permits to non-discharging TWTDS. In response, USEPA promulgated revisions to the NPDES permit regulations at Parts 122 and 124 on May 2, 1989 (54 FR 18716). These revisions expanded USEPA's authority to include sewage sludge use and disposal standards in NPDES permits and to issue NPDES permits to treatment works that do not have an effluent discharge to waters of the United States, but are involved in sewage sludge use or disposal as preparers, appliers, or owners/operators. TWTDS includes all sewage sludge generators and facilities that change the quality of sewage sludge such as blenders.

Part 503 also establishes minimum monitoring requirements for sewage sludge prior to use and disposal. More frequent monitoring for any of the required or recommended parameters is appropriate when the POTW has any of the following:

- A highly variable influent load of toxics or organic solids;
- A significant industrial load; or
- A history of process upsets due to toxics or of adverse environmental impacts due to sludge use or disposal activities.

The purpose of monitoring municipal sewage sludge is to ensure safe use or disposal. Sludge regulations specified in 40 CFR Part 503 require sewage sludge that is applied to land, placed on a surface disposal site, or incinerated. The frequency of monitoring is based on the annual amount of sludge that used or disposed by these methods. POTWs that provide the sewage sludge to another party for further treatment (such as composting) must provide that party with the information necessary to comply with Part 503. Sewage sludge disposed of in a municipal solid waste landfill unit must meet the criteria for municipal solid waste landfills at 40 CFR Part 258.

USEPA Region 8 is responsible for implementing the 40 CFR Part 503 Standards for the Use or Disposal of Sewage Sludge in permits issued to treatment works treating domestic sewage (TWTDS) in Montana. USEPA has issued a general permit for facilities in the State of Montana that generate, treat, or use or dispose of sewage sludge by means of land application, landfill, or surface disposal (NPDES Permit No. MTG650000 <http://www.epa.gov/region8/water/biosolids/biosolidsdown/MTG650000-2007-Final.pdf>). TWTDS must file a notice of intent with USEPA and the Department in accordance with the timeframes and procedures identified in the applicable permit. Facilities that incinerate sewage sludge are not eligible for coverage under the permit.

Facilities that incinerate sewage sludge are required to apply to USEPA for an individual permit. Biosolids incineration is the firing of biosolids at a high temperature in an enclosed device. An incinerator that burns hazardous wastes with biosolids is considered a hazardous waste incinerator, not a biosolids incinerator, and is covered by 40 CFR Parts 261 through 268. Subpart E of Part 503 covers requirements for biosolids incinerators, including limitations for seven metals and limitations for total hydrocarbons, general requirements and management practices, frequency of monitoring requirements, and recordkeeping and reporting requirements.

USEPA has provided several guidance documents to explain the requirements of Part 503. These guidance documents are useful both for permit writers and permit holders and include the following:

- *Part 503 Implementation Guidance* <http://www.epa.gov/npdes/pubs/owm0237.pdf>;
- *Land Application of Sewage Sludge—A Guide for Land Appliers on the Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503* <http://www.epa.gov/OWM/mtb/biosolids/sludge.pdf>;
- *Surface Disposal of Sewage Sludge—A Guide for Owners/Operators of Surface Disposal Facilities on the Monitoring, Recordkeeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503* <No direct link– see References>;
- *Preparing Sewage Sludge for Land Application or Surface Disposal—A Guide for Preparers of Sewage Sludge on the Monitoring, Record Keeping, and Reporting Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge in 40 CFR Part 503* <No direct link– see References>;
- *Domestic Septage Regulatory Guidance, A Guide to the EPA 503 Rule* <No direct link – see References>;
- *POTW Sludge Sampling and Analysis Guidance Document* <http://www.epa.gov/npdes/pubs/owm012.pdf>; and
- *Control of Pathogens and Vector Attraction in Sewage Sludge* <http://www.epa.gov/ORD/NRMRL/Pubs/1992/625R92013.pdf>.

In addition, USEPA Region 8 has a Web page dedicated to it biosolids permits and associated guidance documents <http://www.epa.gov/region8/water/biosolids/biosolidsdown/index.html - generaldocs>.

The special conditions section of MPDES permits issued to facilities that generate, treat, or use or dispose of sewage sludge by means of land application, landfill, or surface disposal should include a special condition stating that the facility must meet the requirements of the USEPA general permit (MTG650000).

#### 2.5.2.3. Pretreatment Program

Section 402(b)(8) of the CWA requires that POTWs receiving pollutants from significant industrial sources subject to section 307(b) standards establish a POTW pretreatment program to ensure compliance with these standards. The implementing regulations at 40 CFR 403.8(a) state, "any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (mgd) and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards will be required to establish a POTW pretreatment program unless the NPDES state exercises its option to assume local responsibilities as provided in 403.10(e)." USEPA or an authorized state can require POTWs with design flows of 5 mgd or less to develop a POTW pretreatment program if circumstances warrant (40 CFR 403.8(a)). USEPA implements the pretreatment program in Montana; however, the Department currently incorporates pretreatment program requirements into the MPDES permits it issues to POTWs.

The pretreatment program was developed to control industrial discharges to a POTW and to meet three objectives at the POTW: (1) to prevent pass through, (2) to prevent interference, including interference with its use or disposal of municipal sludge, (3) to improve opportunities to recycle and reclaim municipal and industrial wastewater and sludges. As authorized by the pretreatment regulations at 40 CFR 403.8(c), (d) and (e) and the NPDES regulations at 40 CFR 122.44(j)(2), the requirements to develop and implement a POTW pretreatment program are placed as enforceable conditions in a POTW's MPDES permit.

Pretreatment Program development and Program Implementation are two separate steps. Through the MPDES permit the POTW is required to develop a Pretreatment Program. The POTW is required to submit an approvable program to USEPA and the Department that meets the requirements in 40 CFR 403.9(b), specifically, these requirements are the provisions of a program as laid out in 40 CFR 403.8(f). 40 CFR 403.8(f) requires the POTW to have certain legal authority (usually a municipal ordinance or set of regulations) and procedures to fully and effectively exercise and implement the legal authority and procedures.

As part of the POTW pretreatment program, POTWs must have adequate resources and funding to implement the program, evaluate the need for local limits and develop them if the need exists, and develop an enforcement response plan. The permit requires the POTW to submit the program documentation detailing the authority and procedures to be implemented along with other information about the program as laid out in 40 CFR 403.9. Once the permitting authority reviews and approves the program, the program is then incorporated into the permit in order to make the requirement to implement the program an enforceable part of the permit.

Incorporating the requirement to develop a pretreatment is generally done at the time of reissuance of the permit; however, the requirement could be incorporated through a modification of the permit if cause exists. Cause exists if "... the addition of pollutants into POTW by an industrial user or combination of industrial users presents a substantial hazard to the functioning of the treatment works, quality of the receiving waters, human health, or the environment" (40 CFR 403.8(e)(1)). A permit modification to require the development of a pretreatment program is considered a major modification and must follow the procedures in 40 CFR 122.62 and ARM 17.30.1361. The incorporation of an approved program into the permit, thereby making the implementation of the program an enforceable part of the permit, is considered a minor modification to the permit and must follow the procedures in 40 CFR 122.63(g) and ARM 17.30.1362(g).

During the life of the permit it might be necessary for the POTW to modify its approved pretreatment program (changes to local limits, changes to the ordinance, etc.). These changes could be brought about by the POTW's desire to change the way the program operates, or they as the result of changes that are necessary to address deficiencies in the program found during inspections or audits. In addition, program information and monitoring data obtained through the POTW's pretreatment program can be useful to the permit writer in identifying possible modifications to the pretreatment program's local limits or procedures (or even the need for water quality-based controls in the POTW's permit). Any modification to an approved program that is considered substantial per ~~50~~ 40 CFR 403.18 requires review and approval by USEPA. All approved substantial program modifications to the POTW's approved pretreatment program require minor modifications to the permit.

**Permit II.E**

**Fact Sheet II.C.5**

MPDES permits include standard pretreatment development or implementation conditions (with minor modifications made to tailor the conditions to the specific permittee) that are placed in all POTW MPDES permits though, as noted above, USEPA remains the authority for implementation of the pretreatment program. The requirements vary depending on whether or not the POTW is required to have a pretreatment program. The permit writer might need to update or modify pretreatment implementation language or initiate corrective action related to the pretreatment program.

USEPA Headquarters' Pretreatment Program Web site <http://cfpub.epa.gov/npdes/home.cfm?program_id=3> includes links to pretreatment regulations and guidance documents. In addition, USEPA Region 8's Pretreatment Program Web site <http://www.epa.gov/region8/water/pretreatment/> provides information and support for pretreatment programs in the Region.

## 2.6. Types of Permits

The two basic types of MPDES permits are individual and general permits. These permit types share the same fundamental components and outline, but are used under different circumstances and involve different permit issuance processes.

### 2.6.1. Individual Permits

An individual permit is a permit specifically tailored to an individual facility. Upon receiving the appropriate application form(s), the permit writer develops a permit for that particular facility based on information from the permit application and other sources (e.g., previous permit requirements, discharge monitoring reports, technology and water quality standards, ambient water quality data, special studies). The Department then issues the permit to the facility for a specific period not to exceed five years, with a requirement to reapply prior to the expiration date.

### 2.6.2. General Permits

The Department develops and issues a general permit to cover multiple facilities within a specific category of discharges. General permits are a cost-effective permitting option in some circumstances because of the large number of facilities that can be covered under a single permit.

According to ARM 17.30.1341(1), the Department may issue MPDES general permits for the following categories of point sources determined by the Board following the criteria listed in 40 CFR 122.28 and as stated in ARM 17.30.1105:

- cofferdams or other construction dewatering discharges;
- ground water pump test discharges;
- fish farms;
- placer mining operations;
- suction dredge operations using suction intakes no larger than four inches in diameter;
- oil well produced water discharges for beneficial use;
- animal feedlots;
- domestic sewage treatment lagoons;
- sand and gravel mining and processing operations;
- point source discharges of storm water;
- treated water discharged from petroleum cleanup operations;
- discharges from public water supply systems, as determined under Title 75, Chapter 6, MCA;
- discharges to wetlands that do not contain perennial free surface water;
- discharges from road salting operations;
- asphalt plant discharges;
- discharges of hydrostatic testing water;
- discharges of noncontact cooling water;
- swimming pool discharge; and
- septic tank pumper disposal sites.

General permits may be issued for a category of point sources located throughout the State or may be restricted to more limited geographic areas such as the following:

- designated planning area;
- sewer district;
- city, county, or State boundary;
- State highway system;
- standard metropolitan statistical area; or
- urbanized area.

Where a large number of similar facilities require permits, a general permit allows the Department to allocate resources in a more efficient manner and to provide timelier permit coverage than issuing an individual permit to each facility. In addition, using a general permit ensures consistent permit conditions for comparable facilities.

## 2.7. Major Components of a Permit

All MPDES permits consist, at a minimum, of five components:

- **Cover Page –** Contains the name and location of the discharger, a statement authorizing the discharge, and a listing of the specific locations for which a discharge is authorized;
- **Effluent Limitations –** The primary mechanism for controlling discharges of pollutants to receiving waters. A permit writer spends the majority of his or her time deriving appropriate effluent limitations based on applicable technology and water quality standards;
- **Monitoring and Reporting Requirements** – Used to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions;
- **Special Conditions** – Conditions developed to supplement effluent limitations guidelines. Examples include additional monitoring activities, special studies, best management practices (BMPs), and compliance schedules; and
- **Standard Conditions** – Pre-established conditions that apply to all MPDES permits and delineate the legal, administrative, and procedural requirements of the MPDES permit.

The contents of some permit components will vary depending on whether the permit is issued to a POTW or non-POTW and whether the permit is issued to an individual facility or to multiple dischargers (i.e., a general permit). Distinctions in the contents of MPDES permits based on the type of discharger are discussed in later chapters and in the MPDES Permit and Fact Sheet Template.

## 2.8. Development and Issuance of MPDES Individual Permits

While the limits and conditions in MPDES individual permits are unique to each discharger, the process used to develop the limits and conditions and issue each permit generally follows a common set of steps. **Exhibit 2-6** illustrates the major steps to develop and issue MPDES individual permits. Detailed discussions of each step are found in later chapters of this Manual.

For individual permits, the permitting process generally begins when a facility operator submits an application. Unless the Department decides to deny an MPDES permit (e.g., for recalcitrance or continuing non-compliance)- the permit writer reviews the application for completeness and accuracy. The permit application review process includes ensuring that the Department has received any information, in addition to a complete and accurate application form, that is needed to draft the permit (see **Section 3.4** of this Manual). Additional information might include, for example, information required for a nondegradation review, data to support a request for a mixing zone, or additional data needed to characterize the receiving water or effluent. Following the permit application review, the permit writer uses the information from the application and other available information to develop a draft permit and the justification and documentation for the permit conditions.

The first major step in the permit development process is deriving effluent limitations that meet both technology- and water quality standards, including nondegradation requirements. The more stringent of the technology-based effluent limitations (TBELs) and water quality-based effluent limitations (WQBELs) limits will become the final limits in the MPDES permit, after addressing anti-backsliding requirements. The permit writer must document the decision-making process for deriving effluent limitations and other permit conditions in the permit fact sheet. It is quite possible that a permit will have a mixture of final limitations derived from technology standards for some parameters and water quality standards for others.

Following effluent limit development, the permit writer develops appropriate monitoring and reporting requirements and facility-specific special conditions, always carefully documenting the decision-making process in the fact sheet. The permit writer then adds standard conditions, which are the same for all permits.

The next step is to provide an opportunity for public participation in the permit process. The Department issues a public notice announcing the draft permit and inviting interested parties to submit comments. If appropriate, the Department also holds a public hearing on the draft permit. Based on the public comments and the Department's responses to those comments, the permit writer produces a final permit, with careful attention to documenting the process and decisions, and the Department issues the final permit to the facility. It is possible that the Department will decide to prepare a new draft permit or a revised fact sheet based on public comment, and then provide another opportunity for public review and comment.

The Department provides USEPA (Montana Office) with copies of all draft permits and permit modifications during the public comment period, response to comments, and final (proposed permit) stages. USEPA has 30 days to object to a proposed permit based on 40 CFR 123.44(c) and the 30-day period may be extended to 90 days. The Department has 90 days to reissue the permit in a manner that satisfies USEPA's objection. After that period, USEPA may issue the permit.

## 2.9. Development and Issuance of MPDES General Permits

The process for developing and issuing MPDES general permits is similar to the process for individual permits; however, there are some differences in the sequence of events. **Exhibit 2-7** illustrates the major steps to develop and issue MPDES general permits.

For general permits, the Department first identifies the need for a general permit and collects data that demonstrate that a group or category of dischargers has similarities that warrant a general permit. In deciding whether to develop a general permit, the Department considers whether:

- A large number of facilities will be covered;
- The facilities have similar production processes or activities;
- The facilities generate similar pollutants; and
- Most or all of the permit conditions for the facilities potentially covered by the permit will be the same.

The remaining steps of the permit development process are the same as for individual permits. The Department develops a draft permit that includes effluent limitations, monitoring conditions, special conditions, and standard conditions. The Department then issues a public notice, addresses public comments, and issues the final permit. The final permit establishes the requirements for the specific information that must be submitted by a facility that wishes to be covered under the general permit.

After the final general permit has been issued, facilities that wish to be covered under the general permit typically submit an application or notice of intent (NOI) to the Department. The application or NOI might be designed specifically for the category of dischargers covered under the general permit. Upon receipt of the application or NOI, the Department notifies the facility that it is covered by the general permit or that it does not quality for coverage under the general permit. If the facility is not eligible for coverage, the Department can begin processing the application or NOI under the individual permit issuance process.

The following chapters in this Manual describe the MPDES permitting process in detail. These chapters focus on the steps necessary to develop and issue an individual permit in the State of Montana, but much of the technical discussion applies equally to general permit development.

**Exhibit 2-6. Major steps to develop and issue MPDES individual permits**
[REVISE TO REFLECT UPDATED CHAPTER NUMBERING AND FORMATTING]

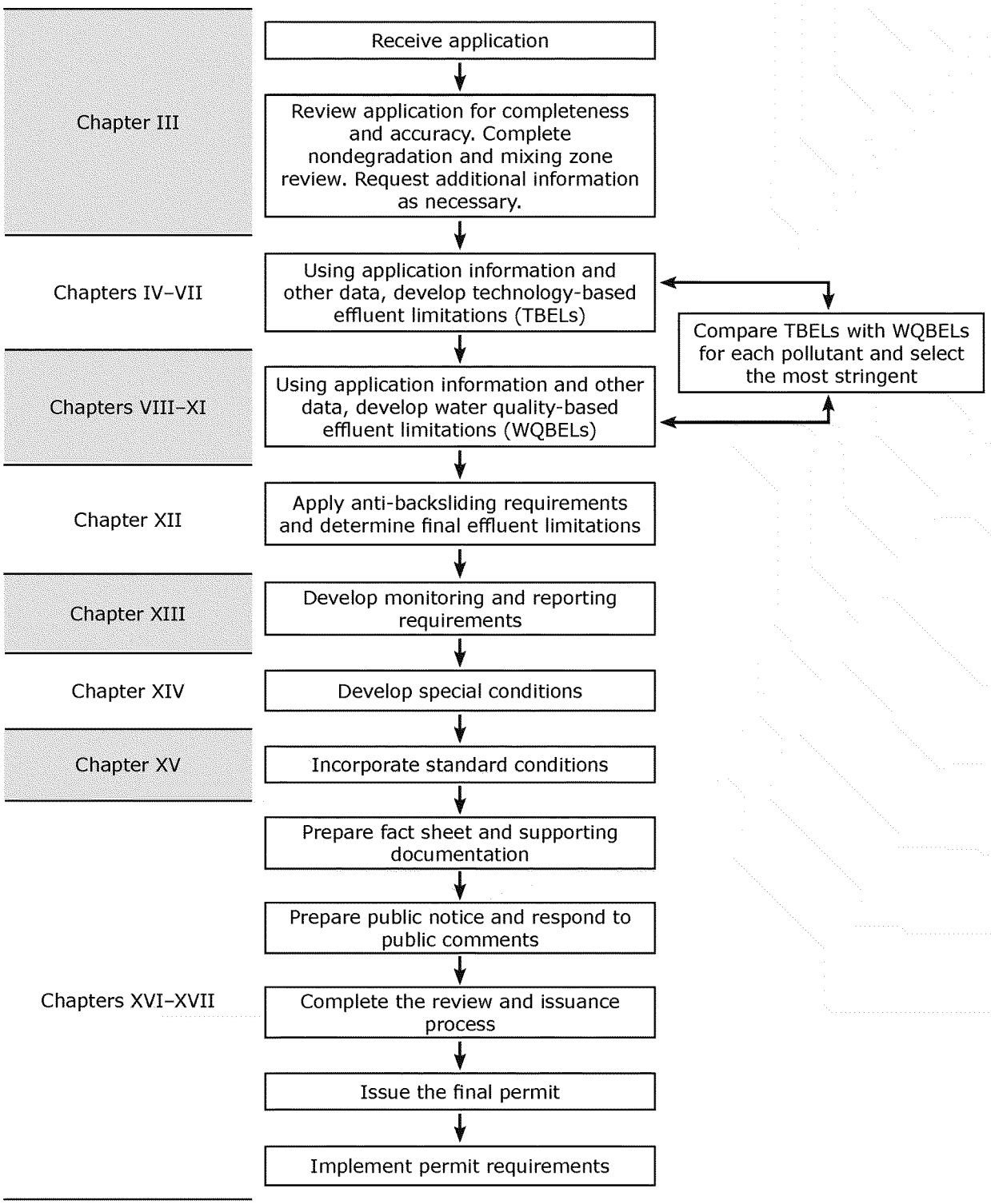
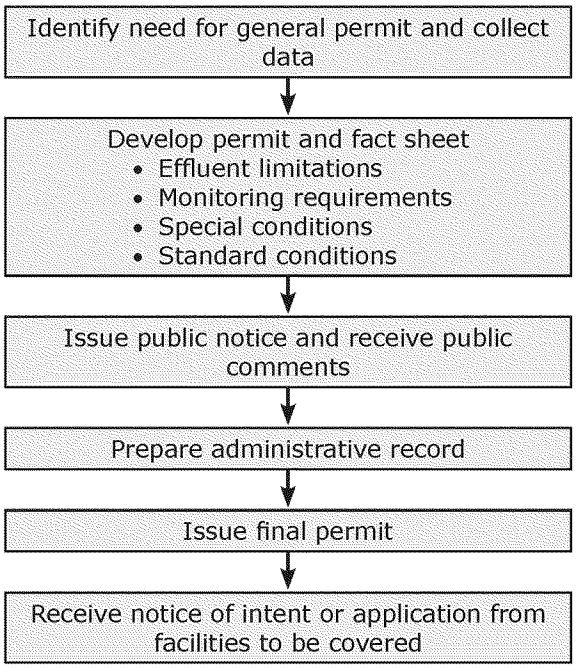



**Exhibit 2-7. Major steps to develop and issue MPDES general permits**

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# Chapter 3. The Permit Application Process

This chapter describes the Montana Pollutant Discharge Elimination System (MPDES) permit application process, including the permit writer's role in reviewing the application and evaluating background information about the applicant. Through this process, the permit writer gains an understanding of the circumstances and characteristics of the proposed discharge, which is necessary to develop appropriate permit limits and conditions.

## *3.1. Who Applies for an MPDES Permit?*

The MPDES regulations at Title 17, Chapter 30 of the Administrative Rules of Montana 1322(1) (ARM 17.30.1322(1)) [see also 40 CFR 122.21(a)] require that any person who discharges pollutants (e.g., an existing MPDES permittee) or proposes to discharge pollutants (e.g., a new facility applying for its first MPDES permit) must apply for a permit. In most instances, the permit applicant will be the owner of the facility; however, the regulations at ARM 17.30.1322(2) [40 CFR 122.21(b)] require that when a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit. The regulations also require the application to be signed and certified by a high-ranking official of the business or activity. The signatory and certification requirements can be found at ARM 17.30.1323 [40 CFR 122.22].

Permits (and applications) are required for most discharges or proposed discharges to State waters; however, MPDES permits are not required for some activities as specified under the "Exclusions" provision in ARM 17.30.1310. Exceptions include:

- Discharge of dredged or fill materials regulated under section 404 of the Clean Water Act (CWA);
- The introduction of sewage, industrial wastes or other pollutants into publicly owned treatment works by indirect dischargers;
- Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR Part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances);
- Any introduction of pollutants from non-point source agricultural and silvicultural activities (but not from regulatory-defined concentrated animal feeding operations, concentrated aquatic animal production facilities, aquaculture projects, and silvicultural point sources);
- Return flows from irrigated agriculture; and
- Discharges into a privately owned treatment works, except as the Department of Environmental Quality (Department) may otherwise require under ARM 17.30.1344(2) [40 CFR 122.44(m)].[3]

## *3.2. Application Deadlines*

The regulations at ARM 17.30.1322(3) and (4) [40 CFR 122.21(c)(1), (d)(1) and (d)(2)] specify the time to apply for MPDES permits. **Exhibit 3-1** provides a summary of the application deadline requirements for dischargers to be covered by an MPDES permit.

**Exhibit 3-1. When to apply for an MPDES permit**

| Type of Permit | Type of Discharger | Schedule |
|---|---|---|

[3] In addition to these exclusions, the federal regulations at 40 CFR 122.3(a) include an exclusion for any discharge of sewage from vessels, effluent from properly functioning marine engines, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel. As of the date of publication of this manual this exclusion is still in the CFR; however, it was vacated as of February 6, 2009, as result of a court decision. USEPA has issued a general permit for vessels to address the court's decision. Some discharges from vessels are excluded from requirements to obtain an NPDES permit because of other portions of the CWA. The court ruling did not affect vessel discharge exemptions from permitting that are specifically provided for in the CWA itself. For example, CWA section 502(6)(A) excludes from the definition of "pollutant" sewage from vessels and discharges incidental to the normal operation of a vessel of the Armed Forces within the meaning of CWA section 312. Furthermore, in July 2008, Congress amended the CWA to add a new section 402(r), which specifically excludes discharges incidental to the normal operation of a recreational vessel from NPDES permitting requirements.

| | | |
|---|---|---|
| Individual | New | At least 180 days before the date on which the discharge is to commence |
| | Existing | At least 180 days before expiration of existing permit |
| | Construction Storm Water | At least 90 days before the date on which construction is to commence [ARM 17.30.1322(17)(h) incorporating 40 CFR 122.26(c)(1) by reference] |
| General | New | ▪ Specified in general permit; or<br>▪ Dischargers seeking coverage under a storm water general permit must apply at least 30 days before the date on which the discharge is to commence [ARM 17.30.1110(3)]; or<br>▪ Dischargers seeking coverage under a general permit for storm water associated with construction must apply by the date upon which the construction-related disturbance is initiated [ARM 17.30.1115(4)] |
| | Existing | X number of days following issuance of general permit (specified in the general permit); dischargers covered by a storm water general permit must reapply at least 30 days prior to expiration of the existing general permit [ARM 17.30.1110(4)] |

As noted in **Exhibit 3-1**, new discharger must apply for an individual MPDES permit no later than 180 days before the date on which the discharge is to commence or, for discharge of storm water associated with construction activity, no later than 90 days before the date on which construction is to commence. An existing discharger must apply for an individual MPDES permit renewal at least 180 days before the expiration of its existing MPDES permit. The Department can allow an application to be submitted later than the dates specified in the regulations but, for existing dischargers, not later than the expiration date of the existing permit. For a general permit, the deadlines for new dischargers are based on the requirements of the general permit or, for storm water, specific deadlines outlined in the Montana storm water regulations. A general permit might also specify a number of days following the issuance of the general permit that operators of existing facilities are given to apply for coverage.

According to ARM 17.30.1313 [40 CFR 122.6], the conditions of an expired MPDES permit continue in force until the new permit is issued, as long as the discharger submitted a complete application in accordance with the timeframes prescribed in the regulations. If the permit application is not on time and complete, the facility could be considered to be discharging without a permit from the time the permit expired until the effective date of the new permit.

## 3.3. Application Forms and Requirements

When a facility needs an individual MPDES permit, it must submit a permit application. Application forms and requirements are specific to the type of facility and discharge. MPDES permit application requirements are found in ARM 17.30.1322, 1323, 1330-1333, 1340, and 1341 and are consistent with the federal NPDES application requirements in 40 CFR Part 122, Subpart B. These requirements are identified on forms developed by the U.S. Environmental Protection Agency (USEPA) and the Department. Authorized states, such as Montana, are not required to use the USEPA application forms; however, any alternative form must include the federal requirements at a minimum. The Department developed DEQ Form 1, as an alternative to USEPA Form 1, and DEQ Form 2B, as an alternative to the CAFO section of USEPA Form 2B. In addition, the Department developed special applications, notices of intent, notices of termination, and notices of exclusion for certain MPDES permits.

**Exhibit 3-2** provides an overview of the types of dischargers required to submit MPDES application forms, identifies the forms they must submit, and references the corresponding MPDES regulatory citation (as well as the federal regulatory citation where appropriate). Some facilities might need to file more than one application form. For example, an existing industrial facility (i.e., renewal) discharging storm water combined with process and non-

process wastewater might need to submit DEQ Form 1, USEPA Form 2C, and USEPA Form 2F if it is applying for individual permits both for its process and storm water discharges.

**Exhibit 3-2. Application forms for MPDES individual and general permits**

| Type of facility | Status | Type of Permit | Forms | Regulatory Citation(s) |
|---|---|---|---|---|
| **Publicly-Owned Treatment Works (POTWs)** | | | | |
| • POTWs with design flows greater than or equal to 0.1 million gallons per day (mgd) | New and Existing | Individual | **USEPA Form 2A**, Parts A, B and C; Parts D, E, F, or G as applicable | ARM 17.30.1322(6)<br>[40 CFR 122.21(j)]<br>40 CFR 122.21(a)(2)(i)(B) |
| • POTWs with design flows less than 0.1 mgd | New and Existing | Individual | **USEPA Form 2A**, Parts A and C; Parts D, E, F, or G as applicable | ARM 17.30.1322(6)<br>[40 CFR 122.21(j)]<br>40 CFR 122.21(a)(2)(i)(B) |
| **Concentrated Animal Production Facilities** | | | | |
| • Concentrated Animal Feeding Operations | New and Existing | Individual | **DEQ Form 2B** | ARM 17.30.1322(6)(a)-(h) and (9)<br>[40 CFR 122.21(f) and (i)]<br>40 CFR 122.21(a)(2)(i)(A) and (C) |
| | | General | **DEQ Form 2B** | ARM 17.30.1110<br>ARM 17.30.1341 |
| • Concentrated Aquatic Animal Production Facilities | New and Existing | Individual | **DEQ Form 2B** | ARM 17.30.1322(6)(a)-(h) and (9)<br>[40 CFR 122.21(f) and (i)] |
| | | General | **DEQ Form 2B** | ARM 17.30.1110<br>ARM 17.30.1341 |
| **Industrial Facilities**<br>• Manufacturing Facilities<br>• Commercial Facilities<br>• Mining Activities<br>• Silvicultural Activities | New (Process Wastewater) | Individual | **DEQ Form 1; USEPA Form 2D** | ARM 17.30.1322(6)(a)-(h) and (10)<br>[40 CFR 122.21(f) and (k)]<br>40 CFR 122.21(a)(2)(i)(A) and (E) |
| | Existing (Process Wastewater) | Individual | **DEQ Form 1; USEPA Form 2C** | ARM 17.30.1322(6)(a)-(h) and (7)<br>[40 CFR 122.21(f) and (g)]<br>40 CFR 122.21(a)(2)(i)(A) and (D) |
| | New and Existing (Non-Process Wastewater) | Individual | **DEQ Form 1; DEQ Form 2E** | ARM 17.30.1322(6)(a)-(h) and (8)<br>[40 CFR 122.21(f) and (h)]<br>40 CFR 122.21(a)(2)(i)(A) and (F) |
| **Non-Process Wastewater Discharges Associated with:**<br>• Construction De-Watering<br>• Disinfected Water<br>• Petroleum Clean-Up | New and Existing | General | **DEQ Form 1; DEQ Form 2E** | ARM 17.30.1322(6)(a)-(h) and (7)<br>[40 CFR 122.21(f) and (g)]<br>ARM 17.30.1110<br>ARM 17.30.1341 |
| **Process Wastewater Discharges Associated with:**<br>• Portable Suction Dredges<br>• Produced Water<br>• Sand and Gravel Operations | New and Existing | I<br>General | **DEQ Form 1; USEPA Form 2C (existing) or Form 2D (new)** | ARM 17.30.1322(6)(a)-(h) and (7)<br>[40 CFR 122.21(f) and (g)]<br>ARM 17.30.1110<br>ARM 17.30.1341 |
| **Storm water discharges associated with industrial activities** | New and Existing | Individual | **DEQ Form 1; USEPA Form 2F** | ARM 17.30.1105, 1110, and 1322(11) and (12)<br>40 CFR 122.21(a)(2)(i)(A) and (G)<br>40 CFR 122.21(f)<br>40 CFR 122.26(c) |
| | | General | **DEQ SW-1**[1] | ARM 17.30.1110 and 1322(11) and (12) |
| **Storm water discharges associated with construction activity** | New | Individual | **DEQ Form 1; USEPA Form 2F** | ARM 17.30.1322(11) and (12)<br>40 CFR 122.26(c) |
| | | General | **DEQ Form NOI**[2] | ARM 17.30.1115, and 1322(11) and (12) |

| | | | | |
|---|---|---|---|---|
| **Storm water discharges associated with mining and with oil and gas activities** | New and Existing | Individual | **DEQ Form 1; USEPA Form 2F** | ARM 17.30.1105, 1110, and 1322(11) and (12)<br>40 CFR 122.26(c) |
| | | General | **DEQ SW-1**[1] | ARM 17.30.1110. and 1322(11) and (12); ARM 17.30.1105, 1110<br>40 CFR 122.26(c) |
| **Storm water discharges from Municipal Separate Storm Sewer Systems (MS4s) serving a population 100,000 or greater** | New and Existing | Individual | None (regulatory requirements only) | 40 CFR 122.26(d) |
| **Storm water discharges from small MS4s**[3] | New and Existing | Individual | None (regulatory requirements only) | ARM 17.30.1111 and 1322(11) |
| | | General | **DEQ Special Application**[4] | ARM 17.30.1105, 1110, 1111, and 1322(11) |
| **Cooling water intake structures** | New and Existing | Individual | **None** | 40 CFR 122.21(r) |

1. Application for coverage under MPDES Permit MTR000000 or MTR300000.
2. Special Notice of Intent (NOI) for coverage under MPDES Permit MTR100000.
3. Small MS4s are facilities that are not defined as "large" or "medium" MS4s pursuant to 40 CFR 122.26(b)(4) and (b)(7)
4. Special application for coverage under MPDES Permit MTR040000

### 3.3.1. DEQ Form 1 – General Information (Individual Permit)

All facilities applying for an individual MPDES permit, with the exception of Publicly Owned Treatment Works (POTWs), Concentrated Animal Feeding Operations (CAFOs), Concentrated Aquatic Animal Production facilities (CAAPs) and Municipal Separate Storm Sewer Systems (MS4s) applying for a municipal storm water permit, must submit DEQ Form 1 <http://www.deq.state.mt.us/wqinfo/WPBForms/Form%201.pdf>. The type of general facility information required by DEQ Form 1 is specified in ARM 17.30.1322(6)(a)-(h) [40 CFR 122.21(f)] and includes:

- Name, mailing address, facility contact, and facility location;
- Standard industrial classification (SIC) code and a brief description of the nature of the business; and
- Topographic map showing the location of the existing or proposed intake and discharge structures.

### 3.3.2. USEPA Form 2A – New and Existing POTWs (Individual Permit)

All new and existing POTWs must submit USEPA Form 2A <http://www.epa.gov/npdes/pubs/final2a.pdf>. USEPA issued a final rule on August 4, 1999 (64 FR 42433), amending permit application requirements and application forms for POTWs. The rule consolidated POTW application requirements, expanded toxic monitoring requirements for POTWs, and revised the forms used to submit permit applications. POTWs must also submit this form for permit renewals. USEPA Form 2A replaces Standard Form A and Short Form A.

POTWs with design influent flows equal to or greater than 100,000 gallons per day (0.1 mgd) must submit Parts A, B and C of Form 2A. POTWs with design flows of less than 100,000 gallons per day (gpd) must submit Parts A and C of USEPA Form 2A. Parts A, B and C are referred to as Basic Application Information:
Part A of USEPA Form 2A contains basic application information for all applicants:

- Facility and applicant information;
- Collection system type, areas served, and total population served;
- Discharges and other disposal methods; and
- If the treatment works discharges effluent to waters of the U.S., a description of outfalls, receiving waters, and treatment and effluent testing information.

Part B of USEPA Form 2A collects additional information for applicants with a design flow greater than or equal to 0.1 mgd, including inflow and infiltration estimates, a topographic map, process flow diagram, and effluent testing data for additional parameters. Part C is a certification that all applicants must complete.

USEPA Form 2A also includes Supplemental Application Information (Parts D-G). Treatment works complete these additional parts, as applicable, depending on the characteristics of the municipal discharge:
Part D requests expanded effluent testing data for metals, volatile organic compounds, acid-extractable compounds, and base-neutral compounds.

A treatment works that discharges effluent to waters of the United States and meets one or more of the following criteria must complete Part D:

- Has a design flow rate greater than or equal to 1 mgd;
- Is required to have a pretreatment program (or has one in place); or
- Is otherwise required by the Department to provide the information (e.g., POTWs known or likely to have toxic pollutants present in their effluent).

A treatment works that meets one or more of the following criteria must complete Part E (Toxicity Testing Data):

- Has a design flow greater than or equal to 1 mgd;
- Is required to have a pretreatment program (or has one in place); or
- Is otherwise required by the Department to submit results of toxicity testing based on consideration of the following factors (see ARM 17.30.1322 6(j)):
  - the variability of the pollutants or pollutant parameters in the POTW effluent (based on chemical-specific information, the type of treatment plant, and types of industrial contributors);
  - the ratio of effluent flow to receiving stream flow;
  - existing controls on point or nonpoint sources, including total maximum daily load (TMDL) calculations for the water body segment and the relative contribution of the POTW;
  - receiving stream characteristics, including possible or known water quality impairment, and whether the POTW discharges to a water designated as an outstanding natural resource; or
  - other considerations (including, but not limited to, the history of toxic impact and compliance problems at the POTW) that the Department determines could cause or contribute to adverse water quality impacts.

**Chapter 11**, "Whole Effluent Toxicity," provides additional details regarding the Department's policy on whole effluent toxicity testing and effluent limitations.

A treatment works that accepts process wastewater from any significant industrial users (SIUs) or receives Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or other remedial wastes must complete Part F. A treatment works that has a combined sewer system must complete Part G. Information that must be provided in this section includes a system map and diagram, and descriptions of outfalls, Combined Sewer Overflow (CSO) events, receiving waters, and operations.

### 3.3.3. DEQ Form 2B – New and Existing CAFOs and CAAPs (Individual or General Permit)

Owners of new and existing concentrated animal feeding operations (defined in ARM 17.30.1330 [40 CFR 122.23]) must submit DEQ Form 2B <http://www.deq.mt.gov/wqinfo/WPBForms/Form2B.pdf>. DEQ Form 2B is derived from USEPA Form 2B, which was significantly modified in February 2003 as part of a final CAFO Rule (68 FR 7176). DEQ Form 2B contains the information required in DEQ Form 1; therefore, facilities completing DEQ Form 2B are not required to complete DEQ Form 1.

The type of information required by DEQ Form 2B for CAFOs includes:

- Current permits and application status
- The facility location and mailing address;
- The name of the owner or operator;
- Contact information for the facility;
- The Standard Industrial Classification (SIC) codes which best reflect the products or services provided by the facility (up to four SIC codes);

- The location of and receiving water for each outfall;
- Specific information about the number and type of animals;
- A description of the waste control facilities—both for storage and for containment;
- Estimated amounts of manure, litter, and process wastewater generated annually;
- The amount of acreage under control of the applicant available for land applying the manure, litter, or process wastewater generated by the facility;
- Estimated amounts of manure, litter, and process wastewater transferred to other persons per year;
- The status of the nutrient management plan; and
- A topographic map of the area extending one mile beyond the property boundaries of the site.

CAFOs also must complete DEQ Form NMP <http://www.deq.mt.gov/wqinfo/WPBForms/NMPver1_3_2.pdf>, which is intended to help CAFO operators develop a site-specific nutrient management plan.

Owners of new and existing concentrated aquatic animal production facilities (defined in ARM 17.30.1331 [40 CFR 122.24]) must also submit DEQ Form 2B. The type of information required for CAAPs by DEQ Form 2B includes:

- Current permits and application status
- The facility location and mailing address;
- The name of the owner or operator;
- Contact information for the facility;
- The Standard Industrial Classification (SIC) codes which best reflect the products or services provided by the facility (up to four SIC codes);
- The location of and receiving water for each outfall;
- The maximum daily and average monthly flow from each outfall;
- The number of ponds, raceways, and similar structures;
- The name of the receiving water and the source of intake water;
- For each species of aquatic animals, the total yearly and maximum harvestable weight;
- The calendar month of maximum feeding and the total mass of food fed during that month; and
- A topographic map of the area extending one mile beyond the property boundaries of the site.

### 3.3.4. USEPA Form 2C – Existing Manufacturing, Commercial, Mining, and Silvicultural Discharges (Individual Permit)

In addition to DEQ Form 1, operators of existing (i.e., currently permitted) manufacturing, commercial, mining, and silvicultural discharges must submit USEPA Form 2C <http://www.epa.gov/npdes/pubs/3510-2C.pdf>. The type of information required in USEPA Form 2C includes:

- Outfall locations;
- A line drawing of the water flow through the facility;
- Flow characteristics, sources of pollution, treatment technologies;
- Production information (if applicable);
- Improvements (if applicable);
- Intake and effluent characteristics for conventional, nonconventional and priority pollutants;
- Potential discharges not covered by analysis;
- Biological testing data;
- Contract analysis information; and
- Certification and signature.

Quantitative effluent data requirements for existing industrial dischargers vary depending on the industrial category of the facility, the facility's discharge characteristics and the types of pollutants expected to be present in the discharge. In addition, ARM 17.30.1322(7)(g) [40 CFR 122.21(g)(7)] specifies sampling and analysis methods that must be used when quantitative data for a pollutant are required.

### 3.3.5. USEPA Form 2D – New Manufacturing, Commercial, Mining, and Silvicultural Discharges of Process Wastewater (Individual Permit)

In addition to DEQ Form 1, operators of new manufacturing, commercial, mining, and silvicultural discharges of process wastewater must submit USEPA Form 2D <http://www.epa.gov/npdes/pubs/3510-2D.pdf>. "New" dischargers are those that have not previously obtained permits for a discharge and those that have not commenced operation. The type of information required in USEPA Form 2D includes:

- Expected outfall locations;
- Date of expected commencement of discharge;
- Expected flow characteristics;
- Sources of pollutants;
- Treatment technologies;
- Production information (if applicable); and
- Expected intake and effluent characteristics.

### 3.3.6. DEQ Form 2E – Manufacturing, Commercial, Mining, and Silvicultural Facilities that Discharge Only Non-Process Wastewater (Individual Permit)

In addition to DEQ Form 1, operators applying for an individual MPDES permit for manufacturing, commercial, mining, and silvicultural facilities discharging only non-process wastewater not regulated by an effluent limitation guideline or new source performance standard must submit DEQ Form 2E <http://deq.mt.gov/wqinfo/WPBForms/2-E.pdf>. "Non-process wastewater" includes sanitary wastes, restaurant or cafeteria wastes, and non-contact cooling water, but does not include storm water. Storm water is specifically excluded from the definition of "non-process wastewater." The type of information required in Form 2E includes:

- Outfall locations;
- Type of waste discharged;
- Effluent characteristics, including quantitative data for selected parameters;
- Flow characteristics;
- Request for a mixing zone; and
- Treatment system description.

The Department also uses DEQ Form 2E as the application form for permittees applying for coverage under the following general permits:

- Construction dewatering (TMG130000);
- Disinfection water (MTG770000); and
- Petroleum cleanup (MTG790000).

### 3.3.7. USEPA Form 2F – Storm Water Discharges Associated with Industrial Activities and Storm Water Discharges Associated with Construction Activities (Individual Permit)

In addition to DEQ Form 1, operators applying for an individual MPDES permit for discharges composed entirely of storm water associated with industrial activity or construction activity must submit USEPA Form 2F <http://www.epa.gov/npdes/pubs/3510-2F.pdf>. Applicants for individual permits with both storm water discharges associated with industrial activity and non-storm water discharges must also submit USEPA Form 2A, 2C, 2D, or DEQ Form 2E as appropriate. Note that POTWs and MS4s are not required to complete DEQ Form 1. The type of information required in USEPA Form 2F includes:

- A topographic map and estimates of impervious surface area;
- Descriptions of material management practices and control measures;
- A certification that outfalls have been evaluated for non-storm water discharges;
- Descriptions of past leaks and spills; and
- Analytical data from each outfall for several specified parameters.

### 3.3.8. DEQ Form SW-1–Storm Water Discharge Associated with Industrial Activity and Storm Water Discharges Associated with Mining and with Oil and Gas Activities (General Permit)

New and existing operators applying for coverage under the General MPDES Permit for Storm Water Discharges Associated with Industrial Activity (MTR000000) <http://www.deq.state.mt.us/wqinfo/mpdes/StormWater/StormWaterIndustrial/Signed2006SWIndustrialGeneralPermit.pdf> or the General MPDES Permit for Storm Water Discharges Associated with Mining and with Oil and Gas Activities (MTR300000) <http://www.deq.mt.gov/wqinfo/MPDES/StormWater/StormWaterMining/MTR300000GeneralPermit.pdf> must submit DEQ Form SW-1 <http://www.deq.state.mt.us/wqinfo/WPBForms/sw1frm.pdf > that covers these sectors. The type of information required in this special application includes:

- Application status;
- Name, mailing address, facility contact, and facility location;
- Existing permits currently in force for the facility;
- Standard industrial classification (SIC) code and a brief description of the nature of the business;
- Topographic map showing the location of the existing or proposed intake and discharge structures and the drainage patterns of the proposed discharge;
- Outfall location and receiving water information;
- Certification that the discharge was tested for the presence of non-storm water;
- The methods used to evaluate for the presence of non-storm water discharges;
- Analytical data of storm water quality, if available;
- Description of major potential pollutant sources exposed to storm water
- Description of any storm water treatment or BMPs in use; and
- Total size of facility or activity contributing to storm water runoff that may contribute to or contaminate storm water;

Permittees applying for coverage under MTR000000 or MTR300000 must prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) along with their application. Operators who can prove that their storm water does not come into contact with their industrial activities can seek exclusion from MPDES Permit MTR000000 or MTR300000 by submitting the Industrial No Exposure Certification Form <http://www.deq.state.mt.us/wqinfo/mpdes/swPermits/10-10-03IndNoExpForm.doc>.

Existing operators under MTR300000 must submit an annual compliance report <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/mining/MinGPRepForms2FinalWEB.pdf> in accordance with Part III.D of MPDES Permit MTR300000. Existing operators who seek to end their coverage under MPDES Permit MTR300000 must meet the Department's Vegetation Stabilization Criteria for Storm Water <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/swmining/VegStabilization.pdf> before submitting a Notice of Termination (NOT) for MTR300000 <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/swmining/swMiningformIIIterm.pdf> to the Department. Existing operators who seek to end their coverage under MPDES Permit MTR000000 must submit a Notice of Termination (NOT) for MTR000000 <http://www.deq.state.mt.us/wqinfo/mpdes/swPermits/SWNOTIndus.pdf> to the Department.

### 3.3.9. DEQ Notice of Intent for Storm Water Discharges Associated with Construction Activities (General Permit)

New and existing operators applying to seek coverage under the General MPDES Permit for Storm Water Discharges Associated with Construction Activity (MTR100000) <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/2002ConstGenPermit/FinalConstPermit02.pdf> must submit a Notice of Intent for MPDES Permit MTR100000 <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/03-10-05NOIForm.pdf> to the DEQ. In addition, the operator must prepare and submit a SWPPP along with the NOI. The type of information required in this NOI includes:

- The name, and contact information of the operator(s) and the job responsibilities of the operator(s);

- The operator(s) responsible for handling particular aspects of permitting operations (i.e., who's responsible for submitting the NOT, paying subsequent annual fees, and achieving "final stabilization" of the site; and
- Information about the construction project (i.e., location of the construction site, name(s) of receiving water(s), purpose of construction, start and completion dates).

Existing operators who seek to end their coverage under MPDES Permit MTR100000 must submit a Notice of Termination (NOT) for MTR100000 <http://www.deq.state.mt.us/wqinfo/MPDES/swPermits/2002ConstGenPermit/FinalNOTform.pdf> to the Department. New operators with construction areas that disturb less than 5 acres can seek an exclusion from MPDES Permit MTR100000 based on the value of the Rainfall Erosivity Factor during the period of construction activity calculated using one of two methods approved by the Department to calculate the operator's Rainfall Erosivity Factor. The Department may also waive permit requirements for such discharges if storm water controls are not needed based on a TMDL approved or established by USEPA that addresses the pollutants of concern or, for non-impaired waters that do not require a TMDL, an equivalent analysis that determines allocations for construction sites disturbing less than five acres of total land area for the pollutants of concern or that determines that such allocations are not needed to protect water quality based on consideration exiting in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. (see ARM 17.30.1105(5)).

### 3.3.10. Storm Water Discharges from MS4s Serving a Population of 100,000 or Greater (Individual Permit)

The 1990 federal storm water application regulations (55 FR 47990) require operators of large or medium MS4s to submit two-part applications. Part 1 application information was required to be submitted by large MS4s (allocated in an incorporated place or county with a population of 250,000 or more) by November 18, 1991, and by medium MS4s (located in an incorporated place or county with a population between 100,000 and 249,000) by May 18, 1992. Submission of Part 2 application information was required for large MS4s by November 16, 1992, and by medium MS4s by May 17, 1993. These applications may be submitted on a system- or jurisdiction-wide basis. Key requirements of each part of the application include:

- Part 1:
  - General information (e.g., name, address);
  - Existing legal authorities to control discharges to the storm sewer system and any additional authority that may be required;
  - Source identification information (e.g., storm sewer outfalls, land use information);
  - Discharge characterization, including monthly precipitation estimates, average number of storm events, and results from dry weather flow screening;
  - Characterization plan, including identification of 5 to 10 representative outfalls for storm water sampling;
  - Description of existing storm water management practices; and
  - Descriptions of existing budget and resources available to complete Part 2 of the application and implement the storm water program.
- Part 2:
  - Demonstration of adequate legal authority;
  - Identification of any major storm sewer outfalls not included in Part 1 of the application;
  - Discharge characterization data from three representative storm events;
  - Proposed storm water management program;
  - Assessment of controls, including expected reductions in pollutant loadings; and
  - Fiscal analysis, including necessary capital and operation and maintenance expenditures for each year of the permit.

Under the MPDES regulations, dischargers are required to reapply for a new MPDES permit prior to the expiration of their existing permit; however, in the case of storm water permits for MS4s, Part 1 and Part 2 application requirements were intended only for the initial issuance of a MS4 permit and specific requirements for reapplication have not been defined in the regulations. On May 17, 1996, USEPA issued a policy that sets forth a

streamlined approach for reapplication requirements for operators of MS4s (61 FR 41698, August 9, 1996). It allows municipalities to use recommended changes submitted in their fourth year annual report required under 40 CFR 122.42(c)(2), as the principal component of their reapplication package. It also encourages changes to monitoring programs to make them appropriate and useful to storm water management decisions. With the policy, USEPA seeks to improve municipal storm water management efforts by allowing municipalities to target their resources for the greatest environmental benefit.

### 3.3.11. Storm Water Discharges from MS4s Serving a Population Less Than 100,000 (Individual and General Permits)

Small MS4s, as defined by ARM 17.30.1102(23) are neither "large" nor "medium" MS4s pursuant to 40 CFR 122.26(b)(4) and (b)(7). Small MS4s serve a population of less than 100,000. ARM 17.30.1102(23) identifies small MS4s both in and outside of urbanized areas in Montana. Operators of small MS4s applying for coverage under the General MPDES permit for Small MS4s (MTR040000) <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/MTR040000GeneralPermit.pdf> must submit the Special DEQ Application <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/MS4appForm2_11_03webFrm.pdf> that covers this sector. The type of information required by this special application includes:

- Name and type of small MS4 applicant;
- The contact information of the owner or operator;
- A narrative on the small MS4 applicant;
- A map showing the location of the facility;
- A list of all the perennial or receiving waters within the permitted area;
- The fees associated with filling out the specific application for small MS4s as well as the annual fee for the first calendar year;
- Whether other entities perform a portion of, or all of, the six minimum control measure responsibilities in developing, implementing and enforcing a Storm Water Management Plan;
- Whether the applicant's form is to be part of a co-permittee application;
- The resident population and surface area of the small MS4 area;
- The attachments associated with this application (i.e., BMP description, BMP measurable goals, and the responsible entities); and
- The storm water discharge monitoring data.

The permit application procedures and permit requirements in ARM 17.30.1111, which apply to the general permit for small MS4s, also apply to small MS4s applying for an individual permit. For more information about small MS4 permitting, visit <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/ms4.asp>.

## *3.4. Application Review*

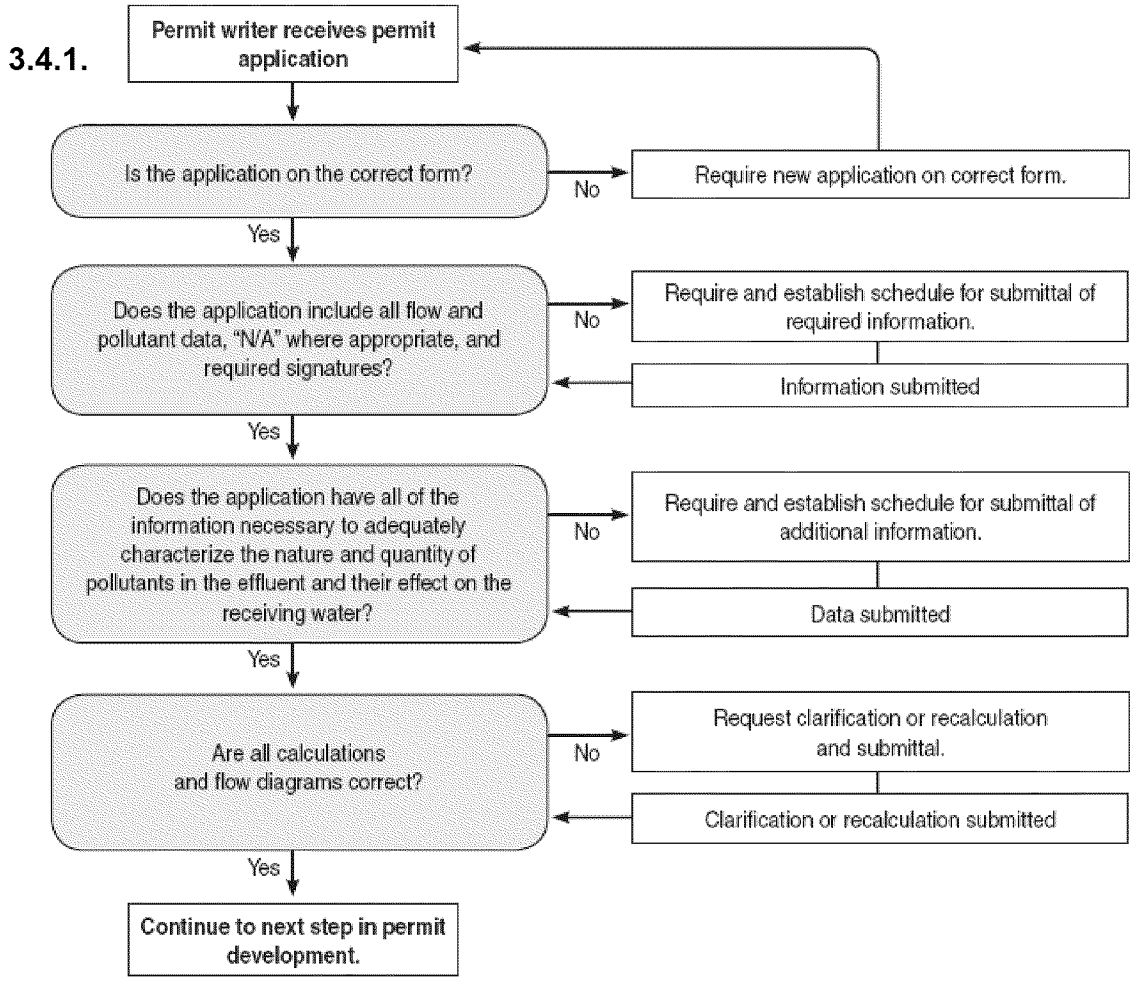
The contents of individual MPDES permits are based, in part, on the information submitted to the Department by the permit applicant. The permit application must be complete and accurate before a permit writer can properly develop a permit. According to ARM 17.30.1322(5), an application is considered complete "…when the Department receives an **application form and any supplemental information** which are completed to the Department's satisfaction." This "supplemental information" typically includes any information needed for a:

- Nondegradation review (if applicable);
- Mixing zone review (where a facility requests a mixing zone at the time of application);
- Montana Environmental Policy Act review; and
- A major/minor review.

**Exhibit 3-3** depicts the general process for reviewing a permit application. The regulations at ARM 17.30.1322(5) also state that the Department "shall not issue a permit before receiving a complete application...." Thus, the application review is an important part of the MPDES permitting process.

The permit writer must review the application form and any supplemental information for completeness within 30 days of receiving the application and must notify the applicant of any deficiencies in writing. Information re-submitted subsequently must also be reviewed within 30 days. For existing sources, a notice of deficiency must specify the date for providing the necessary information—typically 30 days after receipt of the notice of deficiency by the permittee.

**Exhibit 3-3. Permit application review process**




## Application Form Review

Permit writers should be aware of some of the most common omissions and errors found in permit applications. In addition, they should be able identify missing information and verify the accuracy of certain data during the application review process.

At a minimum, the application form must have all applicable spaces filled in. Instructions for the application form state that all items must be completed and that applicants use the statement "not applicable" (N/A) to indicate that the item had been considered. Blanks on a form can occur for a number of reasons, such as:

- The response was inadvertently omitted;
- The applicant had difficulty determining the correct response and rather than provide misleading or incorrect information, left the space blank; or
- The applicant was unwilling to provide the response.

A permit writer must obtain a response to the blank items by contacting the facility in writing or, in some cases, by telephone. Only minor changes should be handled by telephone and even minor items should be documented

in writing in the permit file. Under no circumstances should a permit writer edit or modify the application, which is a legal document that has been signed and certified by the applicant. The original application, any subsequent clarifications, and any supplemental information provided by the applicant should be clearly identified in the file and will become part of the record for the permit. A complete record is critical in the event that there are any legal challenges regarding permit decisions. If the changes or corrections to any application are extensive, the permit writer may require the permit applicant to submit a new application.

The permit writer may also require supplementary information, such as more detailed production information or maintenance and operating data for a treatment system, to process the permit. According to ARM 17.30.1322(5), an application is considered complete when the Department is satisfied that all required information has been submitted. Supplementary information can also be obtained later when the permit writer is actually drafting the permit. The applicant may submit additional information voluntarily or be required to do so under CWA section 308 or MCA Title 72, Chapter 5, Part 6.

One of the most commonly omitted items from permit applications is a topographic map of the area around the discharge, which is required as an attachment to DEQ Form 1, USEPA Form 2A, and USEPA Form 2S. Other industry- or municipality-specific information is also often omitted. For example, industrial applicants sometimes fail to submit a line drawing of the water flow through the facility required by Part II-A of USEPA Form 2C. The line drawing is important for ensuring that the location and description of the outfalls and the description of processes (Parts I and II-B of USEPA Form 2C) provided by the applicant is accurate.

Sometimes applicants do not properly submit the effluent data necessary to characterize the facility. Below are some required data elements that are commonly omitted from permit applications:

- Valid Whole Effluent Toxicity (WET) testing data, required from POTWs with design flows greater than 1 mgd or those with a pretreatment program. This requirement may be satisfied if the expiring permit contains a requirement for effluent characterization of WET. The permit writer should note the use of this option on the fact sheet;
- Biosolids monitoring data; a description of biosolids use and disposal procedures; annual biosolids production volumes; and information on the suitability of the site and a description of the site management for land application sites from POTWs and other TWTDS. A land application plan is required for any sites not identified in the application;
- Expected toxics and other pollutants. Non-municipal dischargers categorized as "primary industries" have some mandatory testing requirements for toxic pollutants (see 40 CFR 122.21, Appendix D, Table I and Table II <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f3c748adbaaf6b81475b7cf3d5ffa0ef&rgn=div9&view=text&node=40:21.0.1.1.12.4.6.5.10&idno=40> and also listed in USEPA Application Form 2C). The comprehensive testing requirements that apply to the various categories of industry are designed to determine whether any contaminants (some expected, some unexpected) are present in significant quantities, as well as to determine levels of pollutants that are known to be present;
- Production rates and flow data from industrial facilities that are subject to production- or flow-based effluent guidelines. Applicants must use units of measure corresponding to applicable effluent limitations guidelines, in order to allow calculation of effluent limits; and
- Appropriate sample types for all required pollutants and parameters being analyzed (Part 136). For example, only grab samples or continuous monitoring may be used for pH, total residual chlorine, and temperature, and only grab samples may be used for total phenols and volatile organics.

**Exhibit 3-4** presents examples of the types of questions that the permit writer should consider to determine whether an application form is complete.

**Exhibit 3-4. Considerations for determining that an application form is complete**

| **Example 1** |
|---|

A soap and detergent manufacturing facility in the liquid detergents subcategory submits DEQ Form 1 and DEQ Form 2C but marks thallium and beryllium as "believed absent" in Section V.C. of USEPA Form 2C and did not provide any data for these pollutants.

**Question:**
Is it appropriate for this applicant to mark "believed absent" in this section of USEPA Form 2C?

**Answer:**
No. Although an applicant that manufactures liquid detergents is not expected to discharge thallium and beryllium, page 2C-3 of the application form instructions and 40 CFR 122.21(g)(7)(v)(B) require testing for all listed metals by all applicants in a primary industry category, such as soap and detergent manufacturers. The indication of "believed absent" is incorrect. The applicant should have indicated "testing required" and provided the results of at least one sample per pollutant. Occasionally, unexpected contaminants could be present in a waste stream.

**Example 2**

A producer of wood rosin-based derivatives submits DEQ Form 1 and USEPA Form 2C and indicates that zinc is "believed absent" from its wastewater.

**Question:**
Is "believed absent" a proper indication for zinc for this wastewater?

**Answer:**
Possibly. After consulting the effluent guidelines development documents for the Gum and Wood Chemicals Manufacturing Point Source Category, the permit writer determines that zinc may be used as a catalyst in the production of wood rosin-based derivatives, though there are no effluent limits specified for zinc in the applicable effluent guidelines. The permit writer should contact the applicant and clarify whether zinc would be expected to be present in the discharge.

**Example 3**

Consider the plastics processor, the liquid detergents manufacturer, and the producer of wood rosin-based derivatives, mentioned above, and answer the following questions:

**Question:**
What pollutant data are needed to characterize the industries above?
For which toxic organic pollutants are they required to test?
For which heavy metals are they required to test?
Which metals would you expect to find in their wastewaters regardless of whether testing is required or not?

**Answer:**
The application form in Table 2C-2 and 40 CFR 122.21(g)(7)(ii)(A) of the NPDES regulations require testing of the volatile GC/MS fraction by the plastics processor and the volatile, acid, and base/neutral fractions by the liquid detergent manufacturer and the producer of wood rosin-based derivatives. Page 2C-3 of the application instructions and 40 CFR 122.21(g)(7)(ii)(B) require testing of all of the metals listed in item V, Part C1 of the application form as well as cyanide and total phenols by all three of these primary industry facilities. See the effluent limitations guidelines development documents for information on which, if any, metals might be expected in wastewater discharged by these applicants.

All information submitted on a permit application must also be accurate. Although it might be difficult to detect certain inaccuracies, a number of common mistakes can be readily detected. When mistakes are detected, they must be corrected. Generally, any correction or edit to the application should be obtained from the applicant, in writing, and must be included in the record for the permit.

In most cases, errors in the application will be inadvertent due to the length and complexity of the forms. However, it should also be noted that the application certification statement indicates, "…that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." If the permit writer believes that falsification has occurred, he or she should refer the findings to the Department's enforcement staff.

Some of the most common mistakes on permit applications include failing to provide the correct long-term average and daily maximum values, reporting quantified values below known quantitation levels or detection limits, using analytical methods that are not sufficiently sensitive, and using misplaced decimal points or incorrect

concentration units. **Exhibit 3-5** contains examples of the types of questions that the permit writer should consider while reviewing the permit application form for accuracy. Additional guidance from USEPA might be of assistance to assist permit writers in reviewing applications for some of these common errors.

**Exhibit 3-5. Considerations for determining that an application form is accurate**

**Example 1**

An industrial user provides a daily maximum effluent flow value of 50,000 gpd in its permit application USEPA Form 2C. However, a review of historical water usage records and an old permit application indicate estimated wastewater flows ranged from 100,000 to 150,000 gpd. The applicant had not instituted any water use reduction measures, significantly changed its process operations, or decreased its number of employees.

**Question:**
Are reported values consistent with historical information?

**Answer:**
No. An inspection of the facility revealed two separate water meters (one for sanitary and one for process water); the industrial user had overlooked the sanitary meter. Further, the process water meter was found to be defective. Subsequent flow monitoring of the actual total waste stream recorded a flow of 125,000 gpd. A new water meter was installed and concurrent waste stream flow monitoring and water meter readings resulted in the following water balances:

**Water In** (based on both water meter readings):
148,000 gpd (131,000 gpd process line and 17,000 gpd sanitary line).

**Water Out** (based on waste stream flow monitoring):
125,000 gpd total waste stream discharged to sewer system.
Evaporative and consumption losses were estimated at 23,000 gpd (15 % of total water usage).

The permit writer should require the applicant to submit a signed and certified letter with the revised flow estimates and a new water balance diagram or submit a revised application.

**Example 2**

A POTW applying for a permit reported its maximum daily flow as 1.2 mgd, the maximum daily total suspended solids concentration as 23 mg/l, and the maximum daily mass discharge of total suspended solids as 690 lb/day.

**Question:**
Do the concentration, mass, and flow values correspond?

**Discussion:**
No. Even in the unlikely event that the maximum daily flow and the maximum daily concentration occurred on the same day, the mass discharged would be well below the reported value of 690 lb/day. Using the calculation below, the mass discharge that corresponds to the solids concentration (23 mg/l) and flow (1.2 mgd) would be 230 lb/day:

23 mg/L x 1.2 mgd x 8.34 (lb)(L)/(mg)(millions of gallons) = 230 lb/day
(conversion factor)

Because the applicant reported a maximum mass discharge of 690 lb/day, a significant discrepancy is indicated. The permit writer should contact the applicant to resolve the discrepancy. The applicant should submit a signed and certified letter clarifying the correct maximum daily mass discharge of total suspended solids or submit a revised application.

**Example 3**

The results submitted in the application for total cyanide are all reported as <1,000 µg/L. When asked, the applicant indicated that total cyanide was analyzed using USEPA Method 335.3 (Color, Auto).

**Question:**
Do concentration values correspond with analytical detection limits for the method used?

**Answer:**
No. USEPA Method 335.3 for total cyanide has a method detection limit (MDL) of 5 µg/L. The applicant should be able to quantify results for total cyanide at values well below 1,000 µg/L using this method. The applicant has most likely used Standard Method 4500-CN (titrimetric) for total cyanide, rather than the testing procedure indicated. If total

cyanide is expected to be present in the discharge and would be of concern at effluent concentrations below 1,000 µg/L, then the permit writer could require the applicant to re-test for total cyanide using the more sensitive method and to submit the results in a signed, certified letter.

### 3.4.2. Nondegradation Review

During the application review process, the permit writer must review the permit application form and any supplemental information provided by the applicant to be sure that the Department has received the information necessary to implement Montana's nondegradation policy as applied to the discharge. **The permit writer may not begin processing the application until all information required under ARM 17.30.706 for a nondegradation review is received.**

The nondegradation policy is a component of Montana's Water Quality Standards, which are discussed in detail in **Chapter 8** of this Manual. The policy is implemented through regulations at ARM 17.30.701-718. To implement the regulations, during the application process the permit writer must first determine whether the discharge is from a "new or increased source."[4] If the discharge is from a new or increased source, the permit writer must then determine the category of receiving water and the corresponding level of protection provided under the nondegradation policy.

#### 3.4.2.1. New or Increased Source Determination for Nondegradation Review

ARM 17.30.702(18) defines a "new or increased source" as an activity resulting in a change of existing water quality occurring on or after April 29, 1993, except:

1. sources from which discharges to State waters commenced or increased on or after April 29, 1993, provided the discharge is in compliance with the limits and conditions of a permit or authorization issued by the Department prior to April 29, 1993;
2. nonpoint sources discharging prior to April 29, 1993;
3. withdrawals of water pursuant to a valid water right existing prior to April 29, 1993; and,
4. activities or categories of activities causing nonsignificant changes in existing water quality.

The statutory and regulatory definition of "degradation" is closely tied to this definition of a "new or increased source." For example, ARM 17.30.702(3) defines "degradation" as any increase of a discharge that exceeds the limits established under or determined from a permit or approval issued by the Department prior to April 29, 1993. The regulation also refers to the definition of "degradation" in 75-5-103 MCA, which refers specifically to a change in water quality that lowers the quality of "high-quality waters" for a parameter, but this definition specifically excludes changes in water quality determined to be nonsignificant pursuant to 75-5-301(5)(c). Thus, to determine whether a proposed discharge is from a "new or increased source" that would cause "degradation" the permit writer should first consider whether the discharge meets Exception 1 or Exception 4 from the definition of a "new or increased source" in ARM 17.30.702(18). Exceptions 2 and 3 are not of interest for MPDES permitting.

***Exception 1***: *sources from which discharges to State waters commenced or increased on or after April 29, 1993, provided the discharge is in compliance with the limits and conditions of a permit or authorization issued by the Department prior to April 29, 1993.*

Permit writers should be aware that most MPDES permits issued prior to April 29, 1993, contained only technology-based effluent limitations. These limitations typically were expressed in terms of mass (load). The average monthly mass limitations are the baseline for nondegradation determinations. For an industrial facility, most mass limitations were calculated based on production. For a POTW, the average monthly mass limitations for conventional pollutants ($BOD_5$ and TSS) are calculated using design capacity. In cases where the effluent

[4] It should be noted that a determination of a new or increased source under the nondegradation policy is not equivalent to a new source determination under 17.30.1340 regarding the applicability of New Source Performance Standards (NSPS) See Section 7.4 for more information on determining the applicability of NSPS.

limitations for these pollutants were not expressed as a load (pounds per day) in permits issued prior to April 29, 1993, the permit writer must determine what the mass loading limitations would have been based on the design flow of the POTW or industrial facility as of April 29, 1993. If a reissued permit retains these limitations and there are no other proposed changes to the discharge, the facility is not considered a new or increased source for purposes of a nondegradation review.

Furthermore, it is important to note that effluent limitations in permits issued or re-issued after April 29, 1993, have already been based on implementation of nondegradation requirements. Such discharges are also considered existing sources, for purposes of a nondegradation review, unless there is a proposed change to the discharge. Nondegradation-based limits for nitrogen and phosphorus are no longer used for this determination or considered valid for nondegradation purposes or permit limits.

***Exception 4***: *activities or categories of activities causing nonsignificant changes in existing water quality.*

To apply this exception, a permit writer must determine whether the discharge will cause a significant or nonsignificant change in existing water quality. This determination is based on whether the discharge within one of the categories of activities listed in 75-5-317(2) MCA and ARM 17.30.716 that, by definition, cause nonsignificant changes in water quality or whether it meets the criteria for determining nonsignificant changes in water quality listed in ARM 17.30.715(1). The categories of activities defined as causing nonsignificant changes in water quality have limited applicability to point source discharges. Furthermore, the regulatory criteria for determining nonsignificance apply to new discharges and do not address incremental changes to an existing discharge. Therefore, generally only new discharges (which could be from a new or existing facility) have the potential to meet the criteria for nonsignificance in ARM 17.30.715(1) and, thereby meet the requirements for Exception 4.

Based on the regulatory definition of a new or increased source, including the exceptions, the Department has determined that any of the following would initially be considered as constituting a new or increased source that triggers a nondegradation review:

1. A facility receiving its first MPDES permit;
2. Addition of a new outfall not previously permitted;
3. Relocation of an outfall that results in a discharge to a receiving water body previously not affected by the discharge;
4. For a Publicly Owned Treatment Works (POTW), any increase in the design capacity since the previous permit, as stated in Part A.6.a of Form 2A and defined in Chapter 10 of this manual, or an increase in pollutant load above those given in the previous statement of basis or fact sheet for any pollutants;
5. For an industrial source, any increase in production rate above that used in the previous permit as stated in Part III of Form 2C; or
6. Except for a POTW receiving inflow from new indirect discharges, the introduction of any new pollutant into the treatment works that would result in a change of change in existing water quality.
7. Other changes to the discharge resulting in a change in receiving water quality that the Department determines would constitute degradation based on the provisions of ARM 17.30.715(2) (e.g., a process change at an industrial facility resulting in additional loading of a toxic pollutant).

The Department has developed a checklist to assist the permit writer in making the determination of whether a particular applicant is a new or increased source. This checklist must be completed and incorporated into the administrative record for the permit issuance and a copy must be provided to the applicant.

***Application Information Requirements***: ARM 17.30.706 (1)-(2) state that persons proposing an activity that would be permitted by the Department and might cause degradation may either determine for themselves, using the nonsignificance criteria contained in ARM 17.30.715 and 17.30.716, that the proposed activity will not cause significant changes in water quality or, alternatively, that the the Department will determine whether a proposed activity might cause degradation. Any permittee included in one of the categories listed above that the Department has determined initially meet the definition of new or increased sources must submit the information needed by

the Department for a nondegradation review in order to be considered to have submitted a complete MPDES permit application. The required information is specified in ARM 17.30.706(3) and includes, but is not limited to:

1. quantity and concentration of the parameters expected to change as a result of the proposed activity;
2. length of time that the water quality is expected to be changed;
3. character of the discharge;
4. an analysis of the existing water quality of the receiving water, and any other downstream or downgradient waters which may be reasonably expected to be impacted, including natural variations and fluctuations in the parameter(s) which may change as a result of the proposed activity; and
5. proposed water quality protection practices.

Items 1-3 (ARM 17.30.706(3)(a)-(c)) typically are obtained as part of the application form (Form 2A, 2C, 2D, 2E, or 2F). The applicant must provide quantitative estimates of pollutant concentrations for any pollutants of concern, as defined in **Section 10.2** of this Manual, which are present in the discharge at or above ambient concentrations. In addition to characterization of the effluent, ARM 17.30.706(3)(d) (Item 4 above) requires the applicant provide an analysis of the receiving water, including flow. Critical receiving water flow is described in **Section 10.2.4** of this Manual. The receiving water analysis must adequately characterize the existing water quality, which is defined in ARM 17.30.702(4) as the quality of the receiving water, including, chemical, physical and biological condition immediately prior to commencement of the activity or that which can be adequately documented on or after July 1, 1971, whichever is the highest quality. Typically this analysis requires a minimum of 6 to 10 receiving water samples over a one year period at the point of discharge for the pollutant of concern. It might also require sampling and analysis of a downgradient water body if the receiving water at the point of discharge is not considered a high quality water (i.e., an ephemeral drainage or a water body with surface expression less than 270 days of the year). This information is necessary to adequately characterize the annual variation in receiving water quality and flow in accordance with ARM 17.30.706(3)(d). Finally, ARM 17.30.706(3)(e) (Item 5 above) requires a description of proposed water quality protection practices that will be implemented to minimize degradation of state waters. Water quality protection practices are defined in 75-5-103(35) MCA, and include proposed treatment equipment, management practices, and operational controls. Typically the level of treatment for a new or increased source exceeds that level provided by the minimum treatment requirements adopted by the Board pursuant to 75-5-305, MCA.

#### 3.4.2.2. Receiving Water Categorization for Nondegradation Review

If a discharge constitutes a new or increased source, the permit writer must then identify the level of protection that is provided to the receiving water under ARM 17.30.705. This determination can be made on a parameter-by-parameter basis or categorically (i.e., for all parameters for the receiving water). The three categories of State waters and the levels of protection in Montana's nondegradation policy parallel the three "tiers" of the federal antidegradation policy as required by USEPA in 40 CFR 131.12. These three "tiers" are as follows:

***Tier I:*** *Existing uses of State waters and the level of water quality necessary to protect those uses must be maintained and protected (75-5-303(1) MCA, ARM 17.30.705(2)(a) 40 CFR 131.12(a)(1)).*

Waters with only Tier I protection include those state waters that are not designated as Outstanding Resource Waters (Tier III) and do not meet the definition of high quality waters (Tier II). When determining the applicable tier on a water body basis, Tier I includes surface waters that are not capable of supporting any one of the designated uses for their classification (class I surface water) and waters with zero flow or surface expression for more than 270 day during most years. Examples of such waters are receiving waters that meet the definition of ephemeral or dewatered streams. On a parameter-by-parameter basis, receiving waters that are not considered high quality are those the are listed as impaired on the most recent 303(d) list for the pollutant of concern or waters in which the background concentration of the receiving water, as determined by the site-specific receiving water concentration of a parameter, naturally exceeds the numeric water quality standard. The determination that a water body is a Tier I water must be based on a site-specific analysis of the discharge and the receiving waters. In accordance with ARM 17.3.705(2)(a), for Tier I waters the existing and anticipated uses and level of water quality necessary to protect those uses must be maintained. Calculation of effluent limitations that meet this requirement is discussed further in **Section 10.6** of this Manual.

***Tier II**: Unless authorized by the Department through a nondegradation analysis or exempted from review under 75-5-317 MCA, the quality of high-quality waters must be maintained (75-5-303(2)-(7) MCA, ARM 17.30.705(2)(b) and 40 CFR 131.12(a)(2)).*

High quality waters are not designated in Montana. The Department makes the assumption that a receiving water is high quality unless it is otherwise determined to not meet the definition of high quality. The level of protection applied to high quality waters is prescribed by the criteria in ARM 17.30.715, [Criteria for Determining Nonsignificant Changes in Water Quality] and ARM 17.30.670 [Numeric Standards for Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)]. An MPDES permit based on these criteria constitutes a finding by the Department that the activities authorized in the permit are nonsignificant pursuant to 75-5-301(5)(c) and do not cause degradation of State waters. Permit limits must be based on these criteria, after allowing for dilution granted through approval of a mixing zone (see **Section 10.6** of this Manual) or, if the facility cannot meet these limitations, it must complete an "Application to Degrade State Waters" if it wishes to proceed with the discharge that constitutes the new or increased source.

***Tier III:** The Board may not authorize degradation of State waters classified as "outstanding resource waters" (75-5-303(7) MCA, ARM 17.30.705(2)(c) and 40 CFR 131.12(a)(3)).*

Outstanding Resource Waters are defined in 75-5-103(20) MCA as "state surface waters located wholly within the boundaries of areas designated as national parks or national wilderness areas as of October 1, 1995 or other surface waters or ground waters classified by the Board under the provisions of 75-5-316 and approved by the legislature." No permanent change in the quality of Outstanding Resource Waters resulting from a new or increased point source discharge is allowed.

***Application Information Requirements***: For any receiving water that is not designated an Outstanding Resource Water (Tier III), a new or increased source applying for a permit may provide information to the Department to support determination that the receiving water is a Tier I water (i.e., not a high quality water) for one or more parameters. The Department will evaluate such information and determine, on a parameter-by-parameter basis or categorically, if the receiving water is a high quality water (Tier II) or if it is provided protection of existing uses only (Tier I).

As noted above, new or increased source proposing to discharge to a high quality (Tier II) water may accept effluent limitations in it MPDES permit based on the criteria of ARM 17.30.715(1)(a)-(g) and ARM 17.30.670 (see **Section 10.6** of this Manual) or submit an "Application to Degrade State Waters." The information required in an "Application to Degrade State Waters" is listed in ARM 17.30.706(7)-(11). Based on the requirements of ARM 17.30.706(12), the Department must notify the applicant in writing within 60 days after receipt of an "Application to Degrade State Waters" that the application does or does not contain all the information necessary for the Department's nondegradation review. If the information from the supplemental submittal and any subsequent supplemental submittal is inadequate, the Department must notify the applicant in writing, within 30 days after receipt of the supplemental submittal, what additional information must be submitted. In any review subsequent to the first, the Department may not make a determination of incompleteness on the basis of a deficiency which could have been noted in the first review.

### 3.4.3. Mixing Zone Review

Another important part of the MPDES permit application review process is the mixing zone review. At the time of application, an applicant may request a mixing zone in its MPDES permit. The types of mixing zones that might be available, depending on the specific discharge situation, are nearly instantaneous, standard, alternative, or source-specific mixing zones. Mixing zones are granted on a parameter-by-parameter basis only and must be based on the applicable criteria specified in the regulations found in Title 17, Chapter 30, Subchapters 5 (Mixing Zones in Surface and Ground Water), Subchapter 6 (Surface Water Quality Standards and Procedures), and 7 (Nondegradation of Water Quality).

For new discharges, the information submitted by the applicant must demonstrate to the Department that the applicant cannot meet the applicable numeric water quality standards at the point of discharge (i.e., that a mixing zone is needed) and that a mixing zone is appropriate based on the criteria specified in the regulations. For existing discharges, the permit writer may continue a mixing zone that was granted in a previous permit provided that continuing to allow the mixing zone would not threaten or impair an existing beneficial use and that the mixing zone complies with the specific restrictions for surface water mixing zones in ARM 17.30.507. Permit writers should refer to **Chapter 9** of this Manual for detailed mixing zone review procedures, for the specific criteria for granting each type of mixing zone, and for the information that must be submitted by an MPDES permit applicant when requesting a mixing zone. A permit writer may also grant a new or re-sized mixing zone (including a mixing zone for a relocated outfall) requested by an existing discharger during the permit application process. This mixing zone review could be based on effluent and receiving water data obtained during previous permit terms or might require the permittee to submit supplemental information that the permit writer concludes is needed to support the Department's determination. A request for a new or re-sized mixing zone for an existing discharge could trigger the need for a nondegradation review as described above.

### 3.4.4. Montana Environmental Policy Act Review—RESERVED

### 3.4.5. Major/Minor Review

During the application form review, the permit writer should also determine whether the facility is a major or minor facility. The distinction between major and minor facilities was made initially to assist USEPA and states in setting priorities for permit issuance and reissuance. The regulations at ARM 17.30.1304(30) define a major facility as "any MPDES facility or activity classified as such by the Department in conjunction with the Regional Administrator." All facilities that are not designated as "majors" are considered "minor" facilities.

Through policy, including the memoranda *Procedures for Revising the Major Permit List* <www.epa.gov/npdes/pubs/owm0364.pdf> (Dougherty, 1988) and *Delegation of Updates to Major/Minor Lists* <www.epa.gov/npdes/pubs/owm0142.pdf> (Pendergast, 1995), USEPA has established working definitions for POTW and non-POTW major facilities. For POTWs, major facilities are those with design flows of one million gallons per day or greater, serve a population of 10,000 or more, or which cause significant water quality impacts. Non-POTW discharges are classified as major facilities based on the number of points accumulated using the NPDES Permit Rating Work Sheet <www.epa.gov/npdes/pubs/owm0116.pdf> (Elder, 1990). This worksheet evaluates the significance of a facility using several criteria, including toxic pollutant potential, flow volume, and water quality factors such as impairment of the receiving water or proximity of the discharge to coastal waters.

Permit writers should require an applicant to submit any information beyond the permit application form and any supplemental information (e.g., information submitted for a nondegradation review) that is needed to complete the major/minor review. This information must be received prior to the permit writer determining that an application is complete.

## *3.5. Confidential Information*

In accordance with MCA 75-5-105, information submitted to the Department pursuant to the MPDES permitting regulations under ARM Chapter 17, Subchapter 30, may be claimed as confidential; however, the Department has determined that the following information will not be held confidential (ARM 17.30.1321):

- Name and address of the applicant;
- Permit applications and information submitted with applications;
- Permits, and
- Effluent data.

Information that may be claimed as confidential includes material related to manufacturing processes unique to the applicant, or information that might adversely affect the competitive position of the applicant if released to the public. Under these circumstances, the permit writer will be required to treat the information as confidential in

accordance with the requirements in MCA 75-1-105. Any claims of confidentiality must be made at the time of submission or the information will not be considered confidential.

## 3.6. Additional Information for MPDES Permit Development

Even after receiving a complete application package, as described above, in most situations a permit writer will find it beneficial to assemble other available information that could be used to develop permit limits and conditions and, if possible, conduct a facility site visit. While these activities are not part of the permit application completeness review, they provide important information to supplement permit application package and can be the first steps in the process of drafting an MPDES permit.

### 3.6.1. Permit File Review

Prior to developing the draft permit and fact sheet, the permit writer should assemble and review any additional available background information on the facility beyond what is required in the permit application or, if applicable, the nondegradation, mixing zone, and MEPA reviews. If the permit writer is reissuing an existing permit, the existing permit record typically would include the following useful information:

- The current permit;
- The fact sheet or statement of basis for the current permit;
- Discharge Monitoring Reports (DMRs);
- Compliance inspection reports;
- Engineering reports; and
- Correspondence or information on changes in plant conditions, problems, and compliance issues.

Much of this information, particularly DMR data, is stored in automated data tracking systems such as:
Integrated Compliance Information System (ICIS)-NPDES <https://icis.epa.gov>;
Online Tracking Information System (OTIS) <http://www.epa.gov/idea/otis/>; and
Envirofacts Warehouse <http://www.epa.gov/enviro/>

The permit writer may check with others who have developed permits for similar types of facilities to see if there are any special considerations related to the type of facility to be permitted. A permit writer also may wish to discuss compliance concerns, changes, or history of complaints with compliance personnel who conducted previous inspections of the facility or with permit writers for other media (e.g., air, solid waste).

Examples of some other sources of information that the permit writer could use for permit development include.

- Receiving water quality data from databases such as the USEPA Storage and Retrieval data base (STORET) <http://www.epa.gov/STORET/>;
- Supporting documentation collected by USEPA for effluent guidelines and categorical pretreatment standards for a variety of industrial categories;
- Reference textbooks and technical documents that provide information about manufacturing processes and waste streams for specific industry categories, which are available from libraries such as:
  - National Technical Information Service (NTIS) <http://www.ntis.gov>;
  - USEPA libraries <http://www.epa.gov/natlibra/libraries.htm>;
  - Office of Water Resource Center (OWRC) <http://www.epa.gov/safewater/resource/>;
  - National Service Center for Environmental Publications (NSCEP) <http://www.epa.gov/ncepihom/>; and
  - Montana State Library <http://msl.mt.gov>
- Related environmental permits that could provide site-specific background information about the types of pollutants and waste streams at a facility, including, for example:
  - RCRA permits—which regulate the management of hazardous waste by owners and operators of treatment, storage, and disposal facilities;
  - Clean Air Act permits—which regulate the discharge of atmospheric pollutants;
- USEPA's Treatability Manual (USEPA, 1980) <http://www.epa.gov/npdes/pubs/owm569.pdf>, which is a five-volume guidance manual that provides detailed descriptions of industrial processes, potential pollutants from each process, appropriate treatment technologies, and cost estimating procedures; and

- The Toxic Release Inventory (TRI) <http://www.epa.gov/tri/>, which is accessible on USEPA's mainframe and through a public online service. The TRI contains information on more than 300 listed toxic chemicals released by specific facilities, including chemical identification, quantity of chemicals released to various environmental media, off-site waste transfer, and waste treatment and minimization information.

### 3.6.2. Facility Site Visits

Facility site visits are an invaluable way to update information on manufacturing processes; obtain information about the facility's operations, equipment or management; and verify application information. A site visit also acquaints the permit writer with the people who will be operating under the permit and participating in the permit development process.

Site visits might also allow the permit writer to gain a better understanding of more complex facilities. Site visits are especially helpful if significant pollution control or treatment improvements will be required, if there have been frequent problems in complying with the existing permit, if there are known problems with spills or leaks or with contaminated surface runoff, or if there are other unique on-site activities that may affect the characteristics of the discharge from the facility.

A site visit should include a detailed review of production processes in order to evaluate the types of toxic or hazardous substances that could be present in raw materials, products, and byproducts. The permit writer should review the water uses, the resulting wastewater streams, and any in-process pollution controls. This review is useful in selecting toxic and other pollutants to be limited and in evaluating possible in-process control improvements. In addition, the site visit should include a review of the performance and operation and maintenance practices of wastewater treatment facilities. This review is useful in evaluating the adequacy of existing treatment performance and assessing the feasibility of improvements and performance. The permit writer should examine effluent monitoring points, sampling methods, and analytical techniques to identify any needed changes to monitoring requirements and to evaluate the quality of DMR data.

Raw material and product storage and loading areas, sludge storage and disposal areas, hazardous waste management facilities, including on-site disposal areas, and all process areas should be observed to determine the need for controls on surface runoff and specific best management practices (BMPs). Information from other environmental programs (e.g., CERCLA or RCRA) may be important in this regard. While on site, the permit writer should note any housekeeping problems or the need for spill prevention actions, which are not usually detectable from permit applications. If allowed, photographs of problem areas should be taken for future use during permit preparation. If necessary, the permit writer should meet with management to ask questions or clarify information provided on the permit application. If any inaccuracies in the application were found as a result of the site visit, a site visit is a good opportunity for the permit writer to request corrected information.

The time required to conduct a site visit varies according to the complexity of the facility. For facilities with only a few basic processes, one main waste treatment system, limited in-process controls, few surface runoff outfalls, and limited on-site management of sludge or hazardous wastes, an adequate site visit most likely could be completed in one day or less. Visits to complex, larger plants with several treatment systems, numerous outfalls, and extensive ancillary activities may require several days. Time spent on site visits often result in time savings during permit preparation, but time or travel resources may not be adequate to allow visits to all facilities to be permitted. In such cases, the permit writer may be able to obtain much of the desired information from facility compliance inspections and should try to coordinate the timing of compliance inspections with the timing of permit development.

Aerial photographs might also provide information on the potential for contamination of surface runoff and on ancillary activities in the absence of a site visit or inspection. In addition, comparing aerial photographs with site and process diagrams provided with the application may provide the permit writer with a complete visual description of the facility. Aerial photographs are available from a variety of sources, including the United States Geological Survey (USGS) National Aerial Photography Program <http://edc.usgs.gov/products/aerial/napp.html>; TerraServer <http://www.terraserver.com/>; Google Earth <http://earth.google.com/>; and other private contractors.

## 3.7. References

Dougherty, Cynthia. 1988. *Procedures for Revising the Major Permit List.* U.S. Environmental Protection Agency, Permits Division. Memorandum, December 28, 1988. <www.epa.gov/npdes/pubs/owm0364.pdf>

Elder, James. 1990. *New NPDES Non-Municipal Permit Rating System.* U.S. Environmental Protection Agency, Office of Water Enforcement and Permits. Memorandum, June 27, 1990. <www.epa.gov/npdes/pubs/owm0116.pdf>

Pendergast, James F. 1995. *Delegation of Updates to Major/Minor Lists.* U.S. Environmental Protection Agency, Office of Wastewater Management. Memorandum, February 6, 1995. <www.epa.gov/npdes/pubs/owm0142.pdf>.

USEPA, 1980. *Treatability Manual: Vol. I - Treatability Data (EPA-600/8-80-042a)* <http://www.epa.gov/npdes/pubs/owm569.pdf>*; Vol. II -Industrial Descriptions (EPA-600/8-80-042b) <No link>; Vol. III - Technologies (EPA-600/8-80-042c) <No link>; Vol. IV - Cost Estimating (EPA-600/8-80-042d)* Publication available on NEPIS Web site <http://nepis.epa.gov/pubtitle.htm> as document 600880042d, *Vol. V - Summary (EPA-600/8-80-042e) <No link>*. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.

# Chapter 4. Secondary Treatment Standards for POTWs

The largest category of dischargers requiring individual MPDES permits is municipal publicly owned treatment works (POTWs). Consistent with federal regulations, ARM 17.30.1304 defines a POTW as "any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a state or municipality." The definition also includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment. Section 304(d) of the CWA required USEPA to establish performance standards for POTWs. These performance standards are referred to as "secondary treatment" and are based on application of biological treatment processes. Furthermore, section 301(b)(1)(B) of the CWA required POTWs to meet effluent limitations based on secondary treatment by July 1, 1977. Later, section 304(d) was amended to require USEPA to develop alternative standards for certain types of POTWs. These requirements are referred to as "equivalent to secondary treatment" standards. .

Several regulations implement the statutory requirements for developing standards and effluent limitations based on secondary treatment. USEPA has promulgated regulations establishing secondary treatment standards, equivalent to secondary treatment standards, and a number of special considerations applied on a case-by-case basis in 40 CFR Part 133. In addition, 40 CFR 122.44(a)(1) requires that NPDES permits include applicable technology-based limitations and standards, while regulations at 40 CFR 125.3(a)(1) specifically state that these technology-based effluent limitations for POTWs must be based on the secondary treatment standards or equivalent to secondary treatment standards specified in 40 CFR Part 133. Montana adopted the federal secondary treatment regulation by reference in ARM 17.30.1209 and 17.30.1344 and adopted the requirements for establishing technology-based effluent limitations by reference in ARM 17.30.1344 and 17.30.1345.

## *4.1. Secondary Treatment and Secondary Treatment Standards*

Secondary treatment is defined as the removal of biodegradable organics and suspended solids by biological treatment. Secondary treatment usually is preceded by primary treatment to remove settleable solids. Because municipal wastewater is amenable to biological treatment, the technology-based standards for POTWs are called secondary treatment standards. Biological treatment processes can include fixed film systems, suspended growth systems, and ponds or lagoons.

In fixed film systems, microorganisms grow on media such as rocks, sand or plastic, and the wastewater is allowed to flow over the media. The constituents in the wastewater (such as organic matter and nutrients) are absorbed and metabolized by the microorganisms. Examples of these types of systems include trickling filters, rotating biological contactors, and sand filters.

Suspended growth systems suspend the microorganisms in wastewater tanks by mixing. The constituents in the wastewater (such as organic matter and nutrients) are absorbed and metabolized by the suspended microorganisms. After a certain period of time (generally several hours) the suspended microorganisms are allowed to settle in a separate sedimentation tank (called a clarifier) as sludge. A portion of the settled sludge, called return activated sludge, is pumped back into the treatment system to allow the treatment process to continue. The rest is wasted and may be treated in a sludge treatment process before disposal. Examples of suspended film systems include various modifications of activated sludge systems such as complete-mix, extended aeration, oxidation ditch, and sequential batch reactors.

Waste stabilization pond or lagoon systems include shallow basins that hold the wastewater for an extended period of time (e.g., several months). This retention time allows sewage to degrade through the actions of microorganisms in the wastewater and natural aeration. Sometimes this degradation is enhances through mechanical aeration. The Department considers facultative lagoons, aerated lagoons, aerobic lagoons, or anaerobic lagoons to meet the general definition of "waste stabilization pond" (USEPA, 1983). Facultative and aerated lagoons are the systems most commonly used for municipal wastewater treatment. Aerobic lagoons are relatively shallow and, thus, are most common in warmer climates, such as in the southern United States.

Anaerobic lagoons typically are used as a pretreatment process for industrial wastewater with high organic content or as a first stage of a municipal wastewater treatment process.

In 40 CFR Part 133, USEPA published secondary treatment standards based on an evaluation of performance data for POTWs practicing biological treatment. This regulation identifies the minimum level of effluent quality attainable by secondary treatment in terms of 5-day biochemical oxygen demand ($BOD_5$), total suspended solids (TSS), and pH. **Exhibit 4-1** summarizes these standards.

**Exhibit 4-1. Secondary treatment standards**

| Parameter | 30-Day Average | 7-Day Average |
|---|---|---|
| 5-day Biochemical Oxygen Demand ($BOD_5$) | 30 mg/L | 45 mg/L |
| Total Suspended Solids (TSS) | 30 mg/L | 45 mg/L |
| $BOD_5$ and TSS Removal (concentration) | 85% | --- |
| pH | Within the range of 6.0 – 9.0 (standard units) | |

The regulation also includes an alternate set of standards that apply to certain facilities employing waste stabilization ponds or trickling filters for biological treatment.

## *4.2. Equivalent-to-Secondary Treatment*

Some of the biological treatment technologies described above, such as trickling filters or waste stabilization ponds, are capable of achieving significant reductions in $BOD_5$ and TSS, but may not consistently achieve the secondary treatment standards. Congress recognized that unless alternate limits were set for facilities with trickling filter or waste stabilization pond treatment systems, which often are located in smaller communities, these facilities would be required to upgrade their treatment systems to meet the secondary treatment standards. To prevent requiring upgrades where facilities were achieving their original design performance levels, Congress included provisions in the 1981 amendments to the Construction Grants statutes [Section 23 of Pub. L. 97-117] that required USEPA to make allowances for alternative biological treatment technologies, such as a trickling filters or waste stabilization ponds. In response to this requirement, in 1984, USEPA promulgated regulations at 40 CFR 133.105 that include alternative standards that apply to facilities using "equivalent-to-secondary treatment." A facility must meet specific criteria laid out in 40 CFR 133.101(g) to qualify for application of equivalent-to-secondary standards.

### 4.2.1. Criteria to Qualify for Equivalent-to-Secondary Standards

To be eligible for effluent limitations based on equivalent-to-secondary standards, a POTW must meet all of the following criteria:

- The principal treatment process must be either a trickling filter or waste stabilization pond (e.g., the largest percentage of $BOD_5$ removal is provided by the trickling filter or waste stabilization pond system) (40 CFR 133.101(g)(1));
- The effluent quality consistently achieved, despite proper operation and maintenance (e.g., the facility is following its operation and maintenance manual, the facility is not operating beyond its design hydraulic or organic loading limit, there is no structural failure causing poor performance), is in excess of 30 mg/L $BOD_5$ and TSS as a monthly average (40 CFR 133.101(g)(2)); and
- The treatment works as a whole provides significant biological treatment, defined as consistently attaining a minimum of 65 percent reduction of $BOD_5$ (monthly average) (40 CFR 133.101(g)(3)).

Application of these criteria is discussed in greater detail in **Chapter 5**.

### 4.2.2. Equivalent-to-Secondary Standards

The maximum limitations allowed under the equivalent-to-secondary treatment standards, as specified in 40 CFR 133.105, are shown in **Exhibit 4-2**.

**Exhibit 4-2. Equivalent-to-secondary treatment standards**

| Parameter | 30-Day Average | 7-Day Average |
|---|---|---|
| 5-day Biochemical Oxygen Demand ($BOD_5$) | Up to 45 mg/L | Up to 65 mg/L |
| Total Suspended Solids (TSS) | Up to 45 mg/L | Up to 65 mg/L |
| $BOD_5$ and TSS Removal (concentration) | As low as 65% | --- |
| pH | Within the range of 6.0 – 9.0 (standard units) | |

The federal equivalent-to-secondary standards would allow relaxation of the $BOD_5$ limitations for waste stabilization ponds and trickling filters to less stringent levels than the secondary treatment standards of 30 mg/L as a 30-day average and 45 mg/L as a 7-day average. Section 304(d)(4) of the federal CWA requires that water quality not be adversely affected by application of treatment equivalent to secondary. For this reason, MPDES permits, maintain the secondary treatment requirements as a means of protecting dissolved oxygen levels in the receiving water unless the discharger demonstrates, to the satisfaction of the Department, that less stringent performance-based concentration limitations for $BOD_5$ will not have a negative impact on dissolved oxygen concentrations in the receiving water.

#### 4.2.2.1. Alternate TSS Requirements for Waste Stabilization Ponds

In accordance with regulations adopted by USEPA in 1977 and revised in 1984, states can adjust the maximum TSS limitations for waste stabilization ponds upward from those specified in the equivalent-to-secondary treatment standards to conform to TSS concentrations achievable with waste stabilization ponds. This regulation, found at 40 CFR 133.103(c), defines TSS concentration achievable with waste stabilization ponds as the concentration that is achieved 90 percent of the time within a state or appropriate contiguous geographical area by waste stabilization ponds that are achieving the minimum effluent quality expected by the equivalent-to-secondary standards for $BOD_5$ (45 mg/L as a 30-day average). Presently, the maximum discharge concentration of TSS as a 30-day average for waste stabilization ponds in Montana is set at 100 mg/L (43 Federal Register 55279. November 27, 1978). In addition, the Department allows a maximum 7-day average discharge concentration of 135 mg/L TSS for waste stabilization ponds. To qualify for an adjustment up to as high as the maximum value allowed, a facility must use a waste stabilization pond as its principal process for secondary treatment and its discharge data must indicate that it cannot achieve the equivalent-to-secondary standards despite proper operation and maintenance. Facilities that are not operated properly, would not qualify for these alternate TSS requirements. For example, ponds have periodic seasonal benthic release and pond turnover periods which usually take place in the spring and fall. While some turnover is normal, severe turnover or excess flows during periods of turnover can result in pass through of excess wastes and nutrients to downstream units and can impact the final discharge. A facility should be operated to minimize turnover and prevent such pass through of wastes. Additional details on applying this regulation to MPDES permits is provided below.

#### 4.2.2.2. Alternative State Requirements (TSS for Trickling Filters and BOD5 for Trickling Filters and Waste Stabilization Ponds)

To further address the potential variations in facility performance due to geographic, climatic, or seasonal conditions in different states, the revised secondary treatment regulations (adopted in 1984) also included provisions in 40 CFR 133.105(d) for Alternative State Requirements (ASRs). These ASR provisions gave states flexibility to modify requirements for both $BOD_5$ and TSS limitations at trickling filter facilities and for $BOD_5$ limitations at waste stabilization pond facilities in a manner similar to that provided by 133.103(c) for TSS limitations at waste stabilization pond facilities. Montana has not adopted ASRs to adjust $BOD_5$ and TSS at trickling filter facilities or $BOD_5$ limitations at waste stabilization pond facilities.

## *4.3. Special Considerations*

40 CFR Part 133 allows a permit writer to make further adjustments to effluent limitations derived from secondary treatment standards or equivalent-to-secondary standards based on several additional considerations.

### 4.3.1. Substitution of $CBOD_5$ for $BOD_5$

Wastewater contains carbonaceous oxygen demanding substances and nitrogenous oxygen demanding substances. $CBOD_5$ measures the carbonaceous oxygen demand while $BOD_5$ measures the total oxygen demand, including the carbonaceous oxygen demand and nitrogenous oxygen demand. During nitrification, nitrifying bacteria use a large amount of oxygen to consume nitrogenous oxygen demanding substances (unoxidized nitrogen and ammonia-nitrogen) and convert these to oxidized nitrate. For wastewaters with significant nitrogen content (e.g., wastewater containing discharges from industries such as meat processing or tanneries) basing permit limits on $CBOD_5$ instead of $BOD_5$ eliminates the impact of nitrification on compliance determinations using the standard BOD test for limitations based on secondary treatment or equivalent to secondary treatment standards. USEPA recognizes that the $CBOD_5$ test can provide accurate information on treatment plant performance in many cases and, in 40 CFR Part 133, allows permit writers to use $CBOD_5$ limitations in place of $BOD_5$ limitations to minimize false indications of poor facility performance.

The $CBOD_5$ secondary treatment performance standards specified by the regulations are 25 mg/L as a 30-day average and 40 mg/L as a 7-day average. The USEPA-approved test procedures in 40 CFR Part 136 include a $CBOD_5$ (nitrogen inhibited) test procedure. At the request of the discharger, a permit writer can specify these $CBOD_5$ limitations along with $CBOD_5$ monitoring requirements in any POTW permit requiring performance based on secondary treatment standards (see 40 CFR 133.102(a)(4)). Equivalent-to-secondary treatment regulations in 40 CFR 133.105(e) also allow permit writers to set a $CBOD_5$ limitation in POTW permits as a substitute for the standard $BOD_5$ limitation. The $CBOD_5$ equivalent-to-secondary treatment performance standards specified by the regulations are 40 mg/L as a 30-day average and 60 mg/L as a 7-day average. A permit writer also may specify $CBOD_5$ limitations and monitoring requirements at the request of the discharger when applying equivalent to secondary standards. In this case, the $CBOD_5$ limitations should be set 5 mg/L below the calculated $BOD_5$ limitations.

### 4.3.2. Substitution of COD or TOC for $BOD_5$

Regulations at 40 CFR 133.104(b) allow a permit writer to set limitations for COD or TOC instead of $BOD_5$ provided a long-term $BOD_5$:COD or $BOD_5$:TOC correlation has been demonstrated. COD and TOC can provide an accurate measure of the organic content of wastewater in a shorter time period than a $BOD_5$ test (i.e., several hours versus 5 days). For MPDES permits, a discharger desiring to substitute COD or TOC for $BOD_5$ should request the substitution at time it applies or reapplies for a permit or through a permit modification. To qualify for this substitution, the permittee must provide the Department with a study demonstrating, to the satisfaction of the Department, the relationship between COD or TOC and $BOD_5$ in its effluent based on a minimum of two years of weekly (or more frequent) monitoring data.

### 4.3.3. Adjustments for Industrial Contributions

Treatment works receiving wastes from industrial categories that have effluent guidelines requirements for TSS which are less stringent (higher) than the secondary treatment standards or, if applicable, the equivalent-to-secondary treatment standards in 40 CFR Part 133, can qualify to have their TSS limitations adjusted upwards provided that: (1) the adjusted limitations are not greater than the effluent guidelines for direct discharges for the industrial category, and (2) the flow or loading of TSS introduced by the industrial category exceeds ten percent of the design flow or loading to the POTW. When adjusting the POTW's limitations based on the industrial contribution to its influent, a permit writer should make the adjustment using a flow-weighted or loading-weighted average of the two concentration limitations (i.e., the effluent guidelines limits for the industrial facility and the secondary or equivalent-to-secondary limitations). The federal regulations also would allow an adjustment to $BOD_5$ limitations based on industrial contributions, but, as noted above, all MPDES permits apply the secondary treatment standards for $BOD_5$ unless the discharger demonstrates, to the satisfaction of the Department, that less stringent performance-based concentration limitations for $BOD_5$ will not have a negative impact on dissolved oxygen concentrations in the receiving water (see Chapter 6 on water quality-based effluent limitations).

### 4.3.4. Adjustments to Percent Removal Requirements

The 85% removal requirement in secondary treatment standards was originally established to achieve two basic objectives:

- To encourage municipalities to remove high quantities of infiltration and inflow (I/I) from their sanitary sewer systems, and
- To prevent intentional dilution of influent wastewater.

In facilities with dilute influent that is not attributable to high quantities of I/I or intentional dilution, the percent removal requirement may result in forcing "advanced treatment" rather than the intended secondary treatment. Advanced treatment generally refers to treatment processes following secondary treatment (e.g., filtration, chemical addition, or two-stage biological treatment). Advanced treatment can achieve significantly greater pollutant removals than secondary treatment processes but at a higher cost.

The regulations provide that, under certain circumstances, permit writers may set less stringent limitations for $BOD_5$ and TSS percent removal. The specific circumstances and the potential adjustments to the percent removal requirement are as follows:

- Treatment works that receive less concentrated wastes from *combined sewer systems during wet weather* are eligible to have less stringent monthly percent removal limits during wet weather events. (40 CFR133.103(a)).
- Treatment works that receive less concentrated wastes from *separate sewer systems* (40 CFR 133.103(d)) *or from combined sewer systems during dry weather* (40 CFR 133.103(e)) can qualify to have less stringent percent removal requirement or receive a mass loading limit instead of the percent removal requirement. Examples of where these conditions might occur include facilities receiving wastewater from groundwater remediation systems, washing operations, metal finishing industry, and many industries manufacturing inorganic chemicals. The treatment plant could qualify for a less stringent percent removal requirement or a mass loading limit in place of a percent removal requirement provided the treatment plant demonstrates all of the following:

1. *The facility is meeting and will meet its permit effluent concentration limits consistently, but cannot meet its percent removal limits because of less concentrated influent.* The permit must document this condition using monitoring data. The permit writer should examine at least two years worth of data, with a minimum of one pair of influent and effluent samples per month, demonstrating at least a two consecutive month period each year where more stringent treatment is necessary to meet the percent removal requirement in the permit. A new discharger should use sewer system flow data or other documentation to show that weak influent is expected at the new facility.

2. *To meet the percent removal requirements, the facility would have to achieve significantly more stringent discharge concentrations than would otherwise be required by the concentration-based standards*. The permit writer should examine at least two years worth of data, with a minimum of one pair of influent and effluent samples per month, demonstrating that meeting the 85% removal requirement would result in an average monthly effluent limitation consistently (i.e., at least a two consecutive month period per year) 5 mg/L more stringent than what would otherwise be required (e.g., 30 mg/L $BOD_5$ and TSS for secondary treatment standards), then the condition is met.

3. *The less concentrated influent wastewater does not result from excessive infiltration and inflow (for separate sewers) or from excessive infiltration or clear water industrial discharges during dry weather (for combined sewers).*

   For separate sewers, nonexcessive infiltration is demonstrated when the quantity of flow is less than 120 gallons per capita per day (domestic base flow and infiltration) or if quantity of infiltration cannot be economically and effectively eliminated from a sewer system as determined in a cost-effectiveness analysis. Nonexcessive inflow is demonstrated when the maximum total flow rate during storm events does not result in chronic operational problems related to hydraulic overloading of the treatment works or does not result in a total flow of more than 275 gallons per capita per day (domestic base flow plus

infiltration plus inflow). Chronic operational problems may include surcharging, backups, bypasses, and overflows. (See 40 CFR 35.2005(b)(16) and 35.2120). If infiltration is 120 gallons per capita per day or more or inflow is 275 gallons per capita per day or more and the permittee requests an adjustment of its percent removal requirement, it must perform and submit with its permit application a study of the sewer system to determine the quantity of infiltration and/or inflow and to propose a sewer rehabilitation program to eliminate all or part of the infiltration exceeding 120 gallons per capita per day and/or inflow exceeding 275 gallons per capita per day or to demonstrate, if applicable, what portion of the infiltration and/or inflow cannot be cost-effectively remove

For combined sewers, the determination of whether the less concentrated wastewater results from excessive infiltration is discussed in 40 CFR 35.2005(b)(28), plus the additional criterion that either 40 gallons per capita per day or 1500 gallons per inch diameter per mile of sewer may be used as the threshold value for that portion of the dry weather base flow attributed to infiltration. If the less concentrated influent waste-water is the result of clear water industrial discharges, then the treatment works must control such discharges pursuant to 40 CFR Part 403.

## 4.4. References

USEPA, 1983. *Design Manual: Municipal Wastewater Stabilization Ponds*. (EPA-625/1-83-015). U.S. Environmental Protection Agency, Office of Research and Development and Office of Water, Washington, DC.

# Chapter 5. Calculating TBELs for POTWs

This section presents a step-by-step procedure to establishing technology-based effluent limitations for POTWs. **Exhibit 5-1** is a flow diagram outlining the step-by-step procedure, which includes a series of questions under each step. This procedure, including the questions, is presented in narrative form below.

**Exhibit 5-1. Establishing effluent limitations for POTWs and facilities treating sewage**

**[INSERT REVISED FLOW CHART BASED ON NEW SECTION NUMBERING FORMAT]**

## *5.1. Determining the Applicable Standards*

The first step a permit writer confronts in developing the appropriate technology-based effluent limitations for a POTW or other facility treating sewage is determining which set of technology-based standards apply. The subsections below assist the permit writer in making this determination.

### 5.1.1. Facility Status

The first question that a permit writer should ask is whether the facility is:

- A new facility (i.e., constructed at a site at which no other source is located);
- An existing facility receiving its first MPDES permit; or
- An existing facility that is undergoing a significant upgrade to the treatment works (e.g., a total replacement of the treatment system causing the discharge or addition of a treatment system substantially independent of the existing source, such as replacement of a single-cell facultative lagoon with a three-cell aerated lagoon).

If the facility does not fall into one of these three categories (i.e., it is an existing facility with an effective MPDES permit and no major treatment system upgrade).

### 5.1.2. Existing Facilities

As discussed in **Chapter 4**, an existing discharger (one that has received an MPDES permit in the past) that employs a waste stabilization pond or trickling filter as part of its treatment process may qualify for effluent limitations based on equivalent-to-secondary standards if it meets all of the following criteria from 40 CFR 133.101(g).

1. The principal treatment process must be either a trickling filter or waste stabilization pond (e.g., the largest percentage of $BOD_5$ removal is provided by the trickling filter or waste stabilization pond system) (40 CFR 133(g)(2));
2. The effluent quality consistently achieved, despite proper operations and maintenance, is in excess of the secondary treatment standards (40 CFR 133(g)(1)); and
3. The treatment works as a whole provides significant biological treatment (40 CFR 133.103(g)(3)).

The permit writer should reevaluate a facility with respect to these criteria each time its MPDES permit is renewed to determine whether is still qualifies for effluent limitations based on equivalent-to-secondary standards. Each of the criteria, as applied to MPDES permits, is discussed in greater detail below. This determination does not apply to facilities undergoing a significant upgrade to the treatment works.

***Criterion #1 – Principal Treatment Process*:** The first criterion that a facility must meet to be eligible for equivalent-to-secondary standards is that its primary treatment process must be a trickling filter or waste stabilization pond. Trickling filters are treatment system in which wastewater is trickled over crushed rock, slag, or manufactured material covered with bacteria that break down the organic waste in wastewater amenable to treatment by aerobic biological process. Waste stabilization ponds, also known as wastewater treatment ponds or

lagoons, also are used for secondary treatment. As noted above, the Department considers facultative lagoons, aerated lagoons, aerobic lagoons, or anaerobic lagoons to meet the general definition of "waste stabilization pond" (USEPA, 1983). Ponds used for equalization, percolation, and sludge storage are not considered waste stabilization ponds.

If greater than 50% of the $BOD_5$ removed (on a concentration basis) during treatment is removed using either a trickling filter or waste stabilization pond or both, then these processes are considered the primary biological treatment processes. If biological treatment processes other than a trickling filter or waste stabilization pond are present at the facility, the permit writer should conduct a percent $BOD_5$ removal analysis computed using measurements of the influent and effluent concentrations for each process for a minimum of the past two years, with a minimum of 10 pairs of influent and effluent data points, to determine whether, on average over the period examined, greater than 50 percent of the monthly $BOD_5$ removal is from trickling filters and waste stabilization ponds. It is the responsibility of the discharger to provide data sufficient to conduct this analysis. If, in the judgment of the Department, the discharger does not provide the requisite data to conduct this analysis the permit writer should apply the secondary treatment standards. If the facility does not employ trickling filters or waste stabilization ponds or does not meet this 50 percent criterion, then the permit writer must apply secondary treatment standards to the facility.

***Criterion #2 – Consistently Exceeding Secondary Treatment Standards***: To satisfy this criterion, the permit writer must assess at least 2 years worth of average monthly $BOD_5$ and TSS effluent concentration data, including a minimum of 10 data points, showing that during 2 or more months per year, or more than 15 percent of the months observed, average monthly $BOD_5$ and TSS effluent concentration exceeds 30 mg/L. Since some facilities may qualify for an adjustment of only the $BOD_5$ limitation or only the TSS limitation, the permit writer may adjust the appropriate limitation ($BOD_5$ or TSS only) if the effluent concentration of only one of the parameters is demonstrated to consistently exceed the 30 mg/L average monthly standard.

***Criterion #3 – Providing Significant Biological Treatment***: To satisfy this criterion, the permit writer must assess at least 2 years of $BOD_5$ percent removal data, including a minimum of 10 data points, where no more than 2 months per year or no more than 15 percent of months observed have $BOD_5$ percent removal of less than 65 percent unless the discharger qualifies for one or more of the special considerations described in 40 CFR 133.103(d). If one or more of the special considerations apply, the facility must consistently achieve the $BOD_5$ percent removal required after taking into account such considerations.

A permit writer should consider each facility on a case-by-case basis to determine whether it meets these criteria. As noted under the discussion of each criterion, to apply these criteria, the permit writer should assemble a minimum of two years of influent, effluent, and flow data from the facility. Up to five years worth of data may be used if the older data are still representative of operations at the facility at the time the MPDES permit is being drafted. Facilities that do not meet all three criteria do not qualify as equivalent-to-secondary treatment facilities. For these facilities, the secondary treatment standards apply.

### 5.1.3. New, Newly Permitted, or Upgraded Facilities

Permit writers must also determine the applicable technology-based standards for new facilities, facilities receiving their first MPDES permit, and facilities undergoing a significant upgrade. A permit writer should initially assume that all such facilities, including those employing trickling filters and waste stabilization ponds, are required to meet the secondary treatment standards. Most of these facilities generally should be capable of achieving secondary standards (40 CFR 133.102).

Some new facilities, facilities receiving their first MPDES permit, and facilities undergoing a significant upgrade (new, newly permitted, or upgraded facilities) that employ a trickling filter or waste stabilization pond could qualify for effluent limitations based on equivalent-to-secondary standards. In order to do so, they meets all of the eligibility criteria from 40 CFR 133.101(g). These criteria are applied to new, newly permitted, or upgraded facilities as follows:

***Criterion #1 – Principal Treatment Process***: For a newly permitted or upgraded facility to meet the requirement that its primary treatment process be a trickling filter or waste stabilization pond, the trickling filter or waste stabilization pond must first meet the appropriate design specifications in Circular DEQ-2 (Montana DEQ, 1999). Trickling filters must be preceded by effective settling tanks equipped with scum and grease collecting devices, or other suitable pretreatment facilities and must be designed to provide reduction in carbonaceous and/or nitrogenous oxygen demand in accordance with water quality standards and objectives for the receiving waters as established in the facility's MPDES permit, or to properly condition the wastewater for subsequent treatment processes. The treatment system must meet the all the design specifications of trickling filters, including design specifications for hydraulics, the media used for the filter, underdrainage system, and special features (such as flooding, freeboard etc.), provided in Chapter 90 of Circular-DEQ 2. Waste stabilization ponds must meet the all the design criteria for waste stabilization ponds, including design specifications for location, area and loadings, detention time, aeration, wastewater characteristics, number of pond cells, and pond shape, in Chapter 93 of Circular-DEQ 2. Design criteria for facultative ponds and partially aerated ponds are available in Table 93-1 and Table 93-2, respectively. If existing data or, if data are not available, engineering estimates indicate that greater than 50% of the $BOD_5$ removed during treatment will be removed using either a trickling filter or waste stabilization pond or both, then these processes are considered the primary biological treatment processes. If the facility does not employ trickling filters or waste stabilization ponds or does not meet this 50 percent criterion, then the permit writer must apply secondary treatment standards to the facility.

***Criterion #2 – Consistently Exceeding Secondary Treatment Standards***: The new, newly permitted, or upgraded facility must demonstrate, to the satisfaction of the Department, that at least 15 percent of the time the secondary treatment standards will not be achievable. The onus is on the discharger to demonstrate that less stringent limitations should apply to the facility in its initial permit or reissued permit following the significant upgrade. In subsequent permits, the permit writer can use data collected by the facility and the procedures outlined above in **Section 5.1.2.** for existing facilities to determine whether the less stringent limitations should continue to apply.

***Criterion #3 – Providing Significant Biological Treatment***:: Again, the onus is on the new, newly permitted, or upgraded facility to demonstrate, to the satisfaction of the Department, that the facility will be able to consistently achieve $BOD_5$ percent removal of 65 percent or greater 85 percent of the time unless the discharger qualifies for one or more of the special considerations described in 40 CFR 133.103(d). If one or more of the special considerations apply, the facility must be able to consistently achieve (85 percent of the time) the $BOD_5$ percent removal required after taking into account such considerations. In subsequent permits, the permit writer can use data collected by the facility and the procedures outlined above in **Section 5.1.2.** for existing facilities to determine whether the less stringent limitations should continue to apply.

## 5.2. Limits based on Secondary Treatment Standards

Applying the secondary treatment standards in MPDES permits to continuous discharges is straightforward. Where secondary treatment standards apply, the permit should include the 30-day average standards ($BOD_5$ or $CBOD_5$ concentrations, TSS concentrations, and percent removal) directly as average monthly effluent limitations. Likewise, the permit should include the 7-day average standards ($BOD_5$ or $CBOD_5$ concentrations and TSS concentrations) directly as average weekly effluent limitations. Finally, the permit should include the required pH range.

**Exhibit 5-2 Limitations based on secondary treatment standards**

Two

| Parameter | Average Monthly Effluent Limitation | Average Weekly Effluent Limitation |
|---|---|---|
| 5-day Biochemical Oxygen Demand ($BOD_5$) | 30 mg/L<br>(25 mg/L $CBOD_5$) | 45 mg/L<br>(40 mg/L $CBOD_5$) |
| Total Suspended Solids (TSS) | 30 mg/L | 45 mg/L |
| $BOD_5$ and TSS Removal (concentration) | 85% | --- |

| | |
|---|---|
| pH | Within the range of 6.0 – 9.0 standard units at all times |

Two USEPA regulations sometimes create confusion regarding this approach to determining effluent limitations. First, the secondary treatment standards are stated as 30-day and 7-day averages, whereas 40 CFR 122.45(d)(2) and ARM 17.30.1345(6)(b) require that effluent limitations for POTWs be expressed, unless impracticable, as average monthly and average weekly limitations. Both the federal and the Montana regulations define average monthly and average weekly limitations on a calendar period basis. Therefore, consistent with USEPA guidance, a permit writer should interpret the 30-day and 7-day average secondary treatment standards as average monthly (calendar month) and average weekly (calendar week) effluent limitations as described above.

Second, regulations at 40 CFR 122.45(f)(1) and ARM 17.30.1345(8)(a) require that all permit limitations, standards or prohibitions be expressed in terms of mass except under the following conditions:

1. When limitations are for pH, temperature, radiation or other pollutants that cannot appropriately be expressed by mass limitations;
2. When applicable standards or limitations are expressed in terms of other units of measure; or
3. If in establishing technology-based limitations on a case-by-case basis, limitations based on mass are infeasible because the mass or pollutant cannot be related to a measure of production. The limitations, however, must ensure that dilution will not be used as a substitute for treatment.

The first condition applies to pH requirements established by secondary treatment standards. Also, because the 30-day and 7-day average requirements for $BOD_5$ and TSS, including percent removal, are expressed in terms of concentration, the second condition applies to these standards. Thus, mass-based effluent limitations are not specifically required to implement secondary treatment standards. MPDES permits, however, typically include mass limitations in addition to concentration-based limitations to define nondegradation thresholds for conventional pollutants. In general, regulations at 40 CFR 122.45(b)(1) and ARM 17.30.1345(2)(a) require using the design flow rate of the POTW to calculate mass-based limitations. The permit writer would calculate a mass-based limitation for a POTW (in lbs/day) using the equation in **Exhibit 5-3**.

**Exhibit 5-3. POTW mass based limitation calculation equation and example calculations**

| **POTW design flow** | X | **Concentration-based limitation** | X | **Conversion factor** |
|---|---|---|---|---|
| (million gallons per day) | | (milligrams per liter) | | 8.34 |
| (mgd) | | (mg/L) | | (lbs)(L)/(mg)(millions of gallons) |

A POTW with a design flow of 2.0 mgd would have mass-based limitations calculated from secondary treatment standards as follows:

**Mass-based limitation** = **POTW design flow** x **Concentration-based limitation** x **Conversion factor**

| | | | | |
|---|---|---|---|---|
| **$BOD_5$** | | | | |
| Average monthly | = | 2.0 mgd x 30 mg/L x 8.34 (lbs)(L)/(mg)(millions of gallons) | = | **500 lbs/day** |
| Average weekly | = | 2.0 mgd x 45 mg/L x 8.34 (lbs)(L)/(mg)(millions of gallons) | = | **750 lbs/day** |
| **TSS** | | | | |
| Average monthly | = | 2.0 mgd x 30mg/L x 8.34 (lbs)(L)/(mg)(millions of gallons) | = | **500 lbs/day** |
| Average weekly | = | 2.0 mgd x 45mg/L x 8.34 (lbs)(L)/(mg)(millions of gallons) | = | **750 lbs/day** |

When applying secondary treatment standards to intermittent dischargers, the permit writer should allow mass effluent limitations to substitute for the average monthly percent removal requirements. Compliance with percent removal requirements generally is based on influent and effluent data taken at approximately the same time. For intermittent discharges, this may not be possible. Mass limitations for intermittent discharges are based on the same equation as mass limitations for continuous discharges, however, the flow value used is not necessarily the design flow.

Design flow is primarily applicable to continuous discharges. While some intermittent dischargers could routinely discharge at, or even above, their design flow, others could discharge only a fraction of the design flow. As a result, establishing mass limitations based on design flow could provide an excessive mass discharge allowance for some dischargers. Mass limitations for intermittent discharges should be established based on the following flow data:

- If no flow data are available, establish mass limits based on the *expected* maximum flow provided by the facility (request the facility to provide the data based on engineering design and best professional judgment) or the design flow of the facility, whichever is less..

- If less than 10 data points for flow are available, use the maximum reported flow or design flow of the facility, whichever is less.

- If 10 or more data points are available, calculate the 95th percentile of monthly average discharge flows as follows:

**95th Percentile Monthly Average Flow = Multiplier$_{95}$ x LTA Flow**

Where:

| | | |
|---|---|---|
| Multiplier$_{95}$ | = | $e(z\sigma - 0.5\sigma 2)$ |
| $\sigma$ | = | $[ln(CV^2/n + 1)]^{0.5}$ |
| CV | = | coefficient of variation |
| Z | = | 1.645 for 95th percentile probability basis |
| n | = | number of days of sampling per month based on monitoring frequency (minimum n = 4; use n = 30 if flow monitoring is daily or continuous) |
| LTA | = | average of the flow data |

If the 95th percentile monthly average flow exceeds the design flow, use the design flow in the calculation.

## 5.3. Limits based on Equivalent-to-Secondary Standards

For facilities that qualify for equivalent-to-secondary standards, the maximum limitations allowed under the federal regulations, as specified in 40 CFR 133.105, before any further approved adjustments, are shown in **Exhibit 5-4**.

**Exhibit 5-4 Limitations based on equivalent-to-secondary treatment standards**

| Parameter | Average Monthly Effluent Limitations | Average Weekly Effluent Limitations |
|---|---|---|
| 5-day Biochemical Oxygen Demand ($BOD_5$) | Up to 45 mg/L (Up to 40 mg/L $CBOD_5$) | Up to 65 mg/L (Up to 60 mg/L C $BOD_5$) |
| Total Suspended Solids (TSS) | Up to 45 mg/L | Up to 65 mg/L |
| $BOD_5$ and TSS Removal (concentration) | As low as 65% | --- |
| pH | Within the range of 6.0 – 9.0 standard units at all times | |

The secondary and equivalent-to-secondary standards for pH are the same (between 6.0 and 9.0). All POTWs, irrespective of the treatment unit in-place, receive the same limitations for pH.

The $BOD_5$ and TSS effluent limitations for facilities that qualify for application of equivalent-to-secondary standards, however, must be determined on a case-by-case basis using the standards and performance data for the facility. Therefore, effluent data are required to establish limits for eligible facilities.

### 5.3.1. Adequacy of Data for Equivalent-to-Secondary Facilities

The permit writer should use a minimum of two-years of data to establish proposed effluent limitations based on past performance. If the facility does not have sufficient data then the permit writer should include the limitations from the previous permit in the new permit and require a two years of, at a minimum, weekly influent and effluent monitoring to generate the necessary data. In addition, the permit should include a provision allowing the Department to reopen and, if necessary, modify the permit after reviewing the data collected from the study.

Effluent limitations for intermittent dischargers should be based on at least 10 samples collected during periods of discharge events. If sufficient data are not available, the permit writer may include the limitations from the previous permit in the new permit and require a minimum of 10 samples from influent and effluent monitoring during periods of discharge over no more than two years to generate the necessary data. Depending on the expected frequency of the discharge, the permit writer might expect that the discharger will not be able to collect sufficient data during discharge events over the two years. In such cases, the permit could specify that sampling during the two-year study may be during periods of no discharge, in which case samples must be collected from a point nearest to the final outfall, which is usually a point near the discharge from the last treatment unit (e.g., a pond). The samples must be collected at a time when the effluent wastewater characteristics in the last treatment unit would be expected to closely resemble effluent characteristics during actual discharge.

### 5.3.2. Proposed Performance-based Limitations

Proposed $BOD_5$ and TSS limitations based on past performance for an equivalent to secondary treatment process are derived statistically by generating a frequency distribution curve using the daily effluent concentration of the pollutant of concern and selecting the $95^{th}$ percentile value as the proposed performance-based monthly average effluent limitation.

**Exhibit 5-5. Proposed performance-based monthly average discharge limitation calculation**

**Proposed performance-based average monthly discharge limitation (AML) = $Multiplier_{95}$ x LTA**

Where:

| | | |
|---|---|---|
| $Multiplier_{95}$ | = | $e^{\wedge}(z\,\sigma - 0.5\,\sigma^2)$ |
| $\sigma$ | = | $[\ln (CV^2/n + 1)]^{0.5}$ |
| CV | = | coefficient of variation (standard deviation divided by the mean) |
| z | = | 1.645 for 95th percentile probability basis |
| n | = | number of days of sampling per month based on expected monitoring frequency (minimum value for n is 4) |
| LTA | = | long term average of the data points (two or more years) |

**Example:**

Long-term average TSS concentration (LTA) from a trickling filter facility based on two years of monitoring is 32 mg/L.
The coefficient of variation (CV) of the data is 0.3, therefore $CV^2 = 0.09$
The permit will require TSS monitoring 4 times per month in the MPDES permit.

Proposed performance-based AML

= e^(1.645 x [ln (0.09 / 4 + 1)]^0.5 – 0.5 [ln (0.09 / 4 + 1)]) X 32 mg/L

= e^(1.645 x [ln (1.0225)^0.5 – 0.5 [ln (1.0225)]) X 32 mg/L

= 1.26 X 32 mg/L

Proposed performance-based AML = 40 mg/L

The average weekly limitation based on past performance is determined by multiplying the proposed average monthly limitation by 1.5. Mass based limitations are calculated using the procedures outlined above in **Section 5.2.**

### 5.3.3. Applicable TSS Limitations

The federal regulations at 40 CFR 133.103(c) allow states to adjust the maximum allowable discharge concentration of TSS for waste stabilization ponds upward from the equivalent-to-secondary standards. As discussed above, Montana has adjusted this standard to allow a limitation of up to 100 mg/L as a monthly average. To qualify for an adjustment up to as high as the maximum value allowed, a facility must use a waste stabilization pond as its principal process for secondary treatment and the data collected and analyzed must indicate that it cannot achieve the equivalent-to-secondary standard. If a waste stabilization pond accounts for greater than 50 percent of the biological treatment at the facility and the performance-based limitation calculated under Step 2.2 above exceeds the equivalent-to-secondary standard of 45 mg/L as an average monthly limitation, then the facility qualifies for an adjusted limitation. The permit writer should conduct a percent $BOD_5$ removal analysis computed using measurements of the influent and effluent concentrations for the waste stabilization pond(s) for a minimum of the past 2 years, and at least 10 pairs of influent and effluent data points, to determine whether, on average over the period examined, greater than 50 percent of the monthly $BOD_5$ removal is from waste stabilization ponds.

Based on the secondary treatment standards and the equivalent-to-secondary standards and Montana's additional adjustment under 40 CFR 133.103(c) for waste stabilization ponds, TSS limitations for facilities in Montana that qualify for application of equivalent-to-secondary standards are governed by the range of standards shown in **Exhibit 5-6**.

**Exhibit 5-6 Range of TSS standards for equivalent-to-secondary facilities**

| Parameter | Secondary Treatment Standards | | Equivalent-to-Secondary Standards | | Alternate Limits for Ponds[1] | |
|---|---|---|---|---|---|---|
| | 30-Day Average | 7-Day Average | 30-Day Average | 7-Day Average | 30-Day Average[1] | 7-Day Average |
| TSS | 30 mg/L | 45 mg/L | Up to 45 mg/L | Up to 65 mg/L | Up to 100 mg/L | Up to 135 mg/L |
| TSS Removal | 85% | 85% | As low as 65% | --- | 65% or lower | --- |

[1] Applicable only to facilities with waste stabilization pond

The following provide the guidelines for establishing TSS concentration and percent removal or mass limitations based on the standards in **Exhibit 5-6**:

#### 5.3.3.1. Trickling Filters

- For the ***TSS concentration limitations***, select the minimum of the TSS limitations based on the upper bound of the equivalent-to-secondary standards and the TSS limitations based on past performance.
- For the ***TSS percent removal requirement for continuous discharges***, select the maximum of 65% removal (equivalent-to-secondary standards) and the percent removal performance generated from facility data.
- ***For intermittent discharges, substitute mass limitations for the TSS percent removal***. The percent removal requirements is developed primarily for continuous discharges. It loses its significance and is difficult to determine objectively when applied to intermittent discharges. USEPA draft guidance (USEPA, 1985) suggests using mass limitations in lieu of percent removal in this situation. Mass limitations are based on the following equation:

**Mass** (lbs/day) (monthly average)
= **Flow** (mgd) **x Concentration** (mg/L) (monthly average) **x 8.34 (lbs)(L)/(mg)(MGD)**

The appropriate flow is determined using the procedures for intermittent discharges outlined in **Section 5.2.** above.

- ***The selected limitations should not be more stringent than limitations based on the secondary treatment standards***. If the selected limitations are more stringent than limitations based on the secondary treatment standards, use the concentration limitations based on secondary treatment standards and calculate mass limitations based on the procedure described above. For intermittent discharges, mass limitations substitute for percent removal requirements.

#### 5.3.3.2. Waste Stabilization Ponds

- ***If alternate TSS limitations are applicable,*** then select as the ***TSS concentration limitations*** the minimum of the upper bound of the alternate limitations and limitations based on past performance.
- ***If alternate TSS limitations are not applicable***, select as the ***TSS concentration limitations*** the minimum of limitations based the upper bound of the equivalent-to-secondary standards and limitations based on past performance.
- ***For continuous discharges, determine the TSS percent removal corresponding to the selected limit***. Note that the required percent removal could be lower than equivalent to secondary standards requirement of 65%.
- ***For intermittent discharges, substitute mass limitations for the percent removal requirement***. The percent removal requirements is developed primarily for continuous discharges. It loses its significance and is difficult to determine objectively when applied to intermittent discharges. Mass limitations are based on the following equation:

**Mass** (lbs/day) (monthly average)
= **Flow** (mgd) x **Concentration** (mg/L) (monthly average) x **8.34 (lbs)(L)/(mg)(MGD)**

The appropriate flow is determined using the procedures for intermittent discharges outlined in **Section 5.2.** above.

- ***The selected limitations should not be more stringent than limitations based on the secondary treatment standards***. If the selected limitations are more stringent than limitations based on the secondary treatment standards, use the concentration limitations based on secondary treatment standards and calculate mass limitations based on the procedure described above. For intermittent discharges, mass limitations substitute for percent removal requirements.

### 5.3.4. Applicable $BOD_5$ Limitations

As previously noted, the State of Montana requires effluent limitations based on secondary treatment standards for $BOD_5$ or $CBOD_5$ concentrations be applied to all POTWs, including those with trickling filters or waste stabilization ponds, unless the discharger demonstrates, to the satisfaction of the Department, that less stringent performance-based concentration limitations for $BOD_5$ will not have a negative impact on dissolved oxygen concentrations in the receiving water. The permit writer may adjust $BOD_5$ percent removal limits as appropriate. For intermittent dischargers, the permit writer should substitute mass limitations for $BOD_5$ for the percent removal requirement as discussed above.

## *5.4. Adjustments to Calculated Limits*

After calculating $BOD_5$ and TSS limitations based on the procedures outlined above, the permit writer must determine whether any additional adjustments to the concentration limits or percent removal requirements are appropriate. These adjustments are based on the special considerations outlined in **Section 4.3** above.

## *5.5. References*

Montana DEQ, 1999. Montana Department of Environmental Quality. *Circular DEQ 2: Design Standards for Wastewater Facilities.* <http://www.deq.state.mt.us/wqinfo/Circulars/DEQ2.PDF>. Montana Department of Environmental Quality, Helena, Montana.

USEPA, 1985. *Guidance for NPDES Permits and Compliance Personnel – Secondary Treatment Redefinition (Draft).* U.S. Environmental Protection Agency,, Permits Division, Washington DC.

# Chapter 6. Effluent Guidelines for Non-Municipal Facilities

Montana Pollutant Discharge Elimination System (MPDES) permits include both technology-based and water quality-based discharge limitations to meet the goals and requirements of the Clean Water Act (CWA) and the Montana Water Quality Act (MWQA). When developing discharge limitations for an MPDES permit, permit writers must select the most protective of the applicable technology-based effluent limitations (TBELs) and water quality-based effluent limitations (WQBELs). TBELs are based on implementing available technologies to reduce or treat pollutants while WQBELs are designed to protect the designated uses of the receiving water. This chapter discusses the standards used to develop TBELs for non-municipal discharges. The terms "non-municipal" and "industrial" are used interchangeably in this document; however, be aware that non-municipal facilities include any facility that is not a publicly-owned treatment works (POTWs), including facilities and discharges not associated with industrial processes (e.g., water treatment plants, private sewage treatment works, federally-owned treatment works, ground water clean-up). **Chapters 4 and 5** discuss calculating TBELs for municipal discharges, while **Chapters 8 through 11** cover WQBELs.

The federal regulation at 40 CFR 122.44(a) (incorporated into ARM 17.30.1344(2)(b) by reference) requires that MPDES permits include applicable technology-based limitations. The intent of a TBEL is to require a minimum level of treatment or control for point source discharges based on the performance of currently available treatment technologies. When developing TBELs for non-municipal facilities, a permit writer must consider all applicable technology-based standards and requirements for all pollutants discharged. First, a permit writer must determine whether USEPA has developed national effluent guidelines applicable to the facility. Effluent guidelines are found in the federal regulations at 40 CFR Subpart N. These requirements are incorporated into the State regulations at ARM 17.30.1344(2)(e) and ARM 17.30.1207. A permit writer must use any applicable effluent guidelines to develop TBELs in a MPDES permit. If no effluent guidelines apply to the facility or if the facility employs processes or discharges pollutants not covered by applicable effluent guidelines the permit writer must determine whether there are any State treatment requirements that apply

## *6.1. Statutory and Regulatory Foundation*

The Federal Water Pollution Control Act of 1972 (later renamed the Clean Water Act) directed USEPA to develop effluent guidelines for various industrial categories and required industrial facilities to meet these standards. Specifically, the law required existing industrial dischargers to achieve effluent limitations requiring the application of the best practicable control technology currently available (BPT) by July 1, 1977 and effluent limitations requiring the application of the best available technology economically achievable (BAT) by July 1, 1983. In addition, USEPA was required to develop new source performance standards (NSPS) for new direct dischargers and pretreatment standards for indirect dischargers. Finally, the Act focused on toxic pollutants by requiring USEPA to publish a list of toxic pollutants and to publish standards for them.

The first round of effluent guidelines, promulgated for 28 industrial categories in 1974 and 1975, typically contained limits for conventional pollutants and some non-conventional and some toxic pollutants such as chemical oxygen demand (COD), phenols, and several metals. But, the effluent guidelines did not fully address toxic pollutants and, as a result, in 1976, USEPA was sued by several environmental groups for failing to accomplish the promulgation of effluent guidelines as directed in the CWA (NRDC v. Train, 1976). As a consequence of the suit, USEPA entered into a consent decree with the National Resources Defense Council (NRDC) and other environmental groups. The consent decree laid out a court-ordered schedule for work and formed the primary agenda for effluent guideline development. The agreement required USEPA to develop a program and adhere to a schedule for promulgating BAT requirements, pretreatment standards, and NSPS for 65 priority toxic pollutants and for 21 major categories of industries (known as the primary industries). This consent decree was incorporated into section 307 of the CWA in 1977. The settlement was further amended to include a total of 34 major categories of industries and 129 individual pollutants (NRDC v. Costle, March 1979). The list of priority pollutants was subsequently revised to become a list of 126 pollutants, which are listed in Appendix A of 40 CFR 423 and **Appendix B** of this Manual.

The 1977 amendments also extended the compliance deadline for BPT standards to April 1, 1979, redefined BAT to include only toxic pollutants (under section 307) and nonconventional pollutants and created a new control standard that required application of the best conventional pollutant control technology (BCT) for conventional pollutants. The deadline for meeting BAT limits was 3 years after their promulgation but no later than July 1, 1987. (The 1987 amendments to the CWA later moved this deadline, again, to March 31, 1989.) The 1977 amendments also required the application of the best conventional pollutant control technology (BCT) for conventional pollutants. The deadline for achieving BCT was July 1, 1984, but in 1987 this date also was changed to March 31, 1989.

USEPA promulgates effluent guidelines under the authority of CWA sections 301, 304, 306, 307, 308, 402, and 501 of (33 U.S.C. 1311, 1314, 1316, 1318, 1342, and 1361). CWA section 304(m) requires USEPA to establish schedules for reviewing and revising existing effluent guidelines and promulgating new effluent guidelines every two years. CWA section 304(m) does not apply to pretreatment standards for indirect dischargers, which USEPA promulgates pursuant to CWA sections 307(b) and 307(c). USEPA publishes its proposed and final 304(m) plan in the Federal Register and online.

The CWA includes the general authority for permit writers to develop case-by-case limitations. Section 402(a)(1) authorizes the USEPA Administrator to issue a permit containing "such conditions as the Administrator determines are necessary to carry out the provisions of this Act" prior to taking the necessary implementing actions, such as establishing effluent guidelines. The NPDES regulations at § 125.3(c)(2), incorporated by reference in ARM 17.30.1345(12)(d), give the authority for permit writers to develop case-by-case TBELs under CWA section 402(a)(1)(B) "to the extent that EPA-promulgated effluent limitations are inapplicable…" Under Montana law, however, where there are no applicable national effluent guidelines, MCA 75-5-305 allows the Board of Environmental Review (Board) to adopt minimum treatment requirements "for parameters likely to affect beneficial uses, ensuring that the requirements are cost-effective and economically, environmentally, and technologically feasible." To date, the Board has not adopted any minimum treatment requirements. The Department has determined that, in accordance with 75-3-305(1) MCA, in the absence of applicable effluent guidelines, permit writers may not develop TBELs on a case-by-case basis. The Department has developed a procedure for addressing specific processes and waste streams that have no effluent guideline requirements but are part of a facility that is otherwise covered by an effluent guideline (i.e., the facility has some processes with effluent guideline requirements). See **Section 6.3** below for further discussion of this approach.

## *6.2. Effluent Guidelines Development*

USEPA establishes separate effluent guidelines for different industrial categories, since the best control technology for one industry is not necessarily the best for another. To date, USEPA has effluent guidelines for 56 different industrial categories . **Exhibit 6-1** provides the list of effluent guidelines promulgated to date, as found in 40 CFR Subpart N.

**Exhibit 6-1. Table of existing point source categories with effluent guidelines**

| Industry category (listed alphabetically) | 40 CFR Part | Industry category (listed alphabetically) | 40 CFR Part |
|---|---|---|---|
| Aluminum Forming | 467 | Meat and Poultry Products | 432 |
| Asbestos Manufacturing | 427 | Metal Finishing | 433 |
| Battery Manufacturing | 461 | Metal Molding and Casting | 464 |
| Canned and Preserved Fruits and Vegetable Processing | 407 | Metal Products and Machinery | 438 |
| Canned and Preserved Seafood Processing | 408 | Mineral Mining and Processing | 436 |
| Carbon Black Manufacturing | 458 | Nonferrous Metals Forming and Metal Powders | 471 |
| Cement Manufacturing | 411 | Nonferrous Metals Manufacturing | 421 |

| | | | |
|---|---|---|---|
| Centralized Waste Treatment | 437 | Oil and Gas Extraction | 435 |
| Coal Mining | 434 | Ore Mining and Dressing | 440 |
| Coil Coating | 465 | Organic Chemicals, Plastics, and Synthetic Fibers | 414 |
| Concentrated Animal Feeding Operations (CAFO) | 412 | Paint Formulating | 446 |
| Concentrated Aquatic Animal Production | 451 | Paving and Roofing Materials (Tars and Asphalt) | 443 |
| Copper Forming | 468 | Pesticide Chemicals | 455 |
| Dairy Products Processing | 405 | Petroleum Refining | 419 |
| Electrical and Electronic Components | 469 | Pharmaceutical Manufacturing | 439 |
| Electroplating | 413 | Phosphate Manufacturing | 422 |
| Explosives Manufacturing | 457 | Photographic | 459 |
| Ferroalloy Manufacturing | 424 | Plastic Molding and Forming | 463 |
| Fertilizer Manufacturing | 418 | Porcelain Enameling | 466 |
| Glass Manufacturing | 426 | Pulp, Paper, and Paperboard | 430 |
| Grain Mills | 406 | Rubber Manufacturing | 428 |
| Gum and Wood Chemicals | 454 | Soaps and Detergents Manufacturing | 417 |
| Hospitals | 460 | Steam Electric Power Generating | 423 |
| Ink Formulating | 447 | Sugar Processing | 409 |
| Inorganic Chemicals | 415 | Textile Mills | 410 |
| Iron and Steel Manufacturing | 420 | Timber Products Processing | 429 |
| Landfills | 445 | Transportation Equipment Cleaning | 442 |
| Leather Tanning and Finishing | 425 | Waste Combustors | 444 |

Because CWA section 304(m) requires USEPA to publish a biennial plan for developing new effluent guidelines and a schedule for the annual review and revision of existing promulgated effluent guidelines, the Agency is constantly evaluating the need to develop new guidelines or revise or update existing guidelines. Effluent guideline requirements are based on the degree of pollutant reduction attainable by an industrial category through application of control technologies, regardless of the facility's location. Thus, similar facilities are regulated in the same manner. For example, an iron and steel mill on the west coast of the United States is generally required to meet the same technology-based limitations as a similar mill located on the east coast.

### 6.2.1. Technical and Economic Considerations

Developing effluent guidelines is a complicated and time-consuming effort. They are based on complex engineering and economic studies that determine a categorization and subcategorization scheme for each industry, examine wastewater characteristics, and identify waste treatment capabilities. First, USEPA determines the scope of the rulemaking by defining the industry category. USEPA then collects, compiles, and reviews available engineering and economic data for the industry from a variety of sources including: literature, databases, trade unions, NPDES permits, the discharge monitoring reports submitted by facilities, responses of the facilities to surveys sent out by USEPA, site visits to facilities, field sampling, stakeholder meetings, recommendations from experts in the industry, and other publicly available sources. Then to accommodate any industry or plant-specific factors in establishing the effluent guidelines, USEPA divides the entire industry into subcategories based on the following:

- manufacturing products and processes
- raw materials
- wastewater characteristics
- facility size
- geographical location
- age of facility and equipment, and
- wastewater treatability

Subcategorization may be necessary where data indicate varying conditions across the industry warrant different requirements. For each subcategory, USEPA determines technologies that represent the various standards of

treatment or control (BPT, BAT, BCT, NSPS for direct dischargers and PSES, PSNS for indirect dischargers) and the pollutants that need to be regulated. The requirements Congress enacted for establishing the different treatment or control standards are summarized below:

- **BPT (best practicable control technology currently available)**: Represents the average of the best performance by plants within an industrial category or subcategory for existing direct dischargers. BPT standards apply to toxic, conventional, and nonconventional pollutants.
- **BCT (best conventional pollutant control technology):** Represents the required level control of conventional pollutants (5-day biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, pH, and oil and grease) for existing direct dischargers. The first step in determining BCT is to establish that a BCT control technology option is technologically feasible. If a BCT option is technologically feasible, USEPA applies a two-part "cost reasonableness" test to evaluate that control option. The results of these tests, along with other industry-specific factors, are evaluated to determine BCT.
- **BAT (best available technology economically achievable)**: Represents the best existing performance of treatment technologies that are economically achievable within an industrial category or subcategory for existing direct dischargers. BAT standards apply to toxic and nonconventional pollutants.
- **NSPS (new source performance standards)**: represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

Pretreatment Standards for Existing Sources (PSES) and Pretreatment Standards for New Sources (PSNS) are applicable to indirect dischargers only and therefore, they are not implemented directly through a MPDES permit.

For each of the technology options, USEPA then estimates industry-wide compliance costs, pollutant loadings and removals, non-water quality effects, and environmental benefits. Using this information, the Agency performs an economic analysis to assess the cost-effectiveness of each technology option and to estimate the financial impact on the industry of implementing the various technology options. The entire process involves rigorous data review, and engineering analysis. Based on the results of the analyses, USEPA might propose effluent guidelines for an industry and, after a period of public comment, establish the final effluent guidelines for the industry through final regulations. In some cases, the Agency evaluates the entire industry, but develops effluent guidelines that apply to only for a portion of the industry or, perhaps, determines that no effluent guidelines are needed at the time for that industry.

Effluent guidelines are not always established for every pollutant present in a point source discharge. In many instances, effluent guidelines only address those pollutants that USEPA determined it was necessary to address to ensure that industrial facilities comply with the technology-based requirements of the CWA (i.e., BPT, BCT, BAT, NSPS). These pollutants are referred to as "indicator" pollutants. For example, USEPA might choose to regulate only one of several metal pollutants present in the effluent from an industrial category indicating that compliance with the effluent guidelines will ensure that all metals present in the discharge are adequately treated.

### 6.2.2. Expression of Limitations in Effluent Guidelines

Most effluent guidelines are expressed in mass units, while a few are expressed in concentration units (e.g., metal finishing). Mass units are usually expressed as the mass of pollutant discharged per unit mass of product (lb of pollutant / 1000 lb of product or kg of pollutant/ kkg of product) or some other measure of production. Concentration limits are expressed in units such as mg/L.

USEPA generally develops both daily maximum and monthly average limitations for all effluent guidelines. ARM 17.30.1345(6)(a) requires that discharge limitations for industrial facilities be stated as average monthly discharge limitations and maximum daily discharge limitations unless impracticable. Permit writers must include both limitations in an MPDES permit. The daily maximum limitations are based on the assumption that daily pollutant measurements are lognormally distributed. Monthly average limitations are based on the distribution of averages of measurements drawn from the distribution of daily measurements. The daily maximum is intended to account for variation in effluent concentrations over the month.

Under certain conditions where no effluent guidelines apply, Section 402(a)(1) of the CWA, authorizes the USEPA Administrator to issue a permit containing "such conditions as the Administrator determines are necessary to carry out the provisions of this Act" prior to taking the necessary implementing actions, such as establishing effluent guidelines. 40 CFR 125.3, which is incorporated by reference in ARM 17.30.1344(2)(f), implements this provision of the CWA in part and authorizes permitting authorities to develop technology-based effluent limitations on a case-by-case basis for industrial facilities using best professional judgment (BPJ). These regulations also provide criteria for developing case-by-case limitations. Under the Montana's statute and regulations, however, permit writers are not authorized to develop case-by-case limitations on their own. As noted above, where there are no applicable national effluent guidelines, MCA 75-5-305 allows the Board of Environmental Review (Board), rather than the permit writer, to adopt minimum treatment requirements "for parameters likely to affect beneficial uses, ensuring that the requirements are cost-effective and economically, environmentally, and technologically feasible" (see **Exhibit 6-2** below).

**Exhibit 6-2. Comparison of CWA and MWQA provisions for case-by-case TBELs**

**Clean Water Act Section 402 Case-by-Case TBEL Provision**

(a) Permits for discharge of pollutants

(1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either

(A) all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or

(B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter.

**Montana Water Quality Act Section 75-5-305 Case-by-Case TBEL Provision**

Adoption of requirements for treatment of wastes -- variance procedure -- appeals.

(1) The board may establish minimum requirements for the treatment of wastes. For cases in which the federal government has adopted technology-based treatment requirements for a particular industry or activity in 40 CFR, chapter I, subchapter N, the board shall adopt those requirements by reference. To the extent that the federal government has not adopted minimum treatment requirements for a particular industry or activity, the board may do so, through rulemaking, for parameters likely to affect beneficial uses, ensuring that the requirements are cost-effective and economically, environmentally, and technologically feasible.

## *6.3. Case-by-Case Effluent Limitations*

As noted above, where there are no applicable national effluent guidelines, MCA 75-5-305 allows the Board of Environmental Review (Board) to adopt minimum treatment requirements, but does not allow permit writers to develop TBELs on a case-by-case basis. Federal regulations at 40 CFR 125.3, adopted by reference in ARM 17.30.1345(12)(d), do require permit writers to identify for each permitted wastewater discharge any applicable TBELs.

The effect of these requirements is that permit writers must rely on water quality-based effluent limitations (WQBELs) as the only applicable effluent limitations for a facility that is part of an industrial category or subcategory for which USEPA has not developed effluent guidelines or for which the entire facility is excluded under the applicability section of an otherwise applicable effluent guideline.

There might be cases where an effluent guideline applies to a facility and includes requirements for a pollutant of concern, but does not include requirements for that pollutant applicable to a particular process at the facility or to a particular waste stream (e.g., non-contact cooling water that is combined with process wastewater). In these cases, the Department will follow the following procedures to establish TBELs for the facility.

1. Assume a zero discharge requirement for the pollutant of concern for the process or waste stream that is not subject to effluent guidelines; or
2. Allow the applicant to develop and propose case-by-case TBELs for the pollutant of concern for the process or waste stream not subject to the effluent guidelines and petition the Board to adopt the TBELs. The Department will incorporate TBELs adopted by the Board into the applicants permit subject to any other requirements necessary to meet water quality standards, nondegradation requirements, antibacksliding requirements, or other statutory and regulatory requirements.

Before applying this approach, the permit writer should make sure that the process or waste stream and the pollutant of concern were not already considered by USEPA when the Agency developed the effluent guidelines. If USEPA considered the pollutant of concern for the process or waste stream in question, but specifically chose not to regulate it in the effluent guideline, the permit writer should not apply the "zero discharge" requirement and the applicant should not develop case-by-case TBELs.

If an applicant decides to pursue developing and proposing case-by-case TBELs, it must consider the appropriate technology for the category class of point source of which the applicant is a member and base the proposed case-by-case limitations on all available information and any unique factors relating to its facility. In developing these TBELs, the applicant must conform to the statutory factors specified in CWA sections 301(b)(2) and 304(b) and the regulatory criteria for case-by-case effluent limitations in 40 CFR 125.3. Applicants should document a reasonable basis for the proposed case-by-case TBELs, how they are based on sound engineering analysis, and how they comply with statutory and regulatory requirements. Additional discussion of this process is included in **Section 7.6** below.

# Chapter 7. Calculating TBELs for Non-POTWs (Industrials)

Derivation of technology-based effluent limitations (TBELs) based on effluent limitations guidelines and standards (effluent guidelines) requires that the permit writer have a general understanding of the effluent guidelines for all industrial categories, and a detailed knowledge of the effluent guidelines applicable to the permittee. The following provides a step-by-step approach to applying effluent guidelines to develop technology-based discharge limitations for a facility and discusses development of case-by-case TBELs in the absence of an applicable effluent guideline.

## *7.1. Learn About the Discharger*

To be able to write an effective permit, a permit writer must know about the facility operations, including the manufacturing processes, the wastewater treatment process, and pollutants that are being discharged or have the potential to be discharged from the facility. The permit writer should collect and review data on the facility operations including production, flow, and discharge monitoring data. This information is available from an existing permit, site visits, site inspections (such as compliance evaluation inspections for an existing permit), MPDES permit applications, and other information submitted by the facility.

## *7.2. Determine Whether Effluent Guidelines Apply*

As noted above, USEPA has established effluent guidelines for 65 different industrial categories. Based on the manufacturing process at the facility, a permit writer must determine whether effluent guidelines apply to that industrial category. If the facility produces multiple products, more than one effluent guideline may be applicable.

Permit writers might need to consult several of the following information sources to determine whether a specific effluent guideline is applicable to the facility:

- *Applicability Section of the Effluent Guidelines*: The first place to look for information for determining whether effluent guidelines apply to a particular facility is in the effluent guidelines themselves. Each effluent guideline includes an applicability section for the category or each subcategory of the industry. The applicability section will give a general description of the types of facilities that are covered by the effluent guidelines for the specific subcategory.
- *North American Industry Classification System (NAICS) and Standard Industrial Classification (SIC)*: In determining the appropriate industrial category(s) for a facility, the current NAICS and former SIC codes often are very helpful. NAICS and SIC codes were developed and are maintained by the Federal government as a way to classify establishments by type of activity for comparing economic and other types of facility-specific data. Although these codes provide a helpful starting point for categorizing a facility, permit writers should be cautious of relying exclusively on NAICS or SIC codes for determining the appropriate industrial category. The codes were not developed based on USEPA's industrial classification scheme, or vice versa, and, therefore, may not always correspond exactly with the categorization process. Also, more than one NAICS or SIC code may apply to a single facility.
- *USEPA's Development Documents*: USEPA produces a technical Development Document with each effluent guideline as a supporting reference that provides detailed information about the development of the effluent guideline. These documents provide a detailed overview of the limitations development process, including decisions made on applicability of the regulations to various process operations. The Development Document should provide the information needed to answer questions about the applicability of effluent guidelines to a particular facility. Development Documents, or information on how to order them, are found on USEPA's Effluent Guidelines Web Site < http://www.epa.gov/guide/>.
- Federal Register Notices: Federal Register notices of the proposed and final effluent guidelines provide additional insight into applicability of the guideline to various types of facilities.
- *USEPA Industry Experts*: USEPA has industry experts at its headquarters office in Washington, D.C.
- *Trade Associations*: Trade associations can also provide additional sources of information on an industry and the applicability of effluent guidelines.

- *Other Sources*: Permit writers might review other sources of information, such as the facility's existing permit and fact sheet and other NPDES permits for facilities performing similar operations, to determine whether effluent guidelines are applicable to the facility. However, one never should simply assume that the facility was correctly categorized in the existing permit. A permit writer should always make certain to understand the facility's operations and the applicability section to ensure correct application of the effluent guidelines.

## 7.3. Categorize the Facility

To properly use and apply effluent guidelines, a permit writer must first determine which industrial category(s) or subcategory applies to the facility being permitted. When determining applicable effluent guidelines, it is best to identify the categories first, and then, through a careful analysis of plant operations, determine the subcategories that apply. After determining potential categories, the permit writer can conduct a more detailed evaluation to narrow the list to only the applicable categories and subcategories using more detailed facility information. The process requires careful reviewing the information obtained from **Step 1** and **Step 2** above.

## 7.4. Determine Whether Existing or New Source Standards Apply

In order to determine whether existing source standards (i.e., BPT, BCT, BAT) or new source performance standards (NSPS) apply to the facility, the permit writer must determine if the facility or any part of the facility is a new source. ARM 17.30.1304(37) and 40 CFR 122.2 define a new source as a building, structure, facility, or installation which discharges pollutants or may discharge pollutants and for which construction commenced after promulgation of the final applicable effluent guidelines or after proposal of the applicable effluent guidelines, but only if they are promulgated within 120 days of proposal.

Furthermore, ARM 17.30.1304(37) and 40 CFR 122.29(b) define additional criteria for determining whether or not a discharge is a new source. These criteria cover situations where a facility is adding on a new building or process line that results in a discharge. Such an addition could result in a new source if it meets one of the following criteria:

- The source is constructed at a site at which no other source is located; or
- The source totally replaces the process causing the discharge from an existing source; or
- The sources processes are substantially independent of an existing source at the same site.

Permit writers should apply these criteria on a case-by-case basis to new construction or new processes. Sometimes it can be difficult to distinguish between a new source and a modification or alteration of an existing source, especially when modifications have occurred slowly over time.

In addition to meeting one the criteria above, there must be a NSPS independently applicable to the discharge for it to be considered a new source. If there are no NSPS independently applicable to the source that otherwise meets the criteria above, the source is considered a new discharger and the BPT, BCT, and BAT requirements apply just as they would for an existing source.

Permit writers can mix both existing and new source requirements in calculating discharge limitations. For example, if effluent guidelines are applicable to an existing facility, and that facility adds a new production line, then the permit writer should calculate the discharge limitation for the reissued permit using BPT, BCT, and BAT standards for the existing production line and NSPS for the new production line.

## 7.5. Calculate TBELs based on Effluent Guidelines

Once the appropriate effluent guidelines based on category/subcategory have been identified, application of the limitations is relatively straightforward because the guideline has already been technically derived (and sometimes litigated). Implementing effluent guidelines might require several sources of information, such as the permit application, discharge monitoring report data, production data from the facility, the Federal Register, and the effluent guidelines development document. The remainder of this Chapter discusses how to properly apply effluent guidelines under different scenarios.

### 7.5.1. Mass-based Limitations

Regulations at 40 CFR 122.45(f)(1) and ARM 17.30.1345(8)(a) require that all permit limitations, standards or prohibitions be expressed in terms of mass except under the following conditions:

- For pH, temperature, radiation or other pollutants that cannot appropriately be expressed by mass limitations;
- When applicable standards or limitations are expressed in terms of other units of measure; or
- If in establishing technology-based permit limitations on a case-by-case basis, limitations based on mass are infeasible because the mass or pollutant cannot be related to a measure of production. The limitations, however, must ensure that dilution will not be used as a substitute for treatment.

In addition, as discussed above in **Chapter 6**, ARM 17.30.1345(6)(a) requires that discharge limitations for industrial facilities be stated as average monthly discharge limitations and maximum daily discharge limitations unless impracticable. effluent guidelines generally include both average monthly and maximum daily requirements.

Most effluent guidelines are mass-based and are expressed in terms of allowable pollutant discharge per unit of production (or some other measure of production such as raw materials used or flow rate). ARM 17.30.1345(2)(b)(i) requires discharge limitations based on a reasonable measure of actual production as specified in the effluent guidelines (e.g., total amount of product, raw materials used, flow, or some other measure of production). Therefore, to calculate discharge limitations, a permit writer should multiply the allowable pollutant discharge per unit of production, as specified in the effluent guidelines, by a reasonable measure of the facility's actual production and not by the design production rate. Information supplied by the facility in the permit application and, for existing facilities, discharge monitoring reports is needed to determine a reasonable measure of the facility's actual production.

The production (or raw materials usage or flow rate) of a facility can vary somewhat over time based on facility operations. These changes can be influenced by market demand, maintenance, product changes, down times, breakdowns, and facility modifications. Yet, permit writers need to determine a reasonable measure of actual production to use in for calculating discharge limitations. Most effluent guidelines were developed based on a single long-term production rate and already account for some of the variations that occur within that long-term production rate. So, to determine "a reasonable measure of actual production," one should use the past three (3) to five (5) years of facility data to calculate a single estimate of the expected production rate that would apply during the term of the proposed permit. To apply the effluent guidelines, the permit writer would multiply this single production value by the per unit allowances in the effluent guidelines to calculate permit limits. In certain instances, three to five years of data might better represent conditions anticipated for the next five years. This would be the case for a facility that has undergone major renovations that would impact production. Making use of data collected prior to the renovations may not be appropriate for calculating production-based limitations for future years. **Exhibit 7-1** illustrates the application of production-based guidelines using this approach in a situation where annual production data are available.

In the examples in **Exhibit 7-1**, the highest annual production rate during the last five years was used as the estimate of production. If historical trends, market forces, company plans to decrease production, or plant designs and capital expenditures for an increase in production indicated that a different level of production would prevail during the permit term, the permit writer could consider a different basis for estimating production or establish tiered discharge limitations as discussed in **Section 7.7** below.

**Exhibit 7-1. Example of calculating mass-based effluent limitation from production-normalized effluent guidelines (Jordan, 1984)**

**Example 1:**

Facility A has produced 331,000 tons, 301,500 tons, 321,500 tons, 330,000 tons, and 331,500 tons of product per year for the previous 5 years operating 255 days per year.

**Question:**
What would be a reasonable measure of production for permitting purposes?

**Answer:**
Using the highest year of production (331,500 tons per year) may be an appropriate and reasonable measure of production, if this figure is representative of the actual production expected to occur over the next term of the permit. Permit writers also should check to see if the maximum yearly value is within a certain percentage (e.g., 20 percent–see Section 5.2.2.7 below) of the average value. In evaluating gross production figures, the number of production days should be considered. If the number of production days per year is not comparable, the permit writer would need to convert the numbers to production per day before comparing them. In this example, all of the yearly production figures were based on 255 days per year of production, so they may be compared directly. The 331,500 tons per year figure is the maximum for the past five years, which is only 2.6 percent above the average annual production of 323,100 tons. Therefore, 331,500 tons is a reasonable measure of the annual production for the facility.

**Example 2:**
For the same facility in Example 1 above with an annual production of 331,500 tons, the production-normalized effluent guidelines for zinc are 0.1 lbs/1,000 lbs as monthly average and 0.15 lbs/1,000 lbs as daily maximum.

**Question:**
What are the resulting zinc technology-based effluent limitations for the NPDES permit?

**Answer:**
The annual production would be converted to an average daily production rate to apply the effluent guidelines. To convert from the annual production rate to an average daily rate, divide the annual production rate by the number of production days per year. To determine the number of production days, subtract the total number of normally scheduled non-production days from the total days in a year. Since Company A normally has 255 production days per year, the annual production rate of 331,500 tons per year would yield an average production daily rate of 1,300 tons per day.

**Monthly average discharge limitation for zinc:**
1,300 tons/day x 2,000 lbs/ton x 0.10 lbs/1,000 lbs = **260 lbs/day**

**Daily maximum discharge limitation for zinc:**
1,300 tons/day x 2,000 lbs/ton x 0.15 lbs/1,000 lbs = **390 lbs/day**

### 7.5.2. Concentration-based Limitations

Some effluent guidelines limitations are concentration-based and, therefore, are expressed in concentration units (e.g., mg/L). For these effluent guidelines, the permit writer can take the limitation for the facility directly from the regulation. It is important to read and understand the applicability portion of the regulation to determine the correct basis for establishing the limitations.

### 7.5.3. Mass-based and Concentration-based Limitations

In some cases, expressing discharge limitations in more than one type of unit is appropriate. For example, expressing limitations in terms of concentration as well as mass encourages the proper operation of a treatment facility at all times. In the absence of concentration limitations, a permittee could potentially increase its effluent concentration (i.e., reduce its level of treatment) during low flow periods and still meet its mass-based discharge limitations. Concentration-based limitations discourage such a reduction in treatment efficiency during low flow periods, and require proper operation of treatment units at all times. ARM 17.30.1345(8)(b) allows a permit writer, at his or her discretion, to express discharge limitations in additional units of measure. Therefore, if effluent guidelines requirements are mass-based, permit writers have the authority to establish concentration-

based limitations for the pollutant in addition to the required mass-based limitations. To convert mass-based limitations to concentration-based limits, or vice versa, the permit writer should use three (3) to five (5) years of flow data to determine the highest maximum daily flow rate (for calculating maximum daily effluent limitations) and the highest average monthly flow rate (to calculate average monthly effluent limitations).

## 7.6. Apply Case-by-Case TBELs as Needed

As discussed above, where an effluent guideline applies to a facility and includes requirements for a pollutant of concern, but does not include requirements for that pollutant applicable to a particular process at the facility or to a particular waste stream the Department can assume a zero discharge requirement for the pollutant of concern for the process or waste stream that is not subject to effluent guidelines; or the applicant can develop and propose case-by-case TBELs for the pollutant of concern for the process or waste stream not subject to the effluent guidelines and petition the Board of Environmental Review (Board) to adopt the TBELs.

Developing case-by-case limitations requires consideration of several specific factors established in § 125.3(d) to select a model treatment technology and derive effluent limitations based on that treatment technology. This process and the factors considered are the same factors required to be considered by USEPA in the development of effluent guidelines and, therefore, are often referred to as the CWA section 304(b) factors. The factors are summarized below in **Exhibit 7-2**. The most stringent of the case-by-case limitations based on BPT, BCT, and BAT are the TBELs for the pollutant of concern.

### 7.6.1.

**Exhibit 7-2 Summary of factors considered when developing case-by-case TBELs**

**For BPT requirements (all pollutants):**

1. The age of equipment and facilities involved*
2. The process(es) employed*
3. The engineering aspects of the application of various types of control techniques*
4. Process changes*
5. Non-water quality environmental impact including energy requirements*
6. The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application

**For BCT requirements (conventional pollutants):**

1. All items in the BPT requirements indicated by an asterisk (*) above
2. The reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits
3. The comparison of the cost and level of reduction of such pollutants from the discharge of POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources

**For BAT requirements (priority and non-conventional pollutants):**

1. All items in the BPT requirements indicated by an asterisk (*) above
2. The cost of achieving such effluent reduction

### Resources for Developing Case-by-Case TBELs

There are numerous resources for identifying candidates for model technologies or process changes and developing case-by-case TBELs using best professional judgment. **Exhibit 7-3** lists some example references that permit writers can use to derive these limitations.

**Exhibit 7-3 Tools for developing case-by-case TBELs using BPJ**

**Permit file information**

1. Current and previous NPDES application forms
2. Previous NPDES permit and fact sheet
3. Discharge Monitoring Reports
4. Compliance Inspection Reports

**Information from existing facilities and permits**

1. View NPDES Individual and General Permits <www.epa.gov/npdes/permitsearch> for other NPDES permits issued to facilities in the same region or state, or that include case-by-case limitations for the same pollutants
2. Toxicity reduction evaluations for selected industries
3. Other media permit files (e.g., Resource Conservation and Recovery Act [RCRA] permit applications and Spill Prevention Countermeasure and Control [SPCC] plans
4. ICIS-NPDES <https://icis.epa.gov/icis> data
5. Literature (e.g., technical journals and books)

**Effluent guidelines development and planning information**

1. Industry experts within EPA Headquarters, EPA Regions, and states <www.epa.gov/guide/contacts.html>
2. Development Documents, CWA section 308 questionnaires, screening and verification data, proposed and final regulations, contractor's reports, and project officer contacts <www.epa.gov/guide>
3. EPA's Technical Support Documents <www.epa.gov/guide/304m> and records supporting EPA's biennial effluent guidelines program plans also provide additional useful information. In particular, these resources provide a sample of the current limitation and latest developments in industrial pollutant prevention, water conservation, and wastewater treatment. The Technical Support Documents also identify industrial sectors not currently regulated by effluent guidelines.

**Statistical guidance**

1. Effluent Guidelines Technical Development Support Documents, such as the Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category <www.epa.gov/guide/>

**Economics guidance**

1. *Protocol and Workbook for Determining Economic Achievability for NPDES Permits* <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf> (Putnam, 1982).
2. *BCT Cost Test Guidance* <www.epa.gov/npdes/pubs/owm0009.pdf>

**Guidance for BMP-based limitations**

1. *Guidance Manual for Developing Best Management Practices (BMPs)* <www.epa.gov/npdes/pubs/owm0274.pdf> (USEPA, 1993).
2. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs* <www.epa.gov/npdes/pubs/contents_indguide.pdf> (USEPA, 1992).
3. National Menu of Stormwater Best Management Practices <www.epa.gov/npdes/stormwater/menuofbmps>

### 7.6.3. Statistical Considerations When Establishing Case-by-Case TBELs

The quality of the effluent from a treatment facility will normally vary over time. If, for example, $BOD_5$ data for a typical treatment plant were plotted against time, one would observe day-to-day variations of effluent concentrations. Some of this behavior can be described by constructing a frequency-concentration plot. From this plot, one could observe that for most of the time, $BOD_5$ concentrations are near some average value. Any treatment system can be described using the mean concentration of the parameter of interest (i.e., the long-term average) and the variance (or coefficient of variation) and by assuming a particular statistical distribution (usually lognormal).

When developing a case-by-case limitation, one may use an approach consistent with the statistical approach USEPA has used to develop effluent guidelines. Specifically, the maximum daily limitation may be calculated by multiplying the long-term average achievable by implementation of the model technology or process change by a daily variability factor determined from the statistical properties of a lognormal distribution. The average monthly limitation can be calculated similarly except that the variability factor corresponds to the distribution of monthly averages instead of daily concentration measurements. The daily variability factor is a statistical factor defined as the ratio of the estimated 99th percentile of a distribution of daily values divided by the mean of the distribution. Similarly, the monthly variability factor is typically defined as the estimated 95th percentile of the distribution of monthly averages divided by the mean of the distribution of monthly averages.

A modified delta-lognormal distribution could be fit to concentration data and variability factors computed for the facility distribution. The modified delta-lognormal distribution models the data as a mixture of measured values and observations recorded as values less than the detectable level. This distribution often is selected because the data for many analytes consists of such a mixture of measured values and results below the detectable level. The modified delta-lognormal distribution assumes that all non-detected results have a value equal to the detection limitations and that the detected values follow a lognormal distribution.

For more details on USEPA's use of statistical methods for developing effluent guidelines, refer to *Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category* <www.epa.gov/guide/ironsteel/reg/tdd.htm> (USEPA, 2002).

### 7.6.4. Documenting Case-by-Case TBELs in the Permit Fact Sheet

Permit writers will need to document the basis for any case-by-case limitations in the MPDES permit fact sheet, whether the basis is an assumption that the TBEL for the specific process or waste stream is zero discharge of the pollutant of concern or the basis is a TBEL adopted by the Board. The permit writer also should document the rationale for concluding that there are no applicable effluent guidelines for the pollutant discharge.

## *7.7. Account for Multiple Products or Categories*

There are instances where one facility produces multiple products, or where the facility's production process are covered by multiple effluent guidelines or subcategories. In such cases, a permit writer must examine the applicable guidelines closely to ensure that (1) one guideline does not supersede another, and (2) the guidelines are properly applied. For example, the preamble to the final rule for the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) guideline (40 CFR 414) identifies numerous circumstances where the OCPSF regulations are superseded by existing effluent guidelines for other industrial categories.

When a facility is subject to multiple effluent guidelines (within a single or multiple effluent guidelines), the permit writer must apply each of the guidelines in deriving the technology-based effluent limitations for the particular facility. If all wastewaters regulated by effluent guidelines are treated separately but are combined before the discharge, the permit writer may establish internal outfalls, as allowed under ARM 17.30.1345(10)(b), and apply each guideline at the respective internal outfall. More commonly, wastewaters regulated by effluent guidelines are combined during or prior to treatment. In this case, one can simply combine the allowable pollutant loadings from each guideline to arrive at a single technology-based discharge limitation for the facility using a "building block" approach.

The five scenarios in **Exhibit 7-4** illustrate the building block approach under five different scenarios for two streams of wastewater, **Effluent 1** and **Effluent 2**, combined during or prior to treatment and discharged through a single outfall. The examples include both mass-based and concentration-based limitations, though both are not required by the effluent guidelines. The flow values used in the equations should be the highest maximum daily flow rate (for calculating maximum daily effluent limitations) and the highest average monthly flow rate (to calculate average monthly effluent limitations) based on three (3) to five (5) years worth of data.

**Exhibit 7-4. Examples of "building block" approach to calculate TBELs (Jordan, 1984)**

**Scenario 1**: If the effluent guidelines for the pollutant for Effluent 1 and Effluent 2 are expressed in production-normalized mass units then the technology-based effluent limitation at the outfall is determined by using the following expression:

**Mass Limit = Mass Limit$_1$ x Production$_1$ + Mass Limit$_2$ x Production$_2$**
**Conc Limit = (Mass Limit) ÷ [(Flow$_1$ + Flow$_2$) x 8.34]**

**Where:**

Mass Limit = mass limit at the outfall (lb/day)
Mass Limit$_1$ = effluent guidelines mass limit for Effluent 1 category/subcategory (lb/1000 lb)

| | |
|---|---|
| $Production_1$ | = production of the process for Effluent 1 (1000 lb) |
| $Mass\ Limit_2$ | = effluent guidelines mass limit for Effluent 2 category/subcategory (lb/1000 lb) |
| $Production_2$ | = production of the process for Effluent 2 (1000 lb) |
| $Flow_1$ | = flow of (or contributed by) Effluent 1 in total flow (MGD) |
| $Flow_2$ | = flow of (or contributed by) Effluent 2 in total flow (MGD) |

If a concentration limit is appropriate, then the mass limit calculated above can be divided by the combined flow from Effluent 1 and Effluent 2 to obtain the concentration limit.

**Scenario 2**: If the effluent guidelines for the pollutant for Effluent 1 and Effluent 2 are expressed in concentration units, then the technology-based effluent limitation at the outfall is determined by using the following expression:

$$\textbf{Mass Limit} = \textbf{Conc Limit}_1 \times \textbf{Flow}_1 \times 8.34 + \textbf{Conc Limit}_2 \times \textbf{Flow}_2 \times 8.34$$
$$\textbf{Conc Limit} = (\textbf{Mass Limit}) \div [(\textbf{Flow}_1 + \textbf{Flow}_2) \times 8.34]$$

**Where:**

| | |
|---|---|
| Mass Limit | = mass limit at the outfall (lb/day) |
| $Conc\ Limit_1$ | = effluent guidelines conc. limit for Effluent 1 category/subcategory (mg/L) |
| $Flow_1$ | = flow of (or contributed by) Effluent 1 in total flow (MGD) |
| $Conc\ Limit_1$ | = effluent guidelines conc. limit for Effluent 2 category/subcategory (mg/L) |
| $Flow_2$ | = flow of (or contributed by) Effluent 2 in total flow (MGD) |

**Scenario 3**: In the case where two effluent guidelines apply to a facility and one is production based and the other concentration based, the technology-based effluent limitation at the outfall expressed in terms of mass is determined by using the following expression:

$$\textbf{Mass Limit} = \textbf{Mass Limit}_1 \times \textbf{Production}_1 + \textbf{Conc Limit}_2 \times \textbf{Flow}_2 \times 8.34$$
$$\textbf{Conc Limit} = (\textbf{Mass Limit}) \div [(\textbf{Flow}_1 + \textbf{Flow}_2) \times 8.34]$$

**Where:**

| | |
|---|---|
| Mass Limit | = mass limit at the outfall (lb/day) |
| $Mass\ Limit_1$ | = effluent guidelines mass limit for Effluent 1 category/subcategory (lb/1000 lb) |
| $Production_1$ | = production of the process for Effluent 1 (1000 lb) |
| $Conc\ Limit_2$ | = effluent guidelines conc. limit for Effluent 2 category/subcategory (mg/L) |
| $Flow_2$ | = flow of (or contributed by) Effluent 2 in total flow (MGD) |

**Scenario 4**: If the effluent guidelines for the pollutant for Effluent 1 is expressed in mass units and no effluent guidelines for the same pollutant exist for Effluent 2, then the technology-based effluent limitation at the outfall is determined using the following expression:

**Mass Limit = Mass Limit$_1$ x Production$_1$ + C_BPJ_Limit$_2$ x Flow$_2$ x 8.34**
**Conc Limit = (Mass Limit) ÷ [(Flow$_1$ + Flow$_2$) x 8.34]**

**Where:**

| | |
|---|---|
| Mass Limit | = mass limit at the outfall (lb/day) |
| Mass Limit$_1$ | = effluent guidelines mass limit for Effluent 1 category/subcategory (lb/1000 lb) |
| Production$_1$ | = production of the process for Effluent 1 (1000 lb) |
| Conc BPJ Lim$_2$ | = concentration limit for pollutant in Effluent 2 of zero or based on TBEL adopted by Board (mg/L) |
| Flow$_2$ | = flow of (or contributed by) Effluent 2 in total flow (MGD) |

**Scenario 5**: If the effluent guidelines for the pollutant for Effluent 1 are expressed in concentration units and no effluent guidelines for the same pollutant exist for Effluent 2 then the technology-based effluent limitation at the outfall is determined by using the following expression:

**Mass Limit = Conc Limit$_1$ x Flow$_1$ x 8.34 + C_BPJ_Limit$_2$ x Flow$_2$ x 8.34**
**Conc Limit = (Mass Limit) ÷ [(Flow$_1$ + Flow$_2$) x 8.34]**

**Where:**

| | |
|---|---|
| Mass Limit | = mass limit at the outfall (lb/day) |
| Conc Limit$_1$ | = effluent guidelines conc. limit for Effluent 1 category/subcategory (mg/L) |
| Flow$_1$ | = flow of (or contributed by) Effluent 1 in total flow (MGD) |
| Conc BPJ Lim$_2$ | = concentration limit for pollutant in Effluent 2 of zero or based on TBEL adopted by Board (mg/L) |
| Flow$_2$ | = flow of (or contributed by) Effluent 2 in total flow (MGD) |

**In both Scenario 4 and Scenario 5**, a concentration limit for the waste stream with no effluent guideline (Effluent 2) would ensure that the non-regulated waste stream does not dilute the regulated waste stream.

Effluent guidelines might also specify inconsistent limit expressions that will have to be adjusted. For example, effluent guidelines for one category (e.g., porcelain enameling) include limitations set at a daily maximum limit, while effluent guidelines for another category (e.g., electroplating) set a 4-day average limit for the same pollutant. In this case, where both effluent guidelines are applicable, both effluent guidelines must be applied in the permit. If this situation arises, the permit writer has the option to:

- Place both limitations in the permit (i.e., both the daily maximum and 4-day average) or
- Apply the applicable effluent guidelines using limitations internal outfalls [as allowed under ARM 17.30.1345(10)(b)].

As noted above, if effluent guidelines are applicable to an existing facility, and that facility adds a new production line, then the permit writer should calculate the discharge limitation for the reissued permit using BPT, BCT, and BAT standards for the existing production line and NSPS for the new production line.

**Exhibit 7-5. Example of applying existing and new source standards**

A company adds a completely new plating line to a facility with existing metal plating lines. Wastewater from all of these lines is commingled prior to treatment. The wastewater is then treated and discharged. In this situation, the combination of the NSPS (for the new line) and BPT, BCT, and BAT standards (for the older line) would be used on a flow-weighted basis to derive a limitation.

## 7.8. Address Special Circumstances

Calculating technology-based discharge limitations for a facility sometimes is more complex than multiplying production rates by effluent allowances from the appropriate effluent guidelines. Sanitary wastes, expected significant increases or decreases in production, or variance requests, may complicate the process of applying effluent guidelines.

### 7.8.1. Sanitary Sources

If one of the wastewater streams contributing to an industrial facility's discharge is sanitary wastewater, then the treatment standards for domestic wastewater (i.e., secondary treatment standards) can be applied to that waste stream. Secondary treatment standards, are discussed in **Chapter 4**. If a permit writer needs to calculate mass-based limitations for an industrial facility from the concentration-based secondary treatment standards, he or she would use the highest maximum daily flow rate (for calculating maximum daily effluent limitations) and the highest average weekly flow rate (to calculate average weekly effluent limitations) based on three (3) to five (5) years worth of data.

### 7.8.2. Tiered Discharge Limitations

If the facility operations are expected to change significantly during the life of the permit, ARM 17.30.1345(12)(b), which incorporates 40 CFR 122.45(b)(2)(ii)(A)(i) by reference, gives permit writers the option of including alternate or tiered limitations. For mass-based effluent guidelines, these tiered limitations would become effective when production or flow (or some other measure of production) exceeds a threshold value, such as during seasonal production variations. USEPA has noted that, as a general rule, up to a 20 percent fluctuation in production is within the range of normal variability, while changes in production higher than 20 percent could warrant consideration of tiered limitations. The major characteristics of tiered limitations are illustrated by the example in **Exhibit 7-6**.

Tiered limitations should be included in a permit only after careful consideration of production data and only when a substantial increase or decrease in production is likely to occur. In the example from Exhibit 4-4, the lower limitations would be in effect when production was at "low" levels (March through August). During periods of significantly higher production (September through February), the higher limitations would be in effect. In addition, a tiered or alternate set of limitations may be appropriate in the case of special processes or product lines that only operate during certain times.

A permit writer also could base thresholds for tiered limitations on an expected increase in production during the term of the permit and will continue for the duration of the permit term. For example, if a facility plans to add a process line and significantly expand production in year three of the permit term, the permit could include a higher tier of limitations that go into effect when the facility reaches a production level specified in the permit.

The permit writer must provide detail in the permit regarding the thresholds or time frames when each tier applies, measures of production, and special reporting requirements. Special reporting requirements include provisions such as:

- The permittee notifying the Department at least two business days prior to the month they expect to be operating at a higher level of production and the duration this level of production is expected to continue, and
- The permittee reporting, in the discharge monitoring report, the level of production and the limitation and standards applicable to that level.

The permit writer should provide a detailed discussion or the rationale and requirements for any tiered limitations in the Fact Sheet for the permit.

**Exhibit 7-6 Example of tiered effluent limitations**

Plant B produced approximately 40 tons per day of product during spring and summer months (i.e., March through August) and 280 tons per day during fall and winter months during the previous 5 years. Production during the fall and winter months are significantly higher than during the off-season and the permittee has made a plausible argument that production is expected to continue at that level. The effluent guidelines allowance for Pollutant Y is 0.08 lbs/1,000 lbs for the monthly average and 0.14 lbs/1,000 lbs for the daily maximum. You have decided that tiered discharge limitations are appropriate for this facility. What are the tiered limitations?

**Discussion**:
The first tier or lower limitations would be based on a production rate of 40 tons per day. These limitations would apply from March through August.

*Monthly average limitation:*
40 tons/day x 2,000 lbs/ton x 0.08 lbs/1,000 lbs = 6.4 lbs/day

*Daily maximum limitation:*
40 tons/day x 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 11.2 lbs/day

The second tier or higher limitations would be based on a production rate of 280 tons per day. These limitations would apply from September through February.

*Monthly average limitation:*
280 tons/day x 2,000 lbs/ton x 0.08 lbs/1,000 lbs = 44.8 lbs/day

*Daily maximum limitation:*
280 tons/day x 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 78.4 lbs/day

## 7.9. Apply Variances

The CWA and the federal regulations provide limited mechanisms for variances from national technology-based standards for industrial facilities. A variance can provide alternative (usually less stringent) limitations or more time to comply with limitations. An MPDES permit applicant must meet very specific data and variance application deadline requirements before a variance may be granted. A variance provides a unique exception to a particular requirement, and the permit writer should not expect to routinely receive variance requests. Nevertheless, the permit writer should be aware of the major types of variances and the basic requirements for each.

Variance applications are submitted by the NPDES permit applicant and must be submitted before the close of the public comment period of the permit, except for Fundamentally Different Factors (FDF) variance requests, which must be requested by the NPDES permit applicant within 180 days of the effluent guidelines publication. The permit writer should consult § 124.62 for the specific procedures for decisions regarding different types of variances. **Exhibit 7-7** lists the available variances from effluent guidelines.

**Exhibit 7-7 Variances from effluent guidelines**

| Legislation (CWA section) | Type | Regulation | Approval authority | Application deadline |
|---|---|---|---|---|
| 301(g) | Nonconventional Pollutant | Part 125, Subpart F (Reserved) | EPA Region HQ delegated authority | During permit comment period |
| 301(n) | Fundamentally Different Factors (FDF) | Part 125, Subpart D and ARM 17.30.1354 | EPA Region HQ delegated authority | 180 days from new establishment or revision of effluent guidelines |

| | | | | |
|---|---|---|---|---|
| — | Net Intake or Net/Gross | ARM 17.30.1345(9) and § 122.45(g) | NPDES state or EPA Region in absence of approved state NPDES program | During permit comment period |

The following paragraphs further discuss the variances listed in **Exhibit 7-7** and the factors that are considered in a technical review of a variance request.

### 7.9.1. Nonconventional Pollutant–CWA section 301(g) Variance

CWA section 301(g) and the regulations at § 122.21(m)(2) provide for a variance from new or revised BAT effluent guidelines for certain non-conventional pollutants because of local environmental factors, so long as the discharger demonstrates that it is meeting BPT and that the discharge does not prevent attainment of water quality standards and would not result in additional requirements on other point or nonpoint sources. These pollutants include ammonia, chlorine, color, iron, and phenols (as measured by the colorimetric 4-aminoantipyrine [4AAP] method). The CWA provides a process to petition to include additional pollutants on this list. Typical industries that have applied for CWA section 301(g) variances include Iron and Steel Manufacturing (Part 420), Steam Electric Power Generating (Part 423), Inorganic Chemicals Manufacturing (Part 415), Nonferrous Metals Manufacturing (Part 421), Aluminum Forming (Part 467), and Pesticides Chemicals (Part 455) facilities.

In addition to meeting the application deadline the discharger must file a variance application that meets the following requirements:

- The proposed modified requirements must result in compliance with BPT and water quality standards of the receiving stream;
- No additional treatment will be required of other point or nonpoint source dischargers as a result of the variance approval;
- The modified requirements will not interfere with attainment or maintenance of water quality to protect public water supplies, or with protection and propagation of a balanced population of shellfish, fish, and wildfowl, and will allow recreational activities in and on the water; and
- The modified requirements will not result in quantities of pollutants that may reasonably be anticipated to pose an unacceptable risk to human health or the environment, cause acute or chronic toxicity, or promote synergistic properties.

The permit writer should review the request to ensure that it complies with each of the requirements for this type of variance. This variance request can involve a great deal of water quality assessment, including aquatic toxicity, mixing zone and dilution model analysis, and possible site-specific criterion development. In addition, it may be necessary to assess many complex human health effects, including carcinogenicity, teratogenicity, mutagenicity, bioaccumulation, and synergistic propensities. Permit writers may use EPA's *Draft Technical Guidance Manual for the Regulations Promulgated Pursuant to Section 301(g) of the Clean Water Act of 1977 40 CFR Part 125 (Subpart F)* <www.epa.gov/npdes/pubs/owm0008.pdf> (USEPA, undated) to assess a completed variance request.

### 7.9.2. Fundamentally Different Factors–FDF Variance

Of the possible variances from technology-based requirements, the most commonly applied is the Fundamentally Different Factors (FDF) variance. ARM 17.30.1322(13)(a) and 40 CFR 125 Subpart D establish criteria and standards used in determining whether and FDF variance should be granted. USEPA makes the decision of whether or not to grant and FDF variance. This decision is based on a determination that factors relating to the facility are fundamentally different from the factors considered by USEPA when it developed the effluent guidelines. USEPA may grant an FDF variance for any effluent guidelines requirements promulgated under sections 301 and 304 of the CWA except for the BPT limits contained in 40 CFR 423.12 (Steam Electric Generating Point Source Category). Alternative effluent limitations or standards different from the otherwise applicable requirements in effluent guidelines may be authorized by USEPA if an individual facility is fundamentally different with respect to factors considered in establishing the limitations or standards otherwise

applicable to that facility's industrial category. Such a modification is known as a "fundamentally different factors" (FDF) variance. An FDF variance is not available to a new source subject to NSPS.

EPA regulations at Part 125, Subpart D, authorizing the EPA Regional Administrators to establish alternative limitations and standards, further detail the substantive criteria used to evaluate FDF variance requests for direct dischargers. The regulations at § 125.31(d) identify six factors that may be considered in determining if a facility is fundamentally different:

- Nature or quality of pollutants contained in the raw process wastewater;
- Volume of the process wastewater and effluent discharged;
- Non-water quality environmental impact of control and treatment of the raw wasteload;
- Energy requirements of the application of control and treatment technology;
- Age, size, land availability, and configurations of discharger's equipment or facilities as well as processes employed, process changes, and engineering aspects of the application of control technology; and
- Cost of compliance with required control technology.

The Agency must determine whether, based on one or more of these six factors, the facility in question is fundamentally different from the facilities and factors considered by USEPA in developing the nationally applicable effluent guidelines. The regulation also lists four other factors that may not provide a basis for an FDF variance:

- Infeasibility of installation within the time allowed by the CWA;
- Assertion that the national limitations cannot be achieved with the appropriate waste treatment facilities installed (if the assertion is not based on one or more of the six FDF factors above);
- A discharger's ability to pay for the required water treatment; or
- The impact of a discharge on local receiving water quality.

In addition, under § 125.31(b)(3), a request for limitations less stringent than the national limitation may be approved only if compliance with the national limitations would result in either a:

- Removal cost wholly out of proportion to the removal cost considered during development of the national limitations; or
- Non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limitations.

The conditions for approval of a request to modify applicable pretreatment standards and factors considered are the same as those for direct dischargers.

The legislative history of CWA section 301(n) underscores the necessity for the FDF variance applicant to establish eligibility for the variance. USEPA's regulations at § 125.32(b)(1) are explicit in imposing this burden upon the applicant. The applicant must show that the factors relating to the discharge controlled by the applicant's permit which are claimed to be fundamentally different are, in fact, fundamentally different from those factors considered by the EPA in establishing the applicable effluent guidelines. The pretreatment regulations incorporate a similar requirement at § 403.13(h)(9).

### 7.9.3. Intake Allowance or Net/Gross Variance

Some facilities may be unable to comply with effluent guidelines because of pollutants in their intake water. Under certain circumstances, the MPDES regulations allow credit for pollutants in intake water. Specifically, under 17.30.1345(9) and 40 CFR 122.45(g), permit writers are authorized to grant net credits for the quantity of pollutants in the intake water where: (1) the applicable effluent guidelines specify that the guidelines are to be applied on a net basis; or (2) the pollution control technology would, if properly installed and operated, meet applicable effluent guidelines in the absence of the pollutants in the intake waters. The following requirements are included in the regulations for establishing net limitations:

- Credit for conventional pollutants, such as $BOD_5$ or TSS, are only authorized where the constituents resulting in the effluent $BOD_5$ and the TSS are similar between the intake water and the discharge;

- Credit is only authorized up to the extent necessary to meet the applicable limitation or standard, with a maximum value equal to the influent concentration;
- Intake water must be taken from the same body of water into which the discharge is made; and
- Net credits do not apply to the discharge of raw water clarifier sludge generated during the treatment of intake water.

Permit writers must include influent monitoring in the permit when this type of variance is granted.

### 7.9.4. Thermal Discharge–CWA section 316(a) Variance

CWA section 316(a) and the regulations at ARM 17.30.1322(13)(f) provide for variances from thermal effluent limitations in MPDES permits. USEPA has only promulgated thermal limitations in effluent guidelines for two industrial sectors: Beet Sugar Processing Subcategory of the Sugar Processing Point Source Category (Part 409 Subpart A) and the Cement Manufacturing Point Source Category (Part 411, Subparts A and B). Most thermal limitations are based on water quality standards, so most thermal variances actually are not true "technology-based" variances. Dischargers must apply for a thermal discharge variance with its permit application if the thermal effluent limitation is based on an effluent guideline or during the permit comment period if the thermal effluent limitation is based on a WQBEL.

Regulations for submitting and reviewing thermal discharge variance requests are promulgated at Part 125, Subpart H. The approval authority for a thermal discharge variance request is the state permitting authority or the EPA Region in absence of an approved state NPDES program. Less stringent alternative thermal effluent limitations may be included in permits if the discharger properly demonstrates that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made, taking into account the cumulative impact of its thermal discharge together with all other significant impacts on the species affected. Once a variance is granted, the discharger must still reapply for the variance each permit term. The majority of thermal variance requests are from power plants seeking relief from water-quality based effluent limitations.

## *7.10. References*

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Putnam, Hayes and Bartlett, Inc. 1982. *Protocol and Workbook for Determining Economic Achievability for National Pollutant Discharge Elimination System Permits*. U.S. Environmental Protection Agency, Permits Division, Washington, DC. <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf.> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf>.

USEPA (undated). *Draft Technical Guidance Manual for the Regulations Promulgated Pursuant to Section 301(g) of the Clean Water Act of 1977 40 CFR Part 125 (Subpart F)* <www.epa.gov/npdes/pubs/owm0008.pdf>.

USEPA. 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs*. EPA 832-R-92-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/contents_indguide.pdf>.

USEPA. 1993. *Guidance Manual for Developing Best Management Practices (BMP)*. EPA 833-B-93-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0274.pdf>.

USEPA. 2002. *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category,* EPA-821-R-02-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/guide/ironsteel/reg/tdd/sections1-5.pdf>.

# Chapter 8. Water Quality Standards

When developing a Montana Pollutant Discharge Elimination System (MPDES) permit, a permit writer considers the potential impacts of each existing and proposed point source discharge on the quality of the receiving water. The water quality goals for a water body are established through Montana's water quality standards. A permit writer might determine that the discharge of a pollutant, either alone or in combination with other sources, has the potential for an unacceptable impact on the quality of the receiving water as measured against the Montana water quality standards, even after application of technology-based effluent limitations (TBELs). Under these circumstances, the permit writer must develop water quality-based effluent limitations (WQBELs) for that pollutant and include these limitations in the MPDES permit for the discharge. This chapter provides background information on water quality standards. **Chapter 9** discusses the Department of Environmental Quality's (Department's) regulations and implementation procedures for determining the allowable mixing zone and dilution when developing MPDES permit requirements. **Chapter 10** details the Department's approach to determining whether WQBELs for specific parameters are needed in a permit and the procedure for developing such limitations. **Chapter 11** discusses developing effluent limitations and other requirements that address the toxicity of an effluent discharge as a whole, including the effects of mixtures of specific pollutants (i.e., whole effluent toxicity or WET).

## *8.1. Components of Water Quality Standards*

Section 303(c) of the Clean Water Act (CWA) requires every state to develop water quality standards applicable to all water bodies or segments of water bodies within the state. The Montana Water Quality Act (MWQA), Title 75, Part 3 specifically requires the Board of Environmental Review (Board) to establish the classification of all State waters in accordance with their present and future most beneficial uses; to formulate and adopt standards of water quality, giving consideration to the economics of waste treatment and prevention; adopt rules implementing the State's nondegradation policy; and adopt rules governing mixing zones. These requirements highlight the basic components of Montana's water quality standards, and match the description of the basic components of water quality standards in the federal regulations as 40 CFR 131 which are:

1. Designation of uses (40 CFR 131.10);
2. Numeric water quality criteria protecting these designated uses (40 CFR 131.11);
3. Antidegradation policy (40 CFR 131.12); and
4. Other policies regarding implementation of water quality standards (e.g., mixing zones) (40 CFR 131.13).

After a state adopts water quality standards, the United States Environmental Protection Agency (USEPA) must approve them before they become effective for CWA purposes (e.g., for NPDES permits) (see 40 CFR 131.21). In addition, both 75-5-301(3) MCA and 40 CFR 131.20 require the Board to review and, as appropriate, modify or adopt new water quality standards at least once every three years, a process known as a water quality standards triennial review. A permit writer must be familiar with the most current water quality standards that apply to the receiving water for the discharge he or she is permitting.

The Montana Surface Water Quality Standards and Procedures are found in ARM 17.30.601-670, which also includes, by reference, Circular DEQ-7—Montana Numeric Water Quality Standards, and the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994 (WQS Handbook), which sets forth procedures for development of site-specific criteria. Montana's regulations on Nondegradation of Water Quality are in ARM 17.30.701-718 and regulations on Mixing Zones in Surface and Ground Water are in ARM 17.30.501-518.

The remainder of this chapter reviews the major components of Montana's surface water quality standards and procedures.

### 8.1.1. Beneficial Uses

Beneficial uses are uses of waters of the state that should be achieved and protected (40 CFR 131.10) and are the first component of Montana's water quality standards. The surface water quality standards regulations establish the classification of all State waters in accordance with their present and future most beneficial uses, including uses such as drinking, swimming, recreation, aquatic life and wildlife growth and propagation, and agricultural and industrial water supply. This classification system includes 18 different classes of water bodies, each with a specific set of beneficial uses.

Water use classifications of specific rivers, streams, and lakes are included in ARM 17.30.607-616. Each section of the regulations applies a particular classification to a water body and its drainage basin. In addition, each section lists specific water bodies within that basin for which a different classification applies. See **Exhibit 8-1** for an example.

**Exhibit 8-1. Example water-use classification from Montana water quality standards**

**ARM 17.30.609 Water-Use Classifications—Kootenai River Drainage**

(1) The water-use classifications adopted for the Kootenai River are as follows:

| | |
|---|---|
| (a) All waters except those listed in (1)(a)(i) through (iv) | B-1 |
| (i) Deep Creek drainage (tributary to the Tobacco River) to the Fortine water supply intake | A-1 |
| (ii) Rainy Creek drainage to the W.R. Grace Company water supply intake | A-1 |
| (iii) Rainy Creek (mainstem) from the W.R. Grace Company water supply intake to the Kootenai River | C-1 |
| (iv) Flower Creek drainage to the Libby water supply intake (approximately at latitude 48.356, longitude -115.5676) | A-1 |

Before any water body is classified or standards are modified, the Board is required to follow general procedures related to rulemaking, including a public participation process (75-5-307 MCA and ARM 17.30.606). The federal regulations require appropriate technical and scientific analyses to support any standards that do not include, at a minimum, the uses specified in CWA section 101(a)(2). These "101(a)(2)" uses, as they are called, are protection and propagation of fish, shellfish, and wildlife and recreation in and on the water.

Once a particular water body or segment has been classified, and thereby assigned specific beneficial uses, the Board may not revise the water quality standards or reclassify the water body in a manner that lowers the applicable water quality standard below the level applicable under the classifications and standards already adopted unless it finds that the standard or classification that was adopted is higher than actual water quality that existed at the time of classification. When the Board is presented with facts indicating that a water body was misclassified, it must initiate rulemaking to correct the classification within 90 days (75-5-302 MCA). The analysis used by the Board to remove a beneficial use or reclassify a water body is called a "use attainability analysis" (UAA). Federal regulations at 40 CFR 131.10(g), (h) and (i) establish the criteria and guidelines for conducting a UAA. ARM 17.30.619(g) incorporates these federal regulations by reference. Also, the WQS Handbook discusses UAAs in greater detail. Reclassifying a water body causes a permanent change in the water quality standards for that water body, including both beneficial uses and associated numeric and narrative standards, which are discussed below.

### 8.1.2. Numeric and Narrative Standards

Federal regulations at 40 CFR 131.11 require states to adopt water quality criteria (referred to as numeric water quality standards in the Montana Surface Water Quality Standards and Procedures) on the basis of sound scientific rationale. These standards include sufficient parameters or constituents to protect the designated use. If a water body has multiple use designations, the criteria must support the most sensitive use. Criteria include numeric criteria for a specific parameter or narrative criteria to supplement numeric criteria or where numeric

criteria cannot be established. section 304(a) of the CWA directs USEPA to establish and publish scientifically derived water quality criteria guidance to assist states in developing water quality standards.

USEPA criteria or guidance for protection of aquatic life consists of three components:

- **Magnitude**: The level of pollutant (or pollutant parameter), generally expressed as a concentration, that is allowable.
- **Duration**: The period of time (averaging period) over which the instream concentration is averaged for comparison with criteria concentrations.
- **Frequency**: How often criteria may be exceeded and water quality still be protected.

These numeric water quality criteria set ambient levels of individual pollutants or parameters or describe conditions of a water body that, if met, generally will protect the aquatic life beneficial uses of the water.

Numeric water quality criteria also are developed to protect human health from the deleterious effects of pollutants. Human health criteria for toxic pollutants protect people from exposure resulting from consumption of fish or other aquatic organisms or from consumption of water and organisms. These criteria express the highest concentrations of a pollutant that are not expected to pose significant long-term risk to human health. Other criteria for protection of human health, such as bacteria criteria, may consider a shorter-term exposure through uses of the water body such as contact recreation.

Each water body classification in the Montana Surface Water Quality Standards and Procedures has associated numeric and narrative water quality standards designed to ensure that the beneficial uses associated with the classification are protected. There are some important similarities and differences between the USEPA criteria and the Montana numeric water quality standards. These similarities and differences are highlighted in **Exhibit 8-2**.

**Exhibit 8-2. Comparison of USEPA water quality criteria and Montana numeric standards**

**Similarities**

- The Board has used the magnitude component of USEPA's recommended water quality criteria and other information to develop the numeric and narrative water quality standards for State waters.
- Most of Montana's chronic aquatic live numeric standards are based on the same 96-hour (four-day) average duration component as the USEPA chronic aquatic life criteria.

**Differences**

- USEPA's acute aquatic life criteria are expressed as a one-hour average, but Montana's acute aquatic life water quality standards are expressed as values not to be exceeded in any surface or ground water sample.
- USEPA human health criteria have no specific duration component, but include various assumptions of duration depending on the endpoint of concern (e.g., carcinogenic effects, developmental effects, oganoleptic effects). Montana's numeric human health numeric standards are expressed as values not to be exceeded in any surface or ground water sample. This difference in duration assumptions results in more conservative assumptions regarding critical stream flows and dilution in Montana's procedures for water quality-based permitting. For example, Montana uses the 7Q10 low flow as the critical flow for human health standards rather than the recommendation in USEPA's guidance to use the harmonic mean flow as the critical flow for human health standards.
- Unlike the USEPA's criteria recommendations, Montana's numeric water quality standards do not have a frequency component (e.g., may be exceeded no more than once in three years).

The numeric and narrative standards applicable to surface waters in Montana include standards and prohibitions that apply to all surface waters, standards applied to specific water use classifications, and standards applied to

specific water bodies. These standards, and the process of identifying the standards that apply to a specific water body, are discussed further in **Chapter 10**.

In accordance with 75-5-306(1), for most classifications, the water quality standards also include a provision indicating that it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements (i.e., TBELs) are met. Implementation of this provision can be accomplished by using similar water bodies that are the least impaired by human activities as a reference condition to establish what constitutes a "natural" condition (see Memorandum from Max Dodson, Director, Water Management Division, USEPA Region 8 to Steven Pilcher, Administrator, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, dated March 23, 1994). This approach is similar to the approach taken by USEPA in establishing its recommendations for nutrient criteria. USEPA also has developed guidance on establishing site-specific numeric water quality standards based on natural background conditions. Additional information is found in the Memo *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background* <http://www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf> (Davies, 1997). Site-specific numeric standards are discussed below in **Section 8.A.4, "Other Policies and Procedures."**

Finally, permit writers should be aware that whole effluent toxicity (WET) testing is used to implement the narrative standard in ARM 17.30.637(d) which states that surface waters must be free from substances attributable to municipal, industrial, agricultural practices, or other discharges that "create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life." (See **Chapter 11** for additional information).

### 8.1.3. Nondegradation Policy

The third component of Montana's water quality standards is a nondegradation policy. As noted above in **Chapter 3**, the MWQA sets forth a policy for nondegradation of water quality in 75-5-303. The three aspects of the State nondegradation polity parallel the three "tiers" of an antidegradation policy as required by USEPA in 40 CFR 131.12. These three "tiers" are as follows:

- ***Tier I***: existing uses of State waters and the level of water quality necessary to protect those uses must be maintained and protected (75-5-303(1) MCA and 40 CFR 131.12(a)(1));
- ***Tier II***: unless authorized by the Department through a nondegradation analysis or exempted from review under 75-5-317 MCA, the quality of high-quality waters must be maintained (75-5-303(2)-(7) MCA and 40 CFR 131.12(a)(2)); and
- ***Tier III***: the Board may not authorize degradation of State waters classified as "outstanding resource waters" (75-5-303(8) MCA and 40 CFR 131.12(a)(3)).

ARM 17.30.701-718 includes regulations for implementing this nondegradation policy. The Department determines whether an applicant is proposing a new or expanded discharge and the category and level of protection provided to the receiving water by the nondegradation policy. A brief summary of implementation of the three tiers of the nondegradation policy is included below.

#### 8.1.3.1. Tier I—Protection of Existing Uses

ARM 17.30.705(2)(a) requires that, for all State waters, existing and anticipated uses and the water quality necessary to protect those uses must be maintained. In practice, application of this regulation means that the effluent limitations in an MPDES permit for a new or increased source, just as the permit for any point source discharge, must be derived from and comply with all numeric and narrative standards associated with the existing and anticipated beneficial uses of the receiving water.

#### 8.1.3.2. Tier II—Protection of High Quality Waters

Tier II of the nondegradation review applies when a proposed new or increased discharge is to a "high quality water." The definition of a "high quality water" in 75-5-103(10) MCA includes all state surface waters except those not capable of supporting any one of the designated uses for their classification or that have zero flow or surface expression for more than 270 days during most years.

As noted in Section 3.4.2 above, a new or increased source proposing to discharge to a high quality (Tier II) water may either accept effluent limitations in it MPDES permit based on the criteria of ARM 17.30.715(1)(a)-(g) and ARM 17.30.670 (see **Section 10.6** of this Manual) or submit an "Application to Degrade State Waters." if it wishes to proceed with the proposed activity. The Department reviews the required information from the application and makes a determination to either authorize degradation or deny the application to degrade according to the procedures for issuing preliminary and final decisions regarding authorizations to degrade in ARM 17.30.707 and 708 and 75-5-303 MCA.

#### 8.1.3.3. Tier III—Protection of Outstanding Resource Waters

As noted in **Chapter 3**, Outstanding Resource Waters are state surface waters located wholly within the boundaries of areas designated as national parks or national wilderness areas as of October 1, 1995 or other surface waters or ground waters classified by the Board and approved by the legislature. ARM 17.30.705(2)(c) requires that, for outstanding resource waters, no degradation is allowed and no permanent change in the quality of Outstanding Resources Waters resulting from a new or increased point source discharge is allowed. In practice, application of this regulation generally would prohibit any activity resulting in a new, permanent discharge of pollutants that would cause any permanent lowering of water quality in Outstanding Resource Waters.

### 8.1.4. Other Policies and Procedures

Federal regulations at 40 CFR 131.13 indicate that a state may, at its discretion, include in its water quality standards, "policies generally affecting their application and implementation, such as mixing zones, low flows, and variances." The MWCA and its implementing regulations and policies address several of these areas of water quality standards implementation.

#### 8.1.4.1. Dilution, Mixing Zones, and Critical Low Flows

The CWA and USEPA regulations allow states, territories, and tribes to designate a mixing zone or provide a dilution allowance when calculating water quality-based effluent limitations as long as the appropriate authorizing policy is included in the applicable water quality standards. A mixing zone is an area in a receiving water body where the effluent plume is progressively diluted in the receiving water. Within the mixing zone, the numeric water quality standards may be exceeded, but the mixing zone must not impair or threaten an existing beneficial use.

The MWQA required the Department to adopt rules governing the granting of mixing zones and specified that these rules must require that mixing zones granted by the Department be specifically identified and that they have the smallest practicable size; a minimum practicable effect on water uses; and definable boundaries (75-5-301(4) MCA). The Department has adopted regulations governing dilution, mixing zones, and critical low flows (ARM 30, Subchapter 5). These regulations implement 75-5-301(4) MCA and specifically allow and place conditions on granting dilution and mixing zones in MPDES permits. ARM 17.30.515 requires the Department to determine whether a mixing zone is appropriate for a particular discharge during the permit renewal, approval, order, or authorization review process. The Department might determine that no mixing zone will be granted or that a standard, source specific, or alternative or modified mixing zone is appropriate. The types of mixing zones permitted by the MWQA and its implementing regulations are discussed in more detail in **Chapter 9**

#### 8.1.4.2. Site-Specific Numeric Standards

By reference, ARM 17.30.619 incorporates the USEPA's WQS Handbook for procedures for the development of site-specific criteria (i.e., site-specific numeric standards). Setting site-specific numeric standards might be appropriate where background water quality parameters, such as pH, hardness, temperature, and color, appear to differ significantly from the laboratory water used to develop the standards or the types of local aquatic organisms differ significantly from those actually tested in developing the standards. Site-specific numeric standards, if adopted by the Board and approved by USEPA, are a permanent change to the water quality standards for the particular water body or segment of a water body but do not affect the beneficial uses or the classification of the water body. These site-specific numeric standards would be applied in MPDES permitting (and other water quality standard implementation purposes) rather than the numeric water quality standards that normally would apply to water bodies of the same classification (e.g., the standards from Circular DEQ-7).

One procedure that may be used to develop site-specific criteria is the Species Recalculation Procedure. This procedure allows the Department to add or remove species toxicity data when determining criteria based on water body specific information. The Department may also use the Water Effect Ratio procedure which takes into account relevant differences in pollutant toxicity for site water and laboratory water. The third procedure is the Resident Species Procedure, which is a combination of the other two procedures. These three procedures are discussed further in Chapter 3 (Water Quality Criteria) of USEPA's *Water Quality Standards Handbook: Second Edition* (USEPA 1994b). USEPA's Office of Science and Technology (OST) has developed detailed guidance on implementing the Water-Effect Ratio Procedure for metals <www.epa.gov/waterscience/standards/handbook/handbookappxL.pdf> (USEPA, 1994a) as well as a streamlined Water-Effect Ratio Procedure for discharges of copper <www.epa.gov/waterscience/criteria/copper/copper.pdf> (USEPA 2001).

Also, as mentioned above, USEPA has provided additional information non setting site-specific numeric standards equal to "natural background" conditions in the Memo *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background* <http://www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf> (Davies, 1997).

#### 8.1.4.3. Temporary Water Quality Standards (Variances)

75-5-312 MCA authorizes and provides criteria and procedures for the Board to adopt temporary water quality standards for a water body or segment. These temporary water quality standards are equivalent to USEPA's concept of a water quality standards variance. When the Board adopts temporary standards, the goal is to improve water quality to the point at which all the beneficial uses designated for that water body or segment are supported. As noted above, a number of temporary water quality standards are included in ARM 17.30.630. Temporary water quality standards may not result in adverse impacts to existing beneficial uses and may not be established for more than 20 years (75-5-312(8)(a) MCA). The Board must review temporary water quality standards every three years at a public hearing and may terminate or modify the temporary standards based on information submitted at the time of the review.

In order to appropriately determine the need for WQBELs when writing an MPDES permit, permit writers must be aware of the applicable water quality standards and implementation procedures. Before proceeding with any effluent limit calculations, the permit writer should check the most recent compilation of standards for the water body of concern and be sure that those standards have not been modified by any approved site-specific or temporary standards.

## 8.2. References

Davies, Tudor T. 1997. *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background.* U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf>.

USEPA, 1994a. *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals.* EPA-823-B-94-001. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <http://www.epa.gov/waterscience/standards/handbook/handbookappxL.pdf>.

USEPA, 1994b. *Water Quality Standards Handbook: Second Edition* (WQS Handbook). EPA 823-B-94-005a. U.S. Environmental Protection Agency, Office of Water, Washington DC. <www.epa.gov/waterscience/standards/handbook/>.

USEPA, 2001. *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*. EPA-822-R-01-005. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, DC. <www.epa.gov/waterscience/criteria/copper/copper.pdf>.

# Chapter 9. Mixing Zones and Dilution

In 1993, the legislature amended the Montana Water Quality Act (MWQA) to direct to the Board of Environmental Review (Board) to adopt rules to grant the Department of Environmental Quality (Department) the authority to grant mixing zones. The MWQA requires that any mixing zone granted by the Department be specifically identified and have the smallest practicable size; have a minimum practicable effect on water uses; and have definable boundaries (75-5-301(4) MCA). The regulations adopted by the Board governing the granting of mixing zones in Montana Pollutant Discharge Elimination System (MPDES) permits (and Ground Water Pollution Control System or GWPCS permits) are found in Title 17, Chapter 30, Subchapters 5 (Mixing Zones in Surface and Ground Water), Subchapter 6 (Surface Water Quality Standards and Procedures), and 7 (Nondegradation of Water Quality).

The purpose of this Chapter is to provide specific guidance and direction on the implementation of these regulations in MPDES permits, especially with respect to the development of parameter-specific water quality based effluent limitations (WQBELs) and whole effluent toxicity (WET) requirements.

## *9.1. Mixing Zone Requirements*

A mixing zone is defined by the regulations as a limited area of a water body where initial dilution of a discharge takes place, where water quality changes may occur, and where certain numeric water quality standards may be exceeded [ARM 17.30.502(6)]. Acute water quality standards may not be exceeded in a mixing zone unless the Department specifically finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses [ARM 17.30.507(1)(b)].

### 9.1.1. General Requirements for Granting a Mixing Zone

Mixing zones are granted by the Department only when:

- a permittee has ***applied*** for a mixing zone and provided with its permit application (see **Chapter 3**) all of the information needed for the Department to make a mixing zone determination;
- where they are ***needed*** (where the discharger cannot meet the applicable numeric water quality standards at the point of discharge); and
- where they are ***appropriate*** (based on the criteria specified in the regulations).

The result of granting a mixing zone is determination of a dilution ratio that is used in calculations to assess the need for and develop WQBELs (**Chapter 10 and Chapter 11**). Mixing zones are not granted for technology-based effluent limitations (TBELs) based on national secondary treatment standards (**Chapter 4**), effluent guidelines (**Chapter 6**), or other technology-based standards that the Board adopts. Technology-based requirements always apply directly to the effluent at the point of discharge or at another point specified by the standards (e.g., immediately following a specific process at the facility).

Mixing zones are granted on a parameter-by-parameter basis only. Blanket or unspecified mixing zones that do not identify the specific parameter to which the mixing zone applies and, therefore, could be considered applicable to all parameters are not allowed. In addition, in order to ensure consistency with the requirements of 70-5-301(4) MCA, any mixing zone granted by the Department must be based on the applicable criteria specified in the regulations and cannot be granted based on "best professional judgment."

Any mixing zone granted by the Department must comply with the General Prohibitions of ARM 17.30.637(1) as outlined in **Exhibit 9-1** below. This regulation states that all states waters must be "free from" certain conditions. These prohibitions apply to all State waters, including area within a mixing zone, and they establish the minimum level of quality that must be maintained.

**Exhibit 9-1. General Prohibitions in ARM 17.30.637(1)**

ARM 17.30.637(1) states that all State waters must be free from substances that will:

- Settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- Create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- Produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- Create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and,
- Create conditions which produce undesirable aquatic life.

WQBELs must be included in the permit if the permit writer determines that there is a reasonable potential for the discharge to cause or contribute to a violation of any of these prohibitions, which serve as narrative water quality standards. Such WQBELs must ensure that these narrative standards are attained throughout the receiving water, including within mixing zones. In some cases, the result of applying these prohibitions is that no mixing zone will be granted for a specific parameter or that the mixing zone size will be significantly restricted to less than the maximum size otherwise allowed. For example, the prohibition in ARM 17.30.637(1) would prohibit a mixing zone for acute whole effluent toxicity (WET).

Furthermore, ARM 17.30.507 establishes specific narrative requirements that restrict the application and size of surface water mixing zones. These restrictions are listed in **Exhibit 9-2** below.

**Exhibit 9-2. Specific restrictions for surface water mixing zones from ARM 17.30.507**

(1) Mixing zones for surface waters are to comply with the following water quality standards:
  (a) narrative water quality standards, standards for harmful substances, numeric acute and chronic standards for aquatic life, and standards based on human health must not be exceeded beyond the boundaries of the surface water mixing zone;
  (b) acute standards for aquatic life for any parameter may not be exceeded in any portion of a mixing zone, unless the department specifically finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses.
(2) Discharges to wetlands (other than constructed wetlands) will not be granted a mixing zone for parameters for which the state has adopted numeric acute or chronic standards for aquatic life or for human health in the surface water quality standards, unless the following can be demonstrated to the satisfaction of the department:
  (a) the standards referenced in (1) will not be exceeded beyond the boundaries of the mixing zone;
  (b) existing beneficial uses will not be threatened or harmed; and
  (c) the conditions in 75-5-303(3), MCA, are met.
(3) For discharges to surface water that first pass through the ground, such as discharges from infiltration systems or land application areas, the surface water mixing zone begins at the most upstream point of discharge into the receiving surface water. If the discharge continues to occur downstream beyond a distance equal to 10 times the stream width measured at the upstream discharge point at low flow, a standard mixing zone will not be granted.

### 9.1.2. Mixing Zone Review and Documentation

A permittee generally applies for a mixing zone as part of its MPDES permit application. The Department reviews mixing zone requests and determines whether or not to grant a mixing zone during the permit application completeness review.

#### 9.1.2.1. New Discharges

For new discharges, the permit writer determines whether a mixing zone will be granted and, if so, what type of mixing zone is appropriate based on effluent and receiving water information submitted by the applicant during the MPDES permit application process (see **Chapter 3**). This information must demonstrate to the Department that the discharger cannot meet the applicable numeric water quality standards at the point of discharge (i.e., that a mixing zone is needed) and that a mixing zone is appropriate based on the criteria specified in the regulations.

#### 9.1.2.2. Existing Discharges

For existing discharges, the permit writer may continue to allow a mixing zone that was granted in a previous permit provided that continuing to allow the mixing zone would not threaten or impair an existing beneficial use and that the mixing zone complies with the specific restrictions for surface water mixing zones in ARM 17.30.507 (listed in **Exhibit 9-2** above).

A permit writer may also grant a new or re-sized mixing zone requested by an existing discharger during the permit application process. The mixing zone determination may be based on effluent and receiving water data obtained during previous permit terms. However, during the permit application and completeness review process, the permittee must submit any supplemental information needed to support this determination.

***Permit writers should be aware that a request for a new (or re-sized) mixing zone to an existing discharge could trigger the need for a nondegradation review.***

If a permittee requests a modification of its MPDES permit to relocate an existing outfall, the request will be treated as a new discharge for purposes of determining whether a mixing zone should be granted. The permittee must request a mixing zone for the relocated outfall, provide information demonstrating that it cannot meet the applicable numeric water quality standards at the point of discharge, and demonstrate that a mixing zone is appropriate based on the criteria specified in the regulations.

**Permit I.A**

**Fact Sheet I.A.3**

Part I of an MPDES permit, as well as the fact sheet or statement of basis, must specify for each outfall the type of mixing zone granted, the resulting dilution ratio, and the specific parameters to which the mixing zone applies. In addition, the fact sheet or statement of basis must indicate the dimension(s) of the mixing zone and explain the rationale for granting the mixing zone. The remainder of this Chapter documents the procedure and required information the Department will use in granting a mixing zone.

## *9.2. Mixing Zone Analysis*

The permit writer uses effluent and receiving water data and information submitted by the permittee to determine whether a mixing zone is necessary and whether the permittee should be granted a nearly-instantaneous, standard, alternative, or source-specific mixing zone.

### 9.2.1. No Mixing Zone

In cases when a mixing zone is not necessary or not appropriate, all calculations used to determine the need for and calculate WQBELs are based on a requirement to attain numeric water quality standards at the point of discharge (i.e., "end-of-pipe"). **No mixing zone is the default condition in MPDES permits**.

In addition, mixing zones are not granted for acute aquatic life numeric standards unless the permittee specifically requests a mixing zone for an acute standard and the permittee qualifies for an alternative mixing zone or demonstrates to the Department that allowing a minimal, initial dilution through a source-specific mixing zone will not threaten or impair existing beneficial uses. Alternative and source-specific mixing zones are discussed in more detail below.

As discussed previously, permittees may apply for mixing zones for new and existing discharges and mixing zones from previous permits can be continued subject to certain restrictions. The Department will not grant a mixing zone in the following situations:

1. The mixing zone would threaten or impair an existing beneficial use.
2. The mixing zone would fail to comply with one or more of the specific restrictions for surface water mixing zones in ARM 17.30.507 (see **Exhibit 9-2**).
3. The discharge is to ephemeral or intermittent stream with no receiving water flow at critical stream flow.
4. The discharge is a new discharge to a lake or wetland (Such discharges would only possibly qualify for a source-specific mixing zone; however, there is insufficient information about a new discharge to properly size a source-specific mixing zone).
5. The parameter of concern is human pathogens as measured by the indicator bacteria Escherichia coli, except for facultative lagoons that have demonstrated adequate detention (greater than 180 days).
6. The parameter of concern is acute whole effluent toxicity (WET).
7. The discharge is a new or increased discharge and the parameter of concern is a parameter listed in Circular DEQ-7 as a carcinogen or as a pollutant with a bioconcentration factor (BCF) greater than 300.
8. The parameter of concern has chronic aquatic life standards listed in Circular DEQ-7 with a BCF greater than 300.
9. Limitations for the parameter of concern will be based on a USEPA-approved a wasteload allocation (WLA). No additional dilution or mixing not already accounted for in the approved WLA will be granted.
10. The facility is being regulated under a general permit.
11. The Department has determined that, for the parameter of concern, there is inadequate of insufficient information to determine that granting a mixing zone is appropriate or to determine the appropriate type and size of the mixing zone.

Furthermore, the regulations at ARM 17.30.506 provide several examples of additional, site-specific situations where the Department could determine that no mixing zone should be granted. These situations include the following:

1. A fish spawning area or shallow water nursery area is near the discharge and could be overlapped by a mixing zone (consider no mixing zone during spawning or nursery periods);
2. A "shore hugging" effluent plume is present in an aquatic life segment of a water body;
3. A drinking water intake is near the discharge and could be overlapped by a mixing zone;
4. A public swimming area is in the vicinity of the discharge and could be overlapped by a mixing zone;
5. The pollutant under consideration is a persistent, toxic, bioaccumulative pollutant;
6. Passage of aquatic organisms (including access to tributaries) would be inhibited;
7. A new mixing zone would result in the existence of multiple or overlapping mixing zones that may threaten or impair existing uses of the receiving water; or
8. A mixing zone would threaten or impair existing beneficial uses for any other reason.

For any parameter that does not qualify for a mixing zone the dilution ratio for all water quality calculations (i.e., determining the need for WQBELs and calculating WQBELs) is zero.

### 9.2.2. Nearly-Instantaneous Mixing Zone

Mixing of an effluent in the receiving water generally falls into one of two categories, incomplete mixing or rapid and complete (nearly-instantaneous) mixing. Slow or incomplete mixing typically occurs when the effluent is discharged to the receiving water through open channel or pipe. When mixing is slow or incomplete, it typically occurs through passive dilution with a small volume of the receiving water. Passive, shore-hugging plumes exhibit relatively smaller plume width, but greater length in which chronic or acute toxicity can persist. Rapid and complete or nearly-instantaneous mixing typically is accomplished through the use of a submerged effluent diffuser designed to enhance the mixing characteristics of the effluent or in effluent-dominated streams. Nearly-instantaneous mixing generally would not occur when a discharge is to a lake or wetland.

#### 9.2.2.1. Criteria for Granting a Nearly-Instantaneous Chronic or Human Health Mixing Zone

ARM 17.30.516(3)(d) defines nearly-instantaneous mixing as a case where:

1. an effluent diffuser extends across the entire stream width at low flow or
2. the mean daily flow of the discharge exceeds the 7Q10 low flow of the receiving water or
3. a permittee has demonstrated nearly-instantaneous mixing by showing that there will be no more than a 10 percent difference in bank-to-bank concentrations at a downstream distance from the point of discharge of less than two (2) stream or river widths. This demonstration study must be conducted in accordance with a plan approved by the Department.

Where there is nearly-instantaneous mixing and prior to dilution, the permittee is unable to meet the chronic aquatic life or human health numeric water quality standards or narrative standards (other than the narrative prohibitions in ARM 17.30.637(1), which must be met everywhere), the permit writer may grant a nearly-instantaneous mixing zone. A nearly-instantaneous chronic or human health mixing zone results in a dilution ratio equal to the 7Q10 low flow divided by the critical effluent flow.

#### 9.2.2.2. Restrictions on Nearly Instantaneous Mixing Zones

A nearly-instantaneous mixing zone may not be granted for numeric acute aquatic life numeric standards or acute WET requirements or for discharges to a lake or wetland. A nearly-instantaneous mixing zone might also be limited by the considerations in ARM 17.30.637(1) and ARM 17.30.506 (see discussion above).

#### 9.2.2.3. Information Requirements for a Nearly-Instantaneous Mixing Zone

When requesting a nearly-instantaneous mixing zone on the basis of the presence of an effluent diffuser, the permittee must submit the following information for the effluent diffuser during the permit application process:

- design criteria;
- operations specifications; and
- performance characterization.

**MPDES e-Permit Tool**

The Data Entry Workbook in the MPDES e-Permit Tool includes cells where permit writers are required to enter the receiving water and effluent flows needed to conduct the initial determination of whether a discharge qualifies for a nearly-instantaneous or standard mixing zone.

When requesting a nearly-instantaneous mixing zone on the relationship between the effluent and receiving water flows, the permittee must provide to the Department during the permit application process:

- the mean daily effluent flow and
- the 7Q10 low flow of the receiving water at the point of discharge (USEPA supports a model called "DFLOW 3.1" developed to estimate user selected design stream flows for low flow analysis and water quality standards. DFLOW is discussed further in **Chapter 10**).

When requesting a nearly-instantaneous mixing zone on the basis of a demonstration of nearly-instantaneous mixing, the permittee must:

- submit to the Department for approval a plan for a study demonstrating that that there will be no more than a 10 percent difference in bank-to-bank concentrations as a downstream distance from the point of discharge of less than two (2) stream or river widths; and
- submit to the Department during the permit application process or, as supplemental information during the time the permit is drafted, the results of the demonstration study conducted in accordance with the approved plan.

An adequate characterization of the receiving water upstream of the point of discharge for the parameter for which the mixing zone is requested or necessary must be available in order to make this demonstration. This characterization includes an analysis of the critical concentration of the parameter of concern as well as any parameters such as pH, temperature, and hardness for which critical values are needed in order to determine the magnitude of the water quality standard. Data requirements for characterizing critical receiving water conditions are discussed in **Chapter 10**.

In addition, the permittee must provide the Department with the critical effluent flow for its discharge in order for the Department to determine the appropriate dilution ratio resulting from a nearly-instantaneous mixing zone. Critical effluent flows are as follows:

- ***For publicly-owned treatment works (POTWs):*** design flow from Application Form 2C or effluent data; and
- ***For non-POTWs***: highest monthly average flow from Application Form 2C or effluent data.

### 9.2.3. Standard Mixing Zones

If a permittee demonstrates that it cannot meet either chronic aquatic life or human health numeric water quality standards or narrative standards at the point of discharge (other than the prohibitions in ARM 17.30.637(1)) and the effluent and receiving water are not characterized by nearly-instantaneous mixing, the permit writer would then determine whether the permittee meets the minimum criteria for a standard chronic or human health mixing zone.

#### 9.2.3.1. Criteria for Granting a Standard Chronic or Human Health Mixing Zone

A permittee could qualify for one of two types of standard mixing zones.

- *The mean annual flow of the effluent is less than 1 MGD and the ratio of the 7Q10 low flow of the receiving water (without the discharge) to the mean annual flow of the effluent is greater than or equal to 100:1.* Discharges meeting these minimum criteria are eligible for a standard mixing zone based on the 7Q10 low flow. The dilution ratio resulting from this type of standard mixing zone and used in WQBEL calculations is equal to the 7Q10 low flow divided by the critical effluent flow.
- *The mean annual flow of the effluent is less than 1 MGD and the ratio of the 7Q10 low flow of the receiving water (without the discharge) to the mean annual flow of the effluent is less than 100:1.* Discharges meeting these minimum criteria are eligible for a standard mixing zone based on 25 percent of the 7Q10 low flow. The dilution ratio resulting from this type of standard mixing zone and used in WQBEL calculations is equal to 25 percent of the 7Q10 low flow divided by the critical effluent flow.

These two types of standard mixing zones are summarized in **Exhibit 9-3** below.

**Exhibit 9-3. Summary of standard mixing zone requirements**

| Case | Mean Annual Flow (MAF) of Effluent | Dilution Ratio in Receiving Water (7Q10 / MAF) | Chronic or Human Health Dilution Allowance (% of 7Q10 Low Flow) | Acute Dilution Allowance (% of 7Q10 Low Flow) |
|---|---|---|---|---|
| 1 | < 1 MGD | ≥100:1 | 100 | 0 |
| 2 | < 1 MGD | <100:1 | 25 | 0 |

#### 9.2.3.2. Restrictions on Standard Mixing Zones

A standard mixing zone <u>may not</u> be granted for acute aquatic life numeric standards or acute WET requirements. In addition, ARM 17.30.516(2) specifically prohibits granting a standard surface water mixing zone to a new or increased discharge to a lake or wetland. Furthermore, because there is no critical flow condition for lakes or wetlands, an existing discharge to a lake or wetland typically would not receive a standard mixing zone.

The ***downstream length of mixing zone*** is the distance from the point of discharge to the point where there is no more than a 10 percent difference in bank-to-bank concentration of the pollutant or pollutant parameter of concern (i.e., the point where complete mix is demonstrated). In no case is the length of a standard mixing zone for flowing surface water permitted to extend downstream more than one-half of the mixing width distance or more than 10 times the stream width at the point of discharge at the 7Q10 low flow, whichever is more restrictive. The recommended formula for calculating the mixing width distance is given in ARM 17.30.516(4) and in **Exhibit 9-4** below.

Furthermore, the applicable numeric water quality standards must not be exceeded at the calculated downstream edge of the mixing zone. The permit writer must demonstrate in the fact sheet that each standard mixing zone granted in the permit meets these criteria. If the standard mixing zone does not meet these criteria, the permit writer must reduce the size of the mixing zone (i.e., reduce the dilution allowance) until the mixing zone is properly sized. A standard mixing zone also could be modified and its size further limited on a case-by-case basis by the site-specific considerations listed in ARM 17.30.506 (see above). For example, the Department can modify, or even deny, a dilution allowance or standard mixing zone where it determines that allowing it would impair or threaten a beneficial use.

#### 9.2.3.3. Information Requirements for a Standard Mixing Zone

When requesting a standard mixing zone, the permittee must provide the following flow values during the permit application process:

- mean annual effluent flow and
- the 7Q10 low flow of the receiving water at the point of discharge.

These flow values are used to determine whether the facility meets the minimum criteria for receiving a standard mixing zone for chronic and human health water quality standards.

In addition, permittees must provide the Department with the critical effluent flow for its discharge in order for the Department to determine the appropriate dilution ratio resulting from a standard mixing zone. Critical effluent flows are as follows:

- ***For publicly-owned treatment works (POTWs)***: design flow from Application Form 2C or effluent data; and
- ***For non-POTWs***: highest monthly average flow from Application Form 2C or effluent data.

As noted above, the permit writer must demonstrate in the fact sheet for the MPDES permit that the length of a standard mixing zone for flowing surface water does not extend downstream more than one-half of the mixing width distance (as calculated using the formula in **Exhibit 9-4**) or more than 10 times the stream width at the point of discharge at the 7Q10 low flow, whichever is more restrictive, and that the applicable numeric water quality standards are not be exceeded at the calculated downstream edge of the mixing zone.

The permittee must provide to the Department the following information needed for these demonstrations either during the permit application process or during the time the draft permit is being prepared.

- First, the permittee must provide the stream width at the point of discharge.
- Second, to determine mixing width distance using the formula given in ARM 17.30.516(4), the permittee must provide the following site-specific receiving water information measured or calculated at the 7Q10 stream flow:
  - stream width
  - stream depth
  - channel slope
  - sinuosity ratio for the channel

  Stream width and depth must be given for one stream channel transect at or immediately above the discharge point, a downstream transect that is at a distance downstream of no more than 10 times the

stream width at the discharge point, and a downstream transect that is at a distance of approximately 20 times the stream width at the discharge point. Channel slope and sinuosity ratio must be given for the stream segment between the transect at the point of discharge (or immediately upstream) and the farthest downstream transect. Because the 7Q10 low flow condition occurs on a relatively infrequent basis, the Department expects that these measurements will be made at a flow other than the 7Q10 and an appropriate hydrological model will be used to estimate the values at the 7Q10. As part of the application process, the permittee must describe the procedure used to adjust the measured data.

- Third, to determine the downstream length of a mixing zone (for comparison to 10 times the stream width at the point of discharge and to one-half the mixing width distance) and to demonstrate that numeric water quality standards are met at the downstream edge of the standard mixing zone, the permittee generally will have to use a mixing model (e.g., RIVPLUM6, CORMIX, or Visual Plumes). Using such a model will require the physical receiving water data listed above (i.e., stream width, stream depth, etc.), a characterization of the receiving water quality upstream of the point of discharge, including critical concentrations of the parameter of concern and parameters such as pH, temperature, and hardness that are used to determine the correct magnitude of the water quality standard. Data requirements for characterizing critical receiving water conditions are also discussed in **Chapter 10**.

If the information described above is not available, then a standard mixing zone cannot be granted.

**Exhibit 9-4. Formula for calculating mixing zone width from ARM 17.30.516(4)**

The recommended calculation to be used to determine the one-half mixing width distance downstream from a stream bank discharge is described below. For purposes of making this determination, the stream width as well as the discharge limitations are considered at the 7Q10 low flow.

$A_{1/2} = [0.4(W/2)^2V]/L$

Where:
$A_{1/2}$ = one-half mixing width distance;
W = width in feet at the 7Q10;
V = velocity of the stream at the 7Q10 downstream of the discharge (in ft/second);
L = lateral dispersion coefficient for the 7Q10 downstream of the discharge (in $ft^2$/second), where:

$L = CDU$

Where:
C = channel irregularity factor immediately downstream of the discharge
Where:
C = 0.1 for straight, rectangular streams;
C = 0.3 for channelized streams;
C = 0.6 for natural channels with moderate meandering;
C = 1.0 for streams with significant meandering; and
C = 1.3 for streams with sharp 90° or more bends;
D = average water depth at the 7Q10 downstream of the discharge (in feet);
U = shear velocity (in ft/sec)
Where:
$U = (32.2DS)^{1/2}$
Where:
32.2 is the acceleration due to gravity (32.2 ft/sec2);
D = average water depth at the 7Q10 downstream of the discharge (in feet); and
S = slope of the channel downstream of the discharge (feet/feet).

### 9.2.4. Alternative Mixing Zones

The mixing zone regulations at ARM 17.30.516(1)(d) allow the Department to determine that an alternative or modified mixing zone, as defined by the Department, is appropriate. For some existing discharges that have not previously been granted a mixing zone in accordance with the mixing zone regulations, the site-specific data necessary to define a standard or source specific mixing zone might not be available, and requiring the permittee

to collect this information could be costly and unnecessary. The Department has developed a conservative approach to granting an alternative mixing zone to certain permittees in accordance with ARM 17.30.516(1)(d).

#### 9.2.4.1. Criteria for Granting an Alternative Mixing Zone

An alternative mixing zone may be granted to an **existing minor POTW or other facility treating sewage** that is not subject to pretreatment requirements, that discharges to a river or stream, and that does not qualify for a nearly-instantaneous mixing zone or a standard mixing zone. An alternative mixing zone may be granted only for the following parameters:

- ammonia;
- total residual chlorine; and
- *E. coli* bacteria (only for facultative lagoons with 180 day detention).

A permit writer may grant to a qualifying facility discharging to a **river or stream** an alternative chronic or human health mixing zone for these parameters that allows up to 10 percent of the 7Q10 low flow as dilution. The permit writer may grant an alternative acute mixing zone that allows up to 1 percent of the 7Q10 low flow as dilution. In accordance with ARM 17.30.507(1)(b), the Department finds that allowing a limited acute mixing zone for these parameters will not threaten or impair existing beneficial uses. This finding is based on the understanding that these parameters are not persistent and typically exhibit first order decay in the receiving water. Limiting dilution to 1 percent of the critical receiving water flow will not result in acute lethality or block passage of migrating organisms.

For facilities that discharge to a **lake**, an alternative chronic or human health mixing zone resulting in a dilution ratio of up to 20% is allowed for these parameters.

#### 9.2.4.2. Restrictions on Alternative Mixing Zones

Facilities that discharge to a stream segment for which the 7Q10 low flow is zero do not quality for an alternative mixing zone unless information is provided to the Department demonstrating that adequate storage exists and that the discharge will only occur when the receiving water flow exceeds a specified flow.

No alternative mixing zone is allowed for acute standards for discharges to lakes. Alternative mixing zones are not allowed for discharges to wetlands.

Alternative mixing zones are subject to the provisions of ARM 17.30.506 and ARM 17.30.637(1). A request for an alternative mixing zone may be denied if site-specific information indicates these provisions will not be met.

#### 9.2.4.3. Information Requirements for an Alternative Mixing Zone

The analysis for an alternative mixing zone requires less information than the analysis for a standard or source-specific mixing zone. When requesting an alternative mixing zone, the permittee must provide the 7Q10 low flow of the receiving water at the point of discharge if the discharge is to a river or stream. If this value is not known the 7Q10 low flow may be estimated as follows for an alternative mixing zone request:

- ***Wadable streams***: measure stream flow using acceptable gauging methods during seasonal low flow (August-September) and use one-half of this value to estimate the 7Q10
- ***Non-wadable streams or rivers***: use a downstream gauging station and the basin portioning method to estimate the 7Q10 low flow.

In addition, for ammonia, total residual chlorine, and *E coli*, the permittee should submit the results of at least one upstream sample analyzed using the required analytical methods from 40 CFR Part 136 to demonstrate that the receiving water is currently meeting the numeric standards for these parameters upstream. For ammonia and *E coli*, the analyses must achieve the required reporting values (RRVs) in Circular DEQ-7 (50 µg/L and 1 per 100 mL respectively). For total residual chlorine, Circular DEQ-7 does not specify an RRV. The permittee must achieve a reporting level of 0.05 mg/L for total residual chlorine.

An alternative mixing zone is not subject to the specific length requirements of ARM 17.30.516(4); however, to fulfill the requirement in 75-5-301(4)(c) an alternative mixing zone must have definable boundaries. The

estimated maximum length and width of an alternative mixing zone for a discharge to a **river or stream** will be described in the permit as follows:

**Exhibit 9-5 Alternative mixing zone description**

| Mixing Zone Dimensions | Chronic or Human Health | Acute |
|---|---|---|
| Length (feet) | 100 | 10 |
| Width (feet) | 0.5W* | 0.1W* |

* W = estimated width of stream at seasonal low flow.

For discharges to **lakes**, estimated the maximum extent of the mixing zone will initially be described as 1% of the maximum dimension of the lake.

The MPDES permit must require the permittee to sample the receiving water to confirm that numeric water quality standards are met at the edge of the area defined by these dimensions. A special condition must be included in the permit describing the sampling protocol for this demonstration.

Finally, the permittee must provide the critical effluent flow rate in order for the permit writer to determine the dilution allowance provided by an alternative mixing zone analysis. The critical effluent flow for POTWs is the design flow from the appropriate application form or from effluent data.

### 9.2.5. Source-specific Mixing Zones

Permittees with discharges that are not able to meet water quality standards at the point of discharge and do not qualify for any other type of mixing zone (nearly-instantaneous, standard, or alternate), may request that the Department grant a source-specific mixing zone. A source-specific mixing zone is the only type of mixing zone that could be granted for:

- acute aquatic life numeric standards;
- chronic or human health aquatic life standards where there is not near-instantaneous mixing and where a standard mixing zone would exceed the maximum allowable size (see discussion above);
- an existing discharge to a lake that does not qualify for an alternative mixing zone; and
- an existing discharge to a wetland (but only where the requirements of ARM 17.30.507(2) are met).

In order for a permittee to be granted a source-specific mixing zone, it must submit to the Department during the permit application process the results of a mixing zone study conducted using a model such as RIVPLUM6, CORMIX, or Visual Plumes (VP).

These results must include information on the quantity, toxicity, and persistence of the pollutant, rate and volume of effluent flow, concentration of pollutants within the mixing zone, and the length of time the pollutants will be present (ARM 17.30.518(4)(a)-(d)).

The results of this study must demonstrate that:

- the permittee has taken all technically and economically feasible measures (including available treatment, management practices, and pollution prevention) to reduce the concentration and mass loading of the pollutant in the discharge and, thus, minimize the size of the requested mixing zone (75-5-301(4)(a) MCA and ARM 17.30.518(4)(j));
- granting the requested mixing zone will have the minimum practicable effect on and will not impair or threaten existing beneficial uses (75-5-301(4)(b) MCA, ARM 17.30.507, and ARM 17.30.518(4)(g) and (j));
- the requested mixing zone has definable boundaries (75-5-301(4)(c) MCA and ARM 17.30.518(4)(f));
- narrative water quality standards, standards for harmful substances, numeric acute and chronic standards for aquatic life, and standards based on human health are not exceeded beyond the boundaries of the requested mixing zone (ARM 17.30.507);

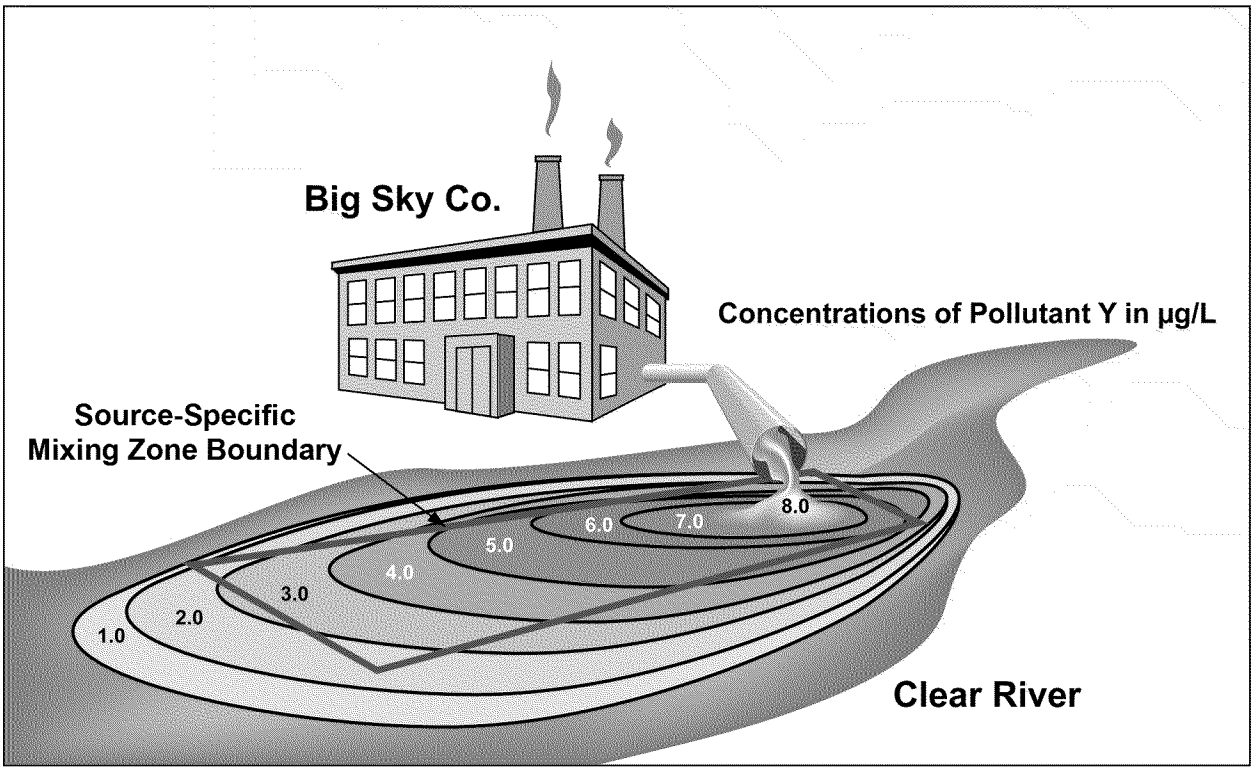
- granting the requested mixing zone will maintain the minimum level of water quality that must be maintained throughout the receiving water as required by the prohibitions in ARM 17.30.637(1); and
- the requested mixing zone meets the requirements of ARM 17.30.506.

Furthermore, with the study results, the permittee must submit to the Department:

- the dilution factor resulting from application of the source-specific mixing zone;
- a monitoring plan designed to ensure that all mixing zone requirements are met; and
- a contingency plan that the permittee will implement if pollutants migrate beyond the mixing zone at concentrations that cause numeric or narrative water quality standards to be exceeded.

**Exhibit 9-6** illustrates a discharge of Pollutant Y from a hypothetical facility called Big Sky Co., to a receiving water, called Clear River. In this example, there is not "nearly-instantaneous mixing" of the discharge with the receiving water and the conditions do not meet the criteria for receiving a standard or alternative mixing zone from the Department. Big Sky Co. has applied for and received a source-specific mixing zone.

**Exhibit 9-6. Reasonable potential determination using an incomplete mixing model**




To determine the dilution ratio provided by this mixing zone, the permittee would have to use an appropriate mixing model calibrated to actual observations from field studies or dye studies, to simulate mixing under critical conditions and determine the dilution ratio at the edge of the mixing zone. Using this approved dilution ratio, the permit writer can apply the simple mass balance equation (as discussed in **Chapter 10** below) and to determine the concentration of Pollutant Y in Clear River at the edge of the approved mixing zone or to determine the concentration of the pollutant that Big Sky Co. can discharge and still ensure that the numeric water quality standards are met at the edge of the source specific mixing zone.

## *9.3. References*

USEPA, 1991. *Technical Support Document for Water Quality-Based Toxics Control* (TSD). EPA-505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0264.pdf>.

# Chapter 10. Parameter-specific Water Quality-based Effluent Limitations (WQBELs)

Clean Water Act (CWA) section 301(b)(1)(C) requires that permits include effluent limitations that "derive from and comply with" water quality standards. Since program authorization in 1974, Montana Pollutant Discharge Elimination System (MPDES) permits historically have relied on technology-based effluent limitations (TBELs) as the primary mechanism for regulating wastewater discharges. For a number of reasons, including the lack of national effluent guidelines for many point source categories and a lack of authority in Montana for developing case-by-case effluent limitations using best professional judgment, the Department of Environmental Quality (Department) initiated a water quality-based permitting program in the late 1990s. During the same time period, the Board of Environmental Review (Board) adopted quantitative nondegradation criteria and mixing zone requirements. Implementation of these water quality-based controls and procedures became problematic without additional guidance to provide a basis for decision-making and consistency between permits.

ARM 17.30.603 (Application and Composition of Surface Water Quality Standards) states, "The standards in this subchapter are adopted to establish maximum allowable changes in surface water quality *and to establish a basis for limiting the discharge of pollutants* which affect prescribed beneficial uses of surface waters" (emphasis added). MPDES permit writers must implement a process to determine when existing effluent limits and existing effluent quality are not sufficient to comply with water quality standards and, where necessary, develop water quality-based effluent limitations (WQBELs). This chapter establishes implementation policy and procedures for developing WQBELs in MPDES permits. After developing WQBELs, the permit writer determines the final effluent limitations for the MPDES permit, includes any compliance schedules and interim effluent limitations, as appropriate, and documents all of his or her decisions and calculations. These activities are discussed further in **Chapter 12 (Final Effluent Limitations)** and **Chapter 14 (Special Conditions).**

As discussed in **Chapter 8**, the Montana Surface Water Quality Standards and Procedures are found in ARM 17.30.601-670. These regulations incorporate Circular DEQ-7—Montana Numeric Water Quality Standards by reference. Circular DEQ-7 includes numeric water quality standards for specific toxic, carcinogenic, bioconcentration, nutrient, radioactive, and harmful parameters. These numeric standards are used to calculate parameter-specific WQBELs. In addition, narrative water quality standards can be interpreted numerically for a specific parameter and used as the basis for parameter-specific WQBELs. This parameter-specific approach to implementing numeric and narrative water quality standards allows for the control of individual pollutants through MPDES permits and is the approach presented in detail in this Chapter. Narrative water quality standards also are implemented in MPDES permits using a whole effluent toxicity (WET) testing approach. A discussion of WET testing and it use in MPDES permits is included in **Chapter 11.**

The surface water quality standards establish acceptable levels of water quality. The Department employs a steady state mass-balance model to set effluent limits in MPDES permit for both conservative and non-conservative parameters for most parameters with numeric in stream standards. This simple steady-state model, which is discussed in detail in this Chapter, describes the fate and transport of pollutants based on constant values of input variables known as design conditions. The model predicts receiving water concentrations of pollutants after allowing for any available dilution granted through designation of a parameter-specific mixing zone.

The remainder of this chapter considers the process for developing parameter-specific WQBELs by further defining each of the four basic steps in the standards-to-permits outlined in **Exhibit 10-1**.

## *10.1. Identifying Applicable Water Quality Standards*

The first step in the standards-to-permits process is determining the water quality standards that apply to the receiving water for the discharge(s) being permitted. **Chapter 8** is a more general overview of water quality standards. The discussion in this section guides permit writers through the process of identifying the applicable water quality standards.

### 10.1.1. Water Use Classification

The Surface Water Quality Standards and Procedures for Montana are found in ARM.17.30, Subchapter 6. These standards are listed in Subchapter 6 by watershed and water body. Specific water bodies and their classifications are listed in ARM 17.30.607 – 616. Each section of the regulations applies a particular classification to a water body and its drainage basin. In addition, each section lists specific water bodies within that basin for which a different classification applies. As discussed in **Chapter 8**, there are 18 classifications of water bodies in the Montana water quality standards. The description of each classification, found in ARM 17.30.622-629 and 650-658, includes the applicable beneficial uses for that classification. The classifications and associated beneficial uses are summarized in **Appendix C** of this Manual.

When considering development of WQBELs, a permit writer should first determine which water body or segment of a water body is the receiving water for the discharge he or she is permitting and the classification of that water body or segment in the water quality standards. Some water bodies are broken into more than one segment with each segment classified differently.

**Example of Classification of Water Bodies by Segment**

Within the Flathead River drainage, the mainstem of Ashley Creek from Smith Lake to the bridge crossing on the airport road about a mile south of Kalispell is classified as B-2, but the mainstem of Ashley Creek from the bridge crossing to the Flathead River is classified C-2.

For most facilities, receiving water body classification information should be available in the existing permit. The permit writer should confirm that the receiving water body or segment of a water body identified in the existing permit is correct or, for a facility being permitted for the first time, he or she should accurately identify the receiving water using the permit application, maps, site visits, or other available mapping tools or geographic information systems. The permit writer can confirm the receiving water's classification using the water quality standards in ARM 17.30, Subchapter 6.

### 10.1.2. Water Quality Standards

Each water body classification has associated beneficial uses and numeric and narrative water quality standards designed to ensure that the beneficial uses are protected. A permit writer will find the numeric and narrative standards in several places in ARM 17.30, Subchapter 6. Some standards apply to only certain classifications of water bodies, some apply to all water bodies, and others apply only to specific, named water bodies. The following is a summary of these numeric standards.

#### 10.1.2.1. Numeric Standards

1. Numeric Standards in Circular DEQ-7: By reference, the description of each water use classification incorporates any appropriate numeric standards for dissolved oxygen and for concentrations of specific carcinogenic, bioconcentrating, toxic, or harmful parameters set forth in Circular DEQ-7
2. Numeric Standards in Subchapter 6: ARM 17.30.621-629 and 650-658 include specific standards for some or all of the following parameters based on water use classification: coliform organisms, pH, turbidity, temperature, and color
3. Numeric Standards for Radioactive Materials: ARM 17.30.645 includes numeric standards for radioactive materials that apply to all water bodies (except where noted in the classification descriptions)
4. Numeric Standards for Algal Biomass and Nutrients: ARM 17.30.631 contains numeric standards for algal biomass and nutrients for certain named waters
5. Numeric Standards for Electrical conductivity (EC) and Sodium Adsorption Ratio (SAR): ARM 17.30.670 contains numeric standards for EC and SAR for certain named waters

#### 10.1.2.2. Narrative Standards

1. Narrative Standards in Subchapter 6: ARM 17.30.621-629 and 650-658 include narrative standards for some or all of the following parameters based on water use classification: sediment or suspended sediment, settleable solids, oils, and floating solids.
2. Narrative Standards in Circular DEQ-7: Circular DEQ-7 includes narrative standards for general use protection and narrative standards that apply based on water use classification.
3. General Prohibitions: Subchapter 6 sets forth General Prohibitions in ARM 17.30.637(1). These General Prohibitions are listed in **Exhibit 9-1** above.

#### 10.1.2.3. Temporary Water Quality Standards

ARM 17.30.630 includes Temporary Water Quality Standards for specific water bodies for certain metals and for pH.

#### 10.1.2.4. Standards Dependent on Background Conditions (Relative Standards)

The water quality standard for some parameters is expressed in terms of an allowable change in concentration of the receiving water relative to background concentration , such as pH, turbidity, temperature, sediment, and color. Thus, the "target" concentration after any available dilution afforded by a mixing zone is the background concentration of the pollutant plus the change allowed by the water quality standards. In addition, for new and increased sources under the nondegradation policy, trigger values are used to determine if a change in water quality for carcinogens, toxics, and nutrients will cause degradation. If the discharge has a reasonable potential to exceed a trigger value, the permit must include a WQBEL based on that trigger value. In both of these situations, the incremental change is applied to the background receiving water concentration, if the site-specific data support an estimate of the background concentration. If the background concentration cannot be estimated, the background concentration used to determine the "target" concentration is zero, which provides a conservative approach. See **Section 10.3.2.4** below for additional information on determining receiving water background pollutant concentrations.

**Exhibit 10-1. Allowable downstream water quality for standards expressed as change above background or with trigger values**

If $C_s$ is quantified:

$$C_r = C_s + WQS_{REL}$$

If $C_s$ is not quantified, then assume $C_s = 0$ and calculate $C_r$.

$$C_r = WQS_{REL}$$

Where:

$C_r$ = allowable concentration in receiving water after dilution
$C_s$ = background pollutant concentration in receiving water (see **Exhibit 10-7**)
$WQS_{REL}$ = maximum change above background condition allowed by water quality standard or by a trigger value

Two examples are given below. One is based on the application of the turbidity standard and the other is based trigger values for a new source.

The allowable turbidity downstream ($C_r$) for a discharge to a receiving water with a B-1 water use classification, which has a water quality standard that allows a 5 NTU change above background, and an existing background of 13 NTUs would be is 18 NTUs. If the background concentration has not been quantified (e.g., the available data set did not meet the minimum sample size requirement), $C_s$ would set to 0 and the maximum downstream

turbidity ($C_r$) becomes 5 NTUs. The reasonable potential analysis (as presented above) and WQBEL calculations (presented below) would be developed based on not exceeding $C_r$ after allowing for any applicable mixing zone.

Trigger values are applied to $C_s$ following the same procedure. For example, a new discharge must be evaluated for nitrogen and phosphorus. The trigger value for total inorganic nitrogen is 10 µg/L. If a background concentration ($C_s$) has been quantified, then $C_r$ is the sum of $C_s$ and the trigger value. If the background is not known, the trigger value is used for $C_r$. The reasonable potential analysis and WQBEL calculations would be developed based on not exceeding $C_r$ after allowing for any applicable mixing zone.

For carcinogens, the estimate of $C_s$ becomes $C_r$ for purposes of the reasonable potential analysis and WQBEL calculations and a mixing zone is not allowed.

#### 10.1.2.5. Special Considerations for Specific Pollutants and Categories of Pollutants

For some standards found in Circular DEQ-7 the magnitude of the standard or the method of calculation for measuring a concentration for comparison with the standards is computed using a formula or is dependent upon special circumstances. Where a standard or concentration measurement is based on a formula, the permit writer must determine the appropriate value(s) of variables used in the formula in order to determine the magnitude of the standard. Pollutants for which additional calculations might be needed to establish the magnitude of the standard are discussed in more detail below:

**Metals**: The Montana aquatic life standards for metals are based on an analysis of samples following a "total recoverable" digestion procedure and are expressed as a function of hardness (mg/L as CaCO3). Because 40 CFR 122.45(c) requires that effluent limitations for metals be expressed in terms of total recoverable metal unless the applicable standard is expressed in another (e.g., dissolved) form or all approved methods only measure another form, the permit writer generally will not have to translate between different forms of metal to calculate WQBELs from the numeric standards. Circular DEQ-7 includes formulae for the acute and chronic aquatic life standards for cadmium, copper, chromium(III), lead, nickel, silver, and zinc that include hardness as a variable. Selection of an appropriate hardness value is discussed below in **Section 10.3**.

**Ammonia**: The numeric water quality standards for total ammonia nitrogen (in mg N/L) are expressed as formulae based on pH and temperature as well as the presence or absence of salmonid fish (for the 1-hour average standard) or early life stages (for the 30-day average standard). Selection of appropriate pH and temperature values is discussed in **Section 10.3**, below. Salmonid fish are expected to be present in waters classified A-1, B-1, B-2, C-1, and C-2. Early life stages are defined as all embryonic and larval stages and all juvenile forms of fish to 30 days following hatching. Permit writers can determine the presence or absence of early life stages using the table "Spawning Times of Montana Fishes," prepared by Don Skaar, Montana Fish, Wildlife and Parks, March 6, 2001, which is included in **Appendix D** of this Manual. Based on this table, which provides the known or expected spawning times for fish in Montana, early life stages of salmonid fishes could be expected at any time of the year. Early stages for non-salmonid fishes could be expected from February 1 through August 31.

Ammonia standards also include a 4-day average that is not to exceed 2.5 times the 30-day average standard. Circular DEQ-7 indicates that the standard is the average of separate evaluations reflective of fluctuations in pH and temperature within the averaging period for the standard. For MPDES permitting purposes, the ammonia standard is calculated assuming critical conditions in the receiving water for pH and temperature.

**Dioxin**: The numeric standard for chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) is expressed as an equivalent concentration of 2,3,7,8-Tetrochlorodibenzo-p-dioxin (TCDD). The equivalent concentration of 2,3,7,8-TCDD is determined on the basis of measurements of the congeners of CDDs and CDFs and the toxicity equivalency factors (TEFs) in **Exhibit 10-2** below. Each congener concentration is multiplied by its TEF and the sum of all the concentrations multiplied by their TEFs is the equivalent concentration of 2,3,7,8-TCDD. If a congener is not detected in the analysis, the permit writer assumes that the concentration of that congener is zero for purposes of calculating the 2,3,7,8-TCDD equivalent concentration.

**Exhibit 10-2. Toxic Equivalency Factors (TEFs) for Congeners of 2,3,7,8-TCDD**

| Name | TEF |
|---|---|
| 1,2,3,4,6,7,8-HpCDD | 0.01 |
| 1,2,3,4,6,7,8-HpCDF | 0.01 |
| 1,2,3,4,7,8,9-HpCDF | 0.01 |
| 1,2,3,4,7,8-HxCDD | 0.1 |
| 1,2,3,4,7,8-HxCDF | 0.1 |
| 1,2,3,6,7,8-HxCDD | 0.1 |
| 1,2,3,6,7,8-HxCDF | 0.1 |
| 1,2,3,7,8,9-HxCDF | 0.1 |
| 1,2,3,7,8,9-HxCDD | 0.1 |
| 1,2,3,7,8-PeCDD | 1 |
| 1,2,3,7,8-PeCDF | 0.05 |
| 2,3,4,6,7,8-HxCDF | 0.1 |
| 2,3,4,7,8-PeCDF | 0.5 |
| 2,3,7,8-TCDD | 1 |
| 2,3,7,8-TCDF | 0.1 |
| OCDD | 0.0001 |
| OCDF | 0.0001 |

**Pentachlorophenol**: As with the metals and ammonia, the magnitude of the pentachlorophenol standard is dependent on other water quality characteristics. Specifically, the pentachlorophenol acute and chronic aquatic life standards are expressed as formulae dependent on pH. Selection of an appropriate pH value to use in the formula is discussed in **Section 10.3** below.

**Dissolved Oxygen**: The numeric water quality standards for dissolved oxygen vary based on whether the waters are classified for growth and propagation of salmonid fishes (A-1, B-1, B-2, C-1, and C-2) or non-salmonid fishes (B-3, C-3, and I) and the presence or absence of early life stages. As noted above, early life stages are defined as all embryonic and larval stages and all juvenile forms of fish to 30 days following hatching and their presence is determined using the table "Spawning Times of Montana Fishes," prepared by Don Skaar, Montana Fish, Wildlife and Parks, March 6, 2001, which is included in **Appendix D** of this Manual and indicates that early life stages of salmonid fishes could be expected at any time of the year and early stages for non-salmonid fishes could be expected from February 1 through August 31. Numeric dissolved oxygen standards include 30-day mean values (other life stages present), 7-day mean values (early life stages present), 7-day mean minimum values (other life stages present), and 1-day minimum values (early life stages present).

**Tralcoxydim**: Circular DEQ-7 states that the sum of the concentrations of tralcoxydim and its breakdown products shall not exceed the standards listed (a human health standard of 20 µg/L).

**Nitrogen and Phosphorus**:, ARM 17.30.631 contains numeric standards for total phosphorus, total nitrogen, and benthic algal chlorophyll a that apply to the mainstem of the Clark Fork River from Warm Springs Creek to the confluence with the Blackfoot River. With the exception of trigger values for new sources under the nondegradation policy, there are no numeric or narrative standards for nutrients for the rest of the State. For permitting purposes, the Department follows the procedures outlined in **Exhibit 10-3** to address nutrients in MPDES permits.

| **Exhibit 10-3. Procedure for addressing nutrients in MPDES permits** |
|---|
| STATEWIDE—OTHER THAN THE MAINSTEM OF THE CLARK FORK RIVER |

A. **Existing Source under Nondegradation Policy**—no applicable nutrient standard

1. If the receiving water is impaired:
   - Apply 75-5-703(10), MCA (no decline in water quality), develop WLA based on Performance Based Limitations (see **Section 10.8**)
   - Include interim/final limits and compliance schedule, as necessary

2. If the receiving water is not impaired:
   - No limit is necessary—monitor only

B. **New or increased source under Nondegradation Policy**—nondegradation applies

1. <u>If the receiving water is impaired</u>:
   - TMDL pending
     - 75-5-703(10)(b), MCA applies
     - Base nutrient limits on criteria of 17.30.715(1)
   - TMDL Complete
     - *If there is reasonable potential* (see **Section 10.4**):
       Apply ARM 17.30.1311(7) consider **nutrient trading**
       All existing source must receive compliance schedule
     - *If there is no reasonable potential*
       No limit is necessary—monitor only

2. <u>If the receiving water is not impaired</u>:
   - Tier 1 waters: Analyze downstream/downgradient impacts
     - *If there is reasonable potential*
       Effluent limits based on criteria of 17.30.715(1) – see MIPPM
     - *If there is no reasonable potential*
       No limit is necessary – monitor only
   - Tier 2 waters: High Quality Water, Effluent limits based on:
     - Criteria of 17.30.715(1) – see MIPPM, or
     - Authorization to Degrade pursuant to 75-5-303, MCA
   - Tier 3 waters: Deny permit, ARM 17.30.705(2)(c)

**CLARK FORK RIVER MAINSTEM—NUTRIENT STANDARD IN ARM 17.30.631 APPLIES**

A. **Existing Source under Nondegradation Policy**

1. If a TMDL is complete--incorporate the WLA from the TMDL
2. If there is no completed TMDL
   - Apply 75-5-703(10), MCA (no decline in water quality)
   - Develop Performance Based Limitations (see **Section 10.8**)
   - Include interim/final limits and compliance schedule, as necessary

B. **New or Increased Source under Nondegradation Policy**

1. If there is reasonable potential
   - Apply ARM 17.30.1311(7)
   - Consider nutrient trading
   - All existing sources must receive a compliance schedule

2. If there is no reasonable potential

- No limit is necessary—monitor only

**MPDES e-Permit Tool**

Permit writers can use the MPDES e-Permit Tool to quickly identify the numeric and narrative standards that apply to a given water body classification. The permit writer enters the classification of the receiving water body or water body segment into the Receiving Water Data Entry Worksheet and the MPDES e-Permit Tool automatically selects the applicable numeric and narrative water quality standards for that classification. Because the magnitude of some numeric water quality standards depends on certain characteristics of the receiving water (e.g., hardness for metals standards) the permit writer must specify the applicable receiving water characteristics in the MPDES e-Permit Tool in order to determine the appropriate numeric standards.

After completing the Receiving Water Data Entry Worksheet, the permit writer should review the water quality standards regulations at ARM 17.30.631 and 670 and ARM 17.30.630 to determine if the receiving water for the discharge being permitted is subject to any site-specific or temporary standards and modify the standards selected by the Tool accordingly. The permit writer also should determine through a nondegradation review whether an activity is subject to the nonsignificance criteria in ARM 17.30.715.

### 10.1.3. Nondegradation Criteria

MPDES permits issued to new or increased sources, as defined by the Montana's Nondegradation Policy found in 75-5-303 MCA, must effluent limitations consistent with this policy.

For **Tier I waters** (as described in **Chapters 3 and 8** above), ARM 17.3.705(2)(a) requires a level of protection of existing and anticipated uses. Existing uses may or may not be achieved currently in Tier I waters, however, all anticipated uses as established by the water-use classification for the watershed found in ARM 17.30.607-613 must be protected. Therefore, effluent limits in permits issued to discharges to Tier I waters must be based on attaining and maintaining the specific numeric and narrative standards prescribed in ARM 17.30.621-629 after recognition of any applicable mixing zone. For example, a new discharge of copper to an ephemeral stream would be required to meet the numeric water quality standard after any applicable mixing zone. The permit writer might also need to consider the impact of the discharge to a down gradient receiving water if the discharge to a Tier I water has the potential to impact hydrologically connected down gradient "high quality waters." In this case the effluent limits would be on the more restrictive of those designed to protect the immediate receiving water and those designed to protect the potentially impacted down gradient receiving water.

ARM 17.30.705(2)(c) requires that, for waters designated by the Department as Outstanding Resource Waters, which are **Tier III waters**, no degradation and no permanent change in water quality resulting from a new or increased point source discharge is allowed. In practice, application of this regulation generally would prohibit any activity resulting in a new, permanent discharge of pollutants that would cause any permanent lowering of water quality in outstanding resource waters.

For **Tier II waters**, called "high quality waters," the level of protection is prescribed by the criteria of ARM 17.30.715, [Criteria for Determining Nonsignificant Changes in Water Quality] and ARM 17.30.670 [Numeric Standards for Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)]. In the absence of an

authorization to degrade issued by the Department pursuant ARM 17.30.708, an MPDES permit for a new or increased source discharging to a "high quality water" must be based on these criteria, after allowing for dilution granted through approval of a mixing zone. These criteria replace the otherwise applicable water quality standards for purposed of developing effluent limits and will protect the assimilative capacity and "high quality" status of the receiving water:

1. the activity would increase or decrease the mean monthly flow of a surface water by less than 15% or the 7-day 10 year low flow (7Q10 low flow) by less than 10%;
2. the discharge contains carcinogenic parameters or parameters with a bioconcentration factor greater than 300 (listed in Circular DEQ-7) at concentrations less than the concentrations of those parameters in the receiving water;
3. the discharge contains toxic parameters or nutrients that would not cause changes that equal or exceed the trigger values in Circular DEQ-7, however, whenever the change would exceed the trigger value, the change would not be significant if the resulting concentration outside of a mixing zone designated by the Department does not exceed 15% of the lowest applicable standard;
4. the resulting change in water quality for any harmful parameter for which water quality standards have been adopted (other than nitrogen, phosphorous, and carcinogenic, bioconcentrating, or toxic parameters) outside of a mixing zone designated by the Department is less than 10% of the applicable standard and the existing water quality level is less than 40% of the standard; and
5. the resulting change in water quality for any parameter for which there are only narrative water quality standards will not have a measureable effect on any existing or anticipated use or cause measurable changes in aquatic life or ecological integrity.
6. EC/SAR?

In addition to the parameters subject to these nonsignificance criteria (carcinogens, toxics, nutrients, harmful and narrative), nondegradation baseline loads must be established for conventional pollutants, such as BOD or TSS, or other parameters that are regulated by technology-based effluent limitations (TBELs). These TBELs typically are expressed as mass loads or, in the case limitations based on secondary treatment standards for publicly-owned treatment works (POTWs), as both concentrations and mass loads. The mass loads based on TBELs for these parameters define the baseline condition. Although these parameters are not subject to nondegradation requirements or criteria their presence in the discharge at readily quantifiable levels support the nondegradation analysis and are useful for identifying an expanding source.

#### 10.1.3.1. Nonsignificance Criteria for New Sources

Incorporation of effluent limitations based on nonsignificance criteria into an MPDES permit for a new source under the Nondegradation Policy constitutes a finding by the Department that the activities authorized in the permit are nonsignificant pursuant to 75-5-301(5)(c) MCA and do not cause degradation of state waters. As noted previously, if the permittee cannot meet the effluent limitations based on these criteria it must complete an application to degrade State waters if it wishes to proceed with the proposed activity. Where possible, effluent limits based on the nondegradation criteria in ARM 17.30.715 must be expressed in both concentration and mass load to both attain the numeric water quality standard and assimilative capacity of the immediate receiving water and to protect any downstream water that may be impacted by the discharge (see also **Section 10.5.1** below).

#### 10.1.3.2. Nonsignificance Criteria for Increased Sources (Expanding Discharges)

As discussed in **Section 3.4.2**, existing dischargers that were permitted prior to April 29, 1993, or that were permitted after that date but have the potential to cause a change in existing water quality might be subject to review under the Nondegradation Policy. Typically these activities fall into one of two categories:

***Category 1***: *the addition of a new outfall not previously identified in the permit*. The addition of a new outfall or relocating an outfall or discharge requires that the discharge be evaluated as a new source and the nondegradation criteria be applied as described in **Section 10.1.3.1.** above.

***Category 2***: *an increase in volume or nature of the discharge that has the potential to cause a change in the existing water quality in the receiving water or downstream water bodies*. This second category includes facilities that propose to increase production rate or design capacity, as described in **Section 3.4.2**, and, therefore, are

proposing to expand an existing discharge to state waters through an existing outfall. (For purposes of a nondegradation determination, a recommencing discharge is equivalent to an existing discharger.). Because the criteria of ARM 17.30.715(1) do not address incremental changes in water they can not be applied to an increased source. Proposed effluent limits in the reissued permit must be based on existing production level (for non-POTWs) or design capacity (for POTWs) or any other more stringent requirements of the existing permit. The facility must control the expanded discharge (e.g., through increased treatment) as necessary to meet these limitations. In addition, effluent limitations must also be calculated for parameters that could cause an incremental decline in water quality but for which existing limitations basd on production or design capacity have not been calculated, such as nutrients or metals. Limitations for such parameters must be based on any existing effluent limitations or the existing effluent quality and the quantity of pollutants in the discharge as described in **Section 10.8** (Performance Based Effluent Limitations) of this Manual.

If the permittee cannot meet effluent limitations for the increased source as described here and the limitations are developed based on the proposed increase in production levels or design capacity change of the discharge or changes in existing effluent quality, the activity will be deemed significant by the Department. The applicant must then submit an application for an "Authorization to Degrade." This determination of significance or nonsignificance is based on ARM 17.30.715(2) (d) and (e), which states the Department may find an activity significant based on changes in loading of parameters or changes in flow.

Add **Exhibit 10.4.**
Example POTW increasing BOD/TSS

## *10.2. Identifying Pollutants of Concern*

After identifying the most current, water quality standards that apply to the receiving water, a permit writer must identify the parameters or pollutants of concern (POC) in the receiving water. After identifying the pollutants of concern, the permit writer uses a steady-state water quality model to predict the impact of the discharge on the receiving water under design conditions (**Section 10.3**) and then determines whether WQBELs are required (**Section 10.4**) and, where needed, calculates WQBELs (**Section 10.5**). There are several ways of identifying pollutants of concern for potential WQBEL development. This section describes five categories of pollutants of concern.

**Fact Sheet II.A.2.f**

### 10.2.1. Pollutants with Applicable TBELs

One category of pollutants of concern are those pollutants for which the permit writer has developed technology-based effluent limitations (TBELs). By developing TBELs for a pollutant, the permit writer already has determined that the MPDES permit will include final limitations for that pollutant. Federal regulations, incorporated by reference in ARM 17.30.1344, also require that effluent limitations be as stringent as necessary to achieve water quality standards (40 CFR 122.44(d)(1)) and that they be derived from and comply with all applicable water quality standards (40 CFR 122.44(d)(1)(vii)(A)).

If the TBELs derived from the technology-based requirements are not as stringent as necessary to achieve water quality standards, then the permit writer must develop WQBELs for the MPDES permit. This is the case even when there are no available data suggesting that the facility currently discharges the pollutant at levels that might

cause or contribute to an excursion of water quality standards. *A permit writer may never include a TBEL in a permit if that TBEL is not stringent enough to attain water quality standards.*

Whenever there are TBELs for a particular pollutant, the simplest way to determine whether more stringent WQBELs are necessary is to calculate the appropriate WQBELs and compare them directly to the calculated TBELs. The more stringent limitations are the final effluent limitations for that pollutant in the MPDES permit, subject to any anti-backsliding requirements, and are the limitations that will ensure that both technology-based requirements and water quality standards are attained. Thus, for any pollutant for which the permit writer has developed TBELs, the permit writer can skip the process of determining the need for WQBELs described in **Section 10 4** and go directly to calculating WQBELs for that pollutant in **Section 10.5**.

### 10.2.2. Pollutants with a Wasteload Allocation from a TMDL

Pollutants of concern also include any pollutant for which a wasteload allocation (WLA) has been assigned to the discharge through a total maximum daily load (TMDL). The federal regulations at 40 CFR 122.44(d)(1)(vii)(B), incorporated by reference at ARM 17.30.1344, require that NPDES permits include effluent limitations developed consistent with the assumptions and requirements of any WLA that has been assigned to the discharge as part of a TMDL prepared by the State and approved by USEPA pursuant to the TMDL regulations. Further, 75-5-703(6)(b) MCA indicates that the Department must incorporate the WLA developed for point sources during the TMDL process into appropriate discharge permits after the TMDL has been developed and approved. Therefore, if a WLA has been allocated to a particular discharger, the permit writer must include WQBELs in that discharger's MPDES permit that are consistent with that WLA. Thus, for any such pollutants, the permit writer can skip the process of determining the need for WQBELs described in **Section 10.4** and go directly to calculating WQBELs in **Section 10.5**. *Permit writers should note, however, that the calculated WQBELs for the pollutant of concern should account for both the applicable WLAs established through a TMDL and limitations derived from numeric or narrative standards that are designed to address potential near-field effects.*

Permit writers should note that pending completion of a TMDL on a listed water body, 75-5-703(10) MCA states that a point source discharge to the listed water body may commence or continue provided that the discharge is in conformance with a permit that reflects, in the manner and to the extent applicable for that discharge, the non-degradation policy provisions of 75-5-303 MCA; that the discharge will not cause a decline in water quality for parameters by which the water body is impaired; and minimum treatment requirements adopted pursuant to 75-5-305 MCA are met.

*Placeholder for text box identifying where a permit writer goes to find the latest approved WLA/TMDL.*

### 10.2.3. Pollutants Associated with an Impairment (Prior to TMDL Development)

Permit writers must also consider any pollutant associated with an impairment of the receiving water a pollutant of concern, regardless of whether a TMDL has been developed and approved by USEPA for that pollutant, a WLA has been assigned to the permitted facility, or the permitted facility has demonstrated that the pollutant is present in its effluent. Where no effluent data for the impairing pollutant are available, an MPDES permit would include monitoring requirements to collect additional data confirming the presence or absence of the impairing pollutant in a the discharger's effluent and providing information for analyses of the need to include WQBELs for that pollutant in the next permit or through a permit modification . (See also "Reasonable Potential in the Absence of Effluent Data" under **Step 3** below and **Chapter 13 (Monitoring and Reporting Conditions**).

### 10.2.4. Pollutants Identified as Needing WQBELs in the Previous Permit

Another category of pollutants of concern is pollutants that were identified as needing WQBELs in the discharger's previous permit. Permit writers must determine whether the conditions leading to a decision to include WQBELs for the pollutant in the previous permit continue to apply. Where those conditions no longer apply, the permit writer would need to complete an anti-backsliding analysis in order to remove the WQBELs from the reissued permit. See "Nondegradation" in **Chapter 8** and see the discussion in **Chapter 12** of this Manual for additional information on anti-backsliding requirements of the CWA and NPDES regulations. In addition, the permit writer might need to conduct an antidegradation analysis if the revised limitation would allow degradation of the receiving water quality.

**MPDES e-Permit Tool**

When the permit writer is satisfied that all pollutants of concern have been identified and that there are enough data available to adequately characterize the effluent and the receiving water, he or she should enter the available flow and pollutant data for the effluent and receiving water into the Effluent Data Entry Worksheet and the Receiving Water Data Entry Worksheet of the MPDES e-Permit Tool. The MPDES e-Permit Tool sorts the data to identify whether there is near instantaneous mixing or whether the discharge meets the minimum criteria for a standard mixing zone. The Tool also projects critical effluent and receiving water conditions for each pollutant based upon the data entered by the permit writer.

### 10.2.5. Pollutants Identified as Present in the Effluent through Monitoring

Pollutants of concern also include any pollutants identified as present in the effluent through effluent monitoring. Effluent monitoring data could be reported in the discharger's MPDES permit application or Discharge Monitoring Reports or through special studies. In addition, the Department may collect data through compliance inspection monitoring or other monitoring. Permit writers would match information on which pollutants are present in the effluent to the applicable water quality standards to identify parameters that are candidates for WQBELs.

### 10.2.6. Pollutants Otherwise Expected to be Present in the Discharge

A final category of pollutants of concern is those pollutants that are not in one of the other categories but are otherwise expected to be present in the discharge. In generating a list of pollutants of concern, the permit writer should review the applicant's operations and processes to identify raw materials, treatment chemicals, additives, and products of the processes and their potential to be present in the discharge from the facility. This review could indicate several potential pollutants of concern including:

- Pollutants present in the influent to the facility;
- For a publicly-owned treatment works, pollutants expected to be present in the effluent of indirect discharges to the facility;
- Chemicals used as a raw material in the facility's process;
- Chemicals present in an end product or by-product at the facility;
- Chemicals added during treatment of wastewater;
- Pollutants resent in biosolids or other treatment residuals; or
- Pollutants known to occur in similar discharges.

Where there are no analytical data to verify the concentrations of specific pollutants in the effluent, the permit writer must either postpone an analysis of the need for WQBELs and generate or require the discharger to generate effluent monitoring data, or base the determination on other information, (as discussed below). The permit writer has two options for requiring the permit applicant to generate effluent monitoring data: 1) require

the applicant to conduct and submit the results of additional monitoring for that pollutant to supplement the MPDES application prior to permit development or 2) include monitoring requirements for the pollutant in the draft permit. Either of these approaches would be authorized under 75-5-602 MCA. If the permit writer includes the monitoring requirements in the draft permit, he or she also should include a provision in the permit specifically indicating that the Department may choose to reopen the permit if these additional data indicate that additional effluent limitations are needed to ensure that water quality standards are attained and maintained (see **Chapter 14–Special Conditions**).

## 10.3. Using Steady-State Model to Predict Water Quality

**Fact Sheet II.A.2.e & II.A.2.f**

Water quality models allow permit writers to consider the interaction between discharges and receiving water bodies. A water quality model is simply a tool that uses a limited set of data based on actual observations of effluent and receiving water conditions to simulate the impact of the discharge on the receiving water body under one or more sets of conditions, including conditions that have not actually been observed. This model may also take into account a mixing zone or dilution allowance granted by the Department consistent with the statutory and regulatory requirements of 75.5.301(4) MCA and ARM 17.30, Subchapter 5.

**Permit I.A**

**Fact Sheet II.A.2.e**

For purposes of water quality-based permitting calculations, the mixing zone provided is generally equated with a dilution allowance (i.e., a percentage of critical low flow) or a dilution ratio. For each numeric water quality standard (acute, chronic, human health) that applies to each pollutant of concern, the permit writer must use the regulations at ARM 17.30, Subchapter 5 to determine whether consideration of a dilution allowance or mixing zone is appropriate and, if it is appropriate, what should be the size of the available dilution allowance or mixing zone. **Chapter 9** of this Manual details this process.

### MPDES e-Permit Tool

The MPDES e-Permit Tool sorts and analyzes the effluent and receiving water flow data entered by the permit writer to determine whether there is near instantaneous mixing or whether the discharge meets the minimum criteria for a standard mixing zone. The Tool calculates the dilution ratio automatically derived from the applicable mixing zone. The permit writer also has the opportunity to override the dilution ratio automatically calculated from a near-instantaneous or standard by modifying the dilution ratio or by entering a dilution factor resulting from a default (minor POTWs only) or source-specific mixing zone.

A water quality model is not necessary where the permit writer has determined that the nature of the discharge or receiving water body is such that a mixing zone should not be allowed. Under these circumstances, the effluent itself must attain the applicable numeric water quality standards for the pollutant of concern at the point of discharge ("end of the pipe") and effluent limitations in the MPDES permit are derived from the applicable standards without accounting for any dilution by the receiving water and without the need for water quality modeling.

Where a mixing zone is permitted, characterizing effluent and receiving water interactions requires using a water quality model. In its *Technical Support Document for Water Quality-based Toxics Control* or TSD (USEPA, 1991), USEPA identifies two basic types of water quality models used in water quality-based permitting: dynamic and steady-state.. Steady-state means that the model projects the impact of the effluent on the receiving water under a single or "steady" set of design conditions. Because the model is run under a single set of conditions,

those conditions generally are set at "critical conditions" for protection of receiving water quality. Dynamic models are more complex and require significantly more data and resources but address the variability in the effluent and receiving water and the magnitude, duration and frequency component of the standards. The use of the steady state model can be conservative in nature due to the use of simplifying assumptions but is appropriate and is approach is protective of both near-field and far-field effects.

### 10.3.1. The Mass-Balance Equation as a Steady-State Model

For purposes of developing water quality based effluent limits for MPDES permits, the Department models all parameters as conservative pollutants using a mass-balance equation, which is a simple, steady-state model. The simple mass-balance equation is used to determine the concentration of a pollutant of concern after accounting for the dilution provided by a mixing zone. The simple mass-balance equation applied to a river or stream is as follows:

$$Q_sC_s + Q_dC_d = Q_rC_r$$

Where:

$Q_s$ = critical stream flow above point of discharge
$C_s$ = critical upstream receiving water pollutant concentration
$Q_d$ = critical effluent flow
$C_d$ = critical effluent pollutant concentration
$Q_r$ = resultant in-stream flow after discharge ($Q_r = Q_s + Q_d$)
$C_r$ = resultant in-stream pollutant concentration (after standard or default mixing zone)

This equation also can be expressed in terms of the dilution ratio at the edge of an approved mixing zone. The dilution ratio is the volume of receiving water at the edge of the mixing zone to the volume of effluent at the edge of the mixing zone. Below is the simple equation arranged to solve for the receiving water concentration of a pollutant of concern:

$$C_r = \frac{C_d + (D \times C_s)}{(1 + D)}$$

Where:

D = dilution ratio for the appropriate critical effluent flow (design for POTW or other facility treating sewage, maximum daily and maximum monthly average for non-POTWs) and appropriate mixing zone (e.g., nearly-instantaneous, standard, alternative) = $Q_s / Q_d$

Use of this equation to determine the need for WQBELs is discussed in greater detail later in this Chapter.

Below is the same equation arranged to calculate an effluent concentration were used in the following equation to calculate an effluent concentration (i.e., wasteload allocation) designed to meet a specific receiving water concentration (i.e., numeric water quality standard) under critical conditions:

$$C_d = C_r + D(C_r - C_s)$$

Arranging the equation in this manner, it can be applied to any effluent and receiving water where the applicable dilution ratio is known (e.g., near instantaneous, standard, or alternative mixing zone). Use of this equation to calculate WQBELs is discussed in greater detail later in this Chapter.

**Fact Sheet II.A.2.b & II.A.2.f**

Identifying the right critical conditions is important for appropriately applying a steady-state model to characterize the effluent and receiving water. Some key effluent and receiving water critical conditions are summarized below. Where a permit writer assembles existing data to determine critical conditions, he or she should *use data from the preceding three to five years.*

Due to the variability in effluent flow and concentration and receiving water flow and concentration, it is not possible to set effluent limits that do not exceed the water quality standards with absolute certainty. Based on EPA's recommendation in the Technical Support Document for Control of Toxics, WQBEL based on the following design criteria should not exceed acute standards in the receiving water more than 1% of the time and for chronic criteria 5% of the time. The same frequency of exceedance applies to WQBEL based on Montana's nondegradation criteria.

#### 10.3.2.1. Critical Effluent Flow

Effluent flow (designated $Q_d$ in equations and calculations used in this Manual) is a critical design condition used when modeling the impact of an effluent discharge on its receiving water.

When permitting ***publicly-owned treatment works (POTWs)*** the critical flow used in steady-state water quality modeling for MPDES permits is the *design flow* reported in Part A.6 of application Form 2A or otherwise determined from information reported by the facility (ARM 17.30.1345(2)(a)). The design flow is based on the design average flow, as defined in Department Circular DEQ-2 and is the average of the daily volumes to be received by system for a continuous 12-month period expressed as volume per unit time.

For ***non-POTWs***, the critical effluent flow is as follows:

- For calculations involving acute aquatic life criteria—the highest maximum daily flow reported in Part II.C or Part V.A of application form 2C or calculated from flow data from a minimum of the past three years (3) and a maximum of the past five (5) years of data that are representative of the discharge that will be permitted.
- For calculations involving chronic aquatic life criteria or human health criteria—the maximum 30-day average flow reported in Part V.A of application form 2C or calculated from flow data from a minimum of the past three years (3) and a maximum of the past five (5) years of data that are representative of the discharge that will be permitted

#### 10.3.2.2. Critical Stream Flow

For rivers and streams the stream flow upstream of the discharge (designated $Q_s$) is a critical condition. If a discharge is controlled so that it does not cause numeric water quality standards to be exceeded in the receiving water at the critical stream flow condition, the discharge controls should be protective and ensure that water quality standards are attained under all flow conditions that exceed this flow condition The critical flow in rivers and streams generally is some measure of the low flow of that river or stream or a percentage of the low flow based on the type and size of mixing zone (see **Chapter 9**).

In Montana's water quality standards, ARM 17.30.635(4) indicates that *the 7-day average, once in 10 years (7Q10) low flow is the critical condition for rivers and streams for most pollutants*. This requirement differs from USEPA's general recommendation to use a 1-day average, once in 10 years (1Q10) low flow as the critical flow when considering acute aquatic life standards, the 7Q10 flow as the critical flow when considering chronic aquatic life standards, and the harmonic mean flow as the critical flow when considering human health standards.

For nitrogen and phosphorus, ARM 17.30.635(4) specifies that the Department will determine a design (i.e., critical) flow. The Department generally uses the *30-day average, once in 10 years (30Q10) low flow as the critical flow for nitrogen and phosphorus*. Some or all of the critical low flow of a river or stream might be available for dilution of the effluent in water quality modeling calculations, depending on the availability and size of a dilution allowance or mixing zone. Dilution allowances and mixing zones are discussed further in **Chapter 9.**

The Department refers to *Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2002* (McCarthy, 2005) which is provided by the United States Geological Survey (USGS) and updated

periodically. The permit writer might also need to account for any additional sources of flow or diversions between the point where a critical low flow has been determined and the actual point of discharge.

In addition, USEPA supports a model called "DFLOW 3.1" (released March 2006). This model is a Windows-based tool developed to estimate user selected design stream flows for low flow analysis and water quality standards. DFLOW inputs daily stream flow records (such as those maintained by the USGS) and calculates user-specified biologically-based design flows, hydrologically-based design flows, harmonic, and percentile flows. DFLOW can simultaneously determine and compare various design flow statistics for numerous water bodies. Information on DFLOW is available from USEPA's Water Qualty Models and Tools Web site <http://epa.gov/waterscience/models/dflow/>.

Permit writers should note that there is no critical flow when the receiving water is a lake or wetland. **Chapter 9** includes a discussion of mixing zones and dilution in situations where the discharge is to a lake or wetland.

There could be specific cases where the critical receiving water flow in a river or stream is not a low flow; for example, where a discharger chooses to store wastewater and only discharge when the stream flow exceeds a predetermined stage or flow condition. A discharge based on the receiving water stage may be controlled (by design) or a result of storm water run-on to the facility, such as concentrated animal feeding operation (CAFO). In either case, the applicant must demonstrate during the permit application process that sufficient storage capacity exists to prevent a discharge when flow in the receiving water is less that the designated stage. The permit must also contain a prohibition against discharge until the receiving water reaches the specified level. The permit must also include requirements to monitor the flow in both the effluent and receiving water. A staged release is different from flow-based or 'seasonal' effluent limits. Neither flow-based nor seasonal effluent limits may be used as a basis for effluent limits in MPDES permits in the absence of an authorization to degrade.

#### 10.3.2.3. Effluent Pollutant Concentration

To determine the critical effluent concentration of a pollutant of concern (generally designated $C_d$) the permit writer must first gather effluent *data from a minimum of the past three (3) years and a maximum of the past five (5) years that are representative of the discharge* being permitted.

***Selecting a Data Set***

The permit writer should use the following criteria to select the effluent data from the past three to five years that will used to determine the critical effluent concentration of the pollutant of concern:

- The result of any analysis reported as "less than (<)" a reporting limit; "non-detect" (ND); "did not quantify" (DNQ); or "below RRV" should be excluded from the selected data set if that analysis did not achieve a reporting level equal to or less than the required reporting value (RRV) listed in Circular DEQ-7 for the pollutant of concern. The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of commercial, university, or governmental laboratories using USEPA approved methods or methods approved by the Department;
- For some pollutants, no RRV is provided in Circular DEQ-7. In such cases, the permit writer should use his or her professional judgment to determine whether a specific data point reported as "less than (<)" a reporting limit; "non-detect" (ND); "did not quantify" (DNQ) should be included or excluded from the data set. The National Environmental Methods Index (NEMI) Web site <http://www.nemi.gov/> provides reporting levels for some parameters that do not have RRVs in Circular DEQ-7.
- All data reported as quantified values should be included in the selected data set.

***Determining the Critical Effluent Pollutant Concentration from Selected Data***

USEPA recommends determining a critical effluent pollutant concentration (Cd) by using available data to approximate the maximum effluent pollutant concentration expected over time. In most cases, permit writers have a limited effluent data set and, therefore, would not have a high degree of certainty that these limited data include a good representation of the maximum potential effluent concentration of the pollutant. In addition, the regulations at 40 CFR 122.44(d)(1)(ii) require that permit writers consider how an effluent varies over time as

part of determining the need for WQBELs. To address these concerns, the Department has developed guidance for permit writers on how to characterize effluent pollutant concentrations using a limited data set and accounting for the variability of the effluent.

By studying effluent data for numerous facilities, USEPA determined that daily pollutant measurements generally follow a lognormal distribution or, where some of the data are not reported as quantified values, a delta-lognormal distribution. *Consistent with USEPA's recommendations, the Department selected the 95th percentile effluent pollutant concentration of a lognormal or delta-lognormal distribution as the critical effluent concentration ($C_d$) for MPDES permitting purposes*. The specific procedures the Department uses for calculating or estimating the 95th percentile concentration ($C_{95}$ or $C_{95(est)}$) vary depending on the number of measurements of effluent pollutant concentration available and whether all, some, or none of those measurements are reported as quantified values. The discussion below provides methods for determining $C_d$ in when:

- all measurements of effluent pollutant concentration are reported as quantified values;
- all measurements of effluent pollutant concentration are reported as non-quantified values; and
- effluent pollutant concentration measurements are reported as a mixture of quantified and non-quantified values.

<u>All Measurements Reported as Quantified Values</u>

Where <u>all of the measurements</u> in the selected effluent pollutant concentration data set are reported as <u>quantified</u> values (i.e., are quantified above a reporting limit), $C_d$ is either calculated directly from the effluent data as $C_{95}$ or estimated as $C_{95(est)}$ depending on the number of data points available in the selected data set. The equations for determining $C_{95}$ and $C_{95(est)}$ both assume a lognormal distribution of the effluent pollutant concentration data and are found below in **Exhibit 10-5**. Where $C_d$ must be estimated as $C_{95(est)}$, the Department uses USEPA's TSD method.

**Exhibit 10-5. Determining $C_d$ when all measurements are reported as quantified values**

***If the total number of measurements in the selected data set is ≥ 10***

$$C_d = C_{95} = \mathrm{EXP}(\ln(x)_{avg} + 1.645 \times S_{\ln(x)})$$

Calculate $C_{(d)}$ as:

$\ln(x)_{avg}$ = arithmetic mean of log-transformations of observed concentrations
$S_{\ln(x)}$ = standard deviation of the log-transformations of observed concentrations

***If the total number of measurements in the selected data set is < 10***

$$C_d = C_{95(est)} = C_{95\text{-}TSD} = C_{e(max)} \cdot \frac{\mathrm{EXP}[z_{0.95} \cdot (\ln(1+CV^2))^{0.5} - 0.5 \cdot \ln(1+CV^2)]}{\mathrm{EXP}[z_{(1-0.95)^{(1/n)}} \cdot (\ln(1+CV^2))^{0.5} - 0.5 \cdot \ln(1+CV^2)]}$$

Estimate $C_{(d)}$ as:

$C_{e(max)}$ = maximum measured and quantified effluent pollutant concentration
CV = coefficient of variation (assumed to be 0.6)
n = number of effluent pollutant concentration measurements in the data set
$z_x$ = the z-statistic for the *x* percentile

Measurements Reported as a Mixture of Quantified and Non-Quantified Values

In some instances, where a data set includes a mixture of quantified and non-quantified values (i.e., a mixture of values above and below the reporting level), $C_d$ can be determined using the delta-lognormal distribution described in Appendix E of USEPA's TSD (USEPA, 1991). This distribution assumes that values above the detection or reporting level are lognormally distributed. Permit writers should apply the following procedures when analyzing effluent pollutant concentration data that include a mixture of quantified and non-quantified measurements:

- If 10 or more data points are available in the selected data; two or more are values above the reporting level (i.e., quantified); and the number values above the reporting level represent more than 5 percent of the total data set, then the permit writer should use the delta-lognormal distribution to calculate $C_{95}$.
- If there are 10 or more data points available in the selected data set, but there are less than two values above the reporting level (i.e., quantified) or the number of values above the reporting level represent less than 5 percent of the total data set, the permit writer should estimate the value of $C_{95}$ (i.e., $C_{95(est)}$) as equal to the highest reporting level.
- If there are less than 10 measurements of the effluent pollutant concentration available in the selected data set, the permit writer should estimate $C_{95(est)}$ using the equation from USEPA's TSD method.

**Exhibit 10-6**, below, provides the equations that apply these procedures for calculating or estimating $C_d$ when the available effluent pollutant concentration data set includes a mixture of quantified and non-quantified measurements.

**Exhibit 10-6. Determining $C_d$ with a mixture of quantified and non-quantified measurements**

***If the total number of measurements in the selected data set is ≥ 10 and***

- ***the number of quantified measurements is ≥ 2 and***
- ***the number of quantified measurements is > 5% of the total number of measurements***

Calculate $C_d$ as: $C_d = C_{95}$ = the maximum of:

1) the highest reporting limit or
2) $EXP(\ln(x)_{avg} + z^* \times s_{\ln(x)})$

$\ln(x)_{avg}$ = arithmetic mean of log-transformations of the quantified measurements
$s_{\ln(x)}$ = standard deviation of log-transformations of the quantified measurements
$z^*$ = the z-statistic for $[0.95-\delta)/(1-\delta)]$
$\delta$ = proportion of measurements that are non-quantified

***If the total number of measurements in the selected data set is ≥ 10 and***

- ***the number of quantified measurements is < 2 or***
- ***the number of quantified measurements is ≤ 5% of the total number of measurements.***

Estimate $C_d$ as: $C_d = C_{95(est)}$ = highest reporting limit

***If the total number of measurements in the selected data set is < 10***

Estimate $C_{(d)}$ as:

$$C_{95(est)} = C_{95\text{-}TSD} = C_{e(max)} \cdot \frac{EXP[z_{0.95} \cdot (\ln(1+CV^2))^{0.5} - 0.5 \cdot \ln(1+CV^2)]}{EXP[z_{(1-0.95)^{(1/n)}} \cdot (\ln(1+CV^2))^{0.5} - 0.5 \cdot \ln(1+CV^2)]}$$

$C_{e(max)}$ = maximum measured and quantified effluent pollutant concentration
CV = coefficient of variation (assumed to be 0.6)
n = number of effluent pollutant concentration measurements in the data set
$z_x$ = the z-statistic for the *x* percentile

All Measurements Reported as Non-Quantified Values

When no measurements in the selected effluent concentration data set are reported as quantified values (e.g., all data are reported as "less than (<)" a reporting limit (e.g., < 0.3 µg/L); "non-detect" (ND); "did not quantify" (DNQ); or "below RRV"), $C_d$ is determined as shown in **Exhibit 10-7.**

**Exhibit 10-7. Determining $C_d$ when no measurement is reported as a quantified value**

***If the total number of measurements in the selected data set is ≥ 30***

Calculate $C_d$ as: $C_d = C_{95}$ = "< the highest reporting limit achieved for the data set"

***If the total number of measurements in the selected data set < 30***

Estimate $C_d$ as: $C_d = C_{95(est)}$* = "< the highest reporting limit achieved for the data set"
*Additional monitoring is required because $C_d$ is estimated from a small data set

The procedures shown in **Exhibit 10-7** are based on estimating a confidence interval around the proportion of the population underlying the data set that is below the reporting limit (Helsel, 2004).

Where there are 30 or more measurements in the selected effluent concentration data set and none of those measurements is reported as a quantified value, the permit writer has a high level of confidence that the vast majority of all of the underlying population of effluent concentrations represented by that data set would be less than the highest reporting limit from the selected data set. For example, if there are 30 or more measurements in the selected data set and none of them are quantified (i.e., they are all reported as "less than (<)" a reporting limit such as the RRV), the permit writer can know with 95 percent confidence that between 90 and 100 percent of the values in underlying population of effluent pollutant concentrations actually are below the highest reporting limit for the data set. If the confidence level required is reduced from 95 percent confidence to only 80 percent confidence, the permit writer could then say that 95 to 100 percent of the values in the underlying population are actually below the highest reporting limit for the data set. Thus, the Department believes that when the permit writer has a selected data set of 30 or more representative effluent pollutant concentration measurements available and none of those observations are reported as a quantified value, the data set is sufficient to establish, for MPDES permitting purposes, that the critical effluent pollutant concentration is somewhere below the highest reporting limit for the data set (i.e., $C_d = C_{95}$ = "< the highest reporting limit achieved for the data set").

Where there are less than 30 measurements in the selected effluent concentration data set and none of the measurements is reported as a quantified value, the permit writer does not have a high level of confidence that the majority of the underlying population is actually below the reporting level. In this situation, the permit writer can only estimate that the critical pollutant concentration as "less than (<)" the highest reporting limit for the data set. Additional data are needed for the permit writer to increase the level of confidence in an assumption that the majority of the underlying population of effluent concentration data is actually below the highest reporting limit. After additional data are collected (generally in response to a monitoring requirement in the permit) to obtain a total of at least 30 representative data points, the permit writer can apply the analysis for larger data sets. If the set

of 30 or more data points does not include a quantified measurement, then the additional data would allow the permit writer to confirm that $C_d$ is "less than (<)" the highest reporting limit for the data set. If, on the other hand, one or more of the additional data points is a quantified value, the permit writer must re-calculate the critical effluent pollutant concentration, $C_d$, using the procedures under "Measurements Reported as a Mixture of Quantified and Non-Quantified Values" above.

Permit writers should note that for pollutants with an RRV in Circular DEQ-7, the highest reporting limit for the selected effluent pollutant concentration data must always be at or below the RRV. Any analysis that did not achieve a reporting limit at or below the RRV must be excluded from the data set (see "Selecting Data" above).

#### 10.3.2.4. Receiving Water Pollutant Concentrations

Another critical condition the permit writer must determine is the receiving water (background) concentration (designated $C_s$) of each pollutant of concern. There is no specific regulatory requirement that applies to the determination of background or receiving water pollutant concentration. USEPA recommends intensive sampling of the receiving water during low flow periods (1 to 7 days) conforming to the critical hydrological (or biologically-based) design conditions described in the water quality standard (1Q10 or 7Q10) and reflecting the same return period as specified in the standard, that is, 10 years. This scenario involves intensive sampling of the receiving water during critical conditions which may only occur for a short period of time annually. Some constituents such as dissolved oxygen, pH and temperature exhibit significant diurnal variation that could exceed 10 to 20 percent of the mean daily value. Further, in Montana the critical hydrological design flow might occur in either summer or winter period. Receiving water data available to the Department or an applicant for developing permit limits typically do not meet the criteria for determining critical receiving water pollutant concentrations directly from measured data; therefore, these conditions must be estimated.

The Department has developed an algorithm, provided in **Exhibit 10-8**, for estimating background receiving water pollutant concentration using the interquartile range (IQR) of the available data. The IQR is a resistant or nonparametric estimator of $C_s$. The Department requires a minimum of 10 samples from the receiving water within the previous three (3) to five (5) year period for this estimate. A minimum of two (2) samples should be available for each calendar quarter. The IQR is defined as the 75$^{th}$ percentile value ($C_{75}$) minus the 25$^{th}$ percentile value ($C_{25}$) of the sample data (Helsel and Hirsch, 1995). The upper bound estimate of the IQR provides an estimate of $C_s$ for the purpose of determining reasonable potential and calculating assimilative capacity for wasteload allocations. The lower bound estimate of the IQR provides an estimate of $C_s$ for setting incremental changes in water quality for nondegradation purposes (determining high quality water) and certain other water quality standards as described in **Section 10.1.2.4**. In cases where long term data are available (i.e., a sample size greater than 30), a 95$^{th}$ percentile confidence interval may be substituted for the interquartile range. In this case, the upper bound of the confidence interval may be used instead of the 75$^{th}$ percentile of the interquartile range. In either case, only data that have achieved an RRV that meets the RRV values in Circular DEQ-7 should be used for this determination (see requirements for selecting a data set for effluent pollutant concentrations under **Section 10.3.1.3.** above).

| **Exhibit 10-8. Determining $C_s$** |
|---|
| ***If the total number of measurements in the selected data set is ≥ 10:*** <br><br> <u>For water quality standards expressed as an absolute value (e.g., 2 mg/L)</u>: <br><br> • If $C_{75}$ is a quantified value, set $C_s$ = upper bound of the interquartile range (i.e., 75$^{th}$ percentile of the data) or 95% confidence interval |

If $C_{75}$ is a non-quantified value
- if water quality standard < RRV, set $C_s$ = ½ WQS
- if RRV < water quality standard, set $C_s$ = ½ RRV

For water quality standards expressed as a relative value based on background concentration:

- If $C_{25}$ is a quantified value, set $C_s$ = lower bound of the interquartile range (i.e., 25th percentile of the data)
- If $C_{25}$ is a non-quantified value, set $C_s$ = 0

***If the total number of measurements in the selected data set is < 10:***

For existing dischargers, no reasonable potential analysis or WQBEL analysis can be completed; permit writer must develop special condition requiring quarterly up gradient ambient monitoring for the pollutant of concern to be included in the permit (see **Section 14.1.1**).

#### 10.3.2.5. Other Receiving Water Characteristics

Finally, in addition to critical receiving water flow (for rivers and streams), and receiving water concentration of the pollutants of concern, there are other critical receiving water characteristics that could apply. Examples of critical receiving water characteristics include conditions such as hardness, pH, temperature, and the presence or absence of certain aquatic species. As discussed above, these receiving water characteristics are important because they can affect the magnitude of certain numeric water quality standards as they apply in the receiving water. Critical conditions for these receiving water characteristics are discussed below.

***Hardness:*** Hardness is a variable in the formulae for determining many of the numeric water quality standards for metals for the protection of aquatic life. For these formulae, the critical condition for hardness is the lower bound of the IQR of hardness measurements (i.e., the 25th percentile of the data) determined using the approach outlined in **Exhibit 10-9** below.

If there are no hardness data available, the permit writer can use a default hardness of 25 mg/L or request that the applicant provide the necessary hardness data with its MPDES permit application. The permit also should require periodic hardness monitoring at the appropriate location. If the hardness value determined from the data is less than 25 mg/L as CaCO3, a default hardness of 25 mg/L must be used in the standards calculations. If the hardness is greater than 400 mg/L as CaCO3, a default hardness of 400 mg/L must be used in the standards calculations.

***pH:*** pH is a variable in the formulae for the aquatic life numeric water quality standards for ammonia and pentachlorophenol. The critical condition for ammonia is the upper-bound of the IQR of pH measurements (i.e., the 75th percentile of the data) and for pentachlorophenol it is the lower-bound of the IQR of pH measurements (i.e., the 25th percentile of the data). In the formulae for the ammonia and pentachlorophenol standards, the permit writer should use the upper- and lower-bound of the IQR (respectively) determined using the approach outlined in **Exhibit 10-9** below. If there are no pH data available, the permit writer can use a default maximum pH of 9.0 s.u. and a default minimum pH of 6.5 s.u. or request that the applicant provide the necessary pH data along with its MPDES permit application. The permit also should require periodic pH monitoring at the appropriate location.

***Temperature***: Temperature is a variable in the formulae for the aquatic life numeric water quality standards for ammonia. The critical condition for ammonia is the upper-bound of the IQR of temperature measurements (i.e., the 75th percentile of the temperature data). In the formulae for these standards, the permit writer should use the upper-bound temperature determined using the approach outlined in **Exhibit 10-9** below. If there are no temperature data available, the permit writer can use a default temperature of 30 degrees Celsius (86 degrees Fahrenheit) or request that the applicant provide the necessary temperature data along with its MPDES permit application. The permit also should require periodic temperature monitoring at the appropriate location.

Permit writers should note that determinations regarding the ratio of the effluent flow to the critical receiving water flow and the availability of a dilution allowance or mixing zone must be made before specifying these critical conditions. Dilution and mixing zone determinations are discussed in **Chapter 9**.

***Presence or Absence of Salmonid Fish and Early Life Stages***: Finally, as noted previously, the numeric water quality standards for total ammonia nitrogen (in mg N/L) are expressed as formulae based not only on pH and temperature, but also on the presence or absence of salmonid fish (for the 1-hour average standard) or early life stages (for the 30-day average standard). As noted above, salmonid fish are expected to be present in waters classified A-1, B-1, B-2, C-1, and C-2. Non-salmonid fish are expected to be present in waters classified as B-3, C-3, and I. Early life stages are defined as all embryonic and larval stages and all juvenile forms of fish to 30 days following hatching. Permit writers can determine the presence or absence of early life stages using the table "Spawning Times of Montana Fishes," prepared by Don Skaar, Montana Fish, Wildlife and Parks, March 6, 2001, which is included in **Appendix D** of this Manual. Based on this table, which provides the known or expected spawning times for fish in Montana, early life stages of salmonid fishes could be expected at any time of the year and early life stages of non-salmonid fishes could be expected from February 1 through August 31. The permit writer may narrow these date ranges based on available information or information submitted by the Discharger regarding the presence or absence of specific species in the receiving water.

**Exhibit 10-9. Determining critical receiving water hardness, pH, and temperature**

**Receiving Water Data Available**

- Where there is nearly instantaneous mixing or where a standard or default mixing zone is granted: use data for the receiving water from the point nearest the discharge where effluent and receiving water mixing is expected to be complete
- Where there is a source-specific, alternative, or modified mixing zone: use data for the receiving water from as close as possible to the point where quality standards must be attained (e.g., at the downstream edge of the mixing zone in a river or stream)
- Where there is no dilution allowance or mixing zone: use data for the receiving water from as close as possible to the point of discharge (e.g., immediately downstream of the point of discharge to a river or stream);

**No Receiving Water Data Available but Effluent Data are Available**

- Where the mean daily flow of the discharge exceeds the critical receiving water flow: require submission of receiving water data with the permit application or approximate the critical receiving water condition using effluent data
- Where the mean daily flow of the discharge does not exceed the critical receiving water flow: require submission of receiving water data with the permit application or approximate the critical receiving water condition using default critical receiving water conditions listed below

**No Receiving Water or Effluent Data Available**

- Where there are no receiving water or effluent data available: require submission of receiving water data with the permit application or approximate the critical receiving water condition using default critical receiving water conditions listed below

**Default Critical Receiving Water Conditions**

- For hardness: use a default hardness of 25 mg/L
- For pH: use a default maximum pH of 9.0 s.u. and a default minimum pH of 6.5 s.u.
- For temperature: use a default temperature of 30 degrees Celsius (86 degrees Fahrenheit)

**MPDES e-Permit Tool**

The Statistical Analysis Worksheets in the MPDES e-Permit Tool include all of the required statistical calculations for determining the effluent and receiving water critical conditions. The permit writer inputs the available effluent and receiving water data and reporting limits from the past three (3) to five (5) years to the Effluent Data Entry Worksheet and Receiving Water Data Entry Worksheet and indicates where any reported measurements are non-quantified (below the RRV or other appropriate reporting limit). The MPDES e-Permit Tool uses these data to calculate or estimate the critical conditions accordingly.

## *10.4. Conducting a Reasonable Potential Analysis*

USEPA regulations at 40 CFR 122.44(d), which are incorporated into ARM 17.30.1344 by reference, require that all effluents be assessed by the Department to determine the need for WQBELs in the permit. Specifically, 40 CFR 122.44(d)(1)(i) states, "Limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level that will *cause*, have the *reasonable potential to cause*, or *contribute* to an excursion above any state water quality standard." Often, this regulation is referred to as the "reasonable potential" regulation and the process that a permit writer uses to determine whether a WQBEL is required is called a "reasonable potential analysis." Thus, a reasonable potential analysis is used to determine whether a discharge, alone or in combination with other sources of pollutants to a water body and under some set of conditions arrived at by making a series of reasonable assumptions, could lead to an excursion above an applicable water quality standard.

When determining the need for WQBELs (determining "reasonable potential"), a permit writer should use the estimates of $C_d$, $Q_d$, $C_s$ and $Q_s$ developed in the previous section as the basis for a decision. If data are not available, the permit writer could decide to work with the discharger to generate data prior to permit issuance or as a condition of the permit. In some instances, a permit writer might be able to conduct a reasonable potential analysis without effluent and receiving water data. This section guides permit writers through the process of a reasonable potential analysis with data and addresses how a permit writer might assess reasonable potential in the absence of effluent and receiving water data.

### 10.4.1. Reasonable Potential Where Effluent Data are Non-Quantified

As discussed in **Section 10.3** above, if all observations of effluent pollutant concentration are non-quantified and there are more than 30 total observations, the permit writer is able to determine with a high degree of confidence that $C_d$ is less than the highest reporting limit achieved for the data set. In this case, there is no reasonable potential and no need to develop WQBELs.

If all observations are non-quantified and there are less than 30 total observations in the data set, the permit writer estimates the critical effluent pollutant concentration $C_{95(est)}$ as "less than the reporting level." In this situation, the permit writer must require further effluent monitoring as a condition of the MPDES permit in order to obtain 30 or more representative data points for the pollutant of concern. If all of these measurements are non-quantified, there is no reasonable potential. On the other hand, if the additional monitoring provides one or more quantified measurements, the permit writer can recalculate $\mathbf{C_d}$ using the procedures for a mixture of quantified and non-quantified data found in **Exhibit 10-4** and reassess reasonable potential. The permit writer should include a specific reopener provision in the Special Conditions section of the permit (**see Chapter 14**) that allows the Department to reassess reasonable potential when sufficient data have been collected and reopen the permit to include new WQBELs if that reassessment shows that there is reasonable potential.

### 10.4.2. Determination of Reasonable Potential based on Steady-State Model

When using a steady-state model, the permit writer determines the impact of the effluent discharge on the receiving water under critical conditions, including effluent flow and pollutant concentrations and receiving water flow (for rivers and streams) and pollutant concentrations and, depending on the particular water body and pollutant of concern, other receiving water characteristics such as temperature, pH, hardness, and presence of certain aquatic species. These critical conditions might vary depending on whether the numeric water quality standard being considered is an acute or chronic aquatic life standard or a human health standard.

#### 10.4.2.1. No Dilution Allowance or Mixing Zone

For each pollutant of concern where the Department has determined that that it will not grant a dilution allowance or mixing zone, the numeric water quality standards must be attained at the point of discharge or "end of the pipe." Therefore the critical effluent pollutant concentration(s) is compared directly to the applicable numeric water quality standards to determine whether there is reasonable potential and, thus, a need to develop WQBELs for that pollutant of concern. This situation is illustrated below in **Exhibit 10-10**.

**Exhibit 10-10. Reasonable potential analysis with no dilution allowance or mixing zone**

**INSERT ILLUSTRATION OF DISCHARGE OF POLLUTANT W FROM ANYTOWN, MONTANA POTW TO A LAKE OR STREAM WITH FLOWS AND CONCENTRATIONS LABELED WITH APPROPRIATE VARIABLES; LABEL EFFLUENT CONCENTRATION 3.7 µg/L**

With no mixing zone:

$$C_r = \frac{C_d + (D \times C_s)}{(1 + D)}$$

reduces to $C_r = C_d = 3.7$ µg/L

The projected receiving water conentration (Cr) of Pollutant W is compared directly to the applicable numeric water quality standards for Pollutant W to assess reasonable potential.

If the projected receiving water pollutant concentration, $C_r$, exceeds an applicable numeric water quality standard then there is reasonable potential and the permit writer must calculate WQBELs. If the projected receiving water pollutant concentration, $C_r$, is equal to or less than the applicable numeric water quality standard, then there is no reasonable potential and no demonstrated need to calculate WQBELs.

#### 10.4.2.2. Mixing Zone Allowed

If a mixing zone is granted, the permit writer can use the simple mass-balance equation to calculate the concentration of the pollutant of concern in the receiving water after applying the dilution ratio determined from the approved mixing zone. The simple mass balance equation can be applied in any type of mixing situation (e.g., near-instantaneous mixing zone, standard mixing zone, alternative mixing zone, source-specific mixing zone) where the dilution ratio after mixing is known or determined through modeling.

$$C_r = \frac{C_d + (D \times C_s)}{(1 + D)}$$

To use the simple mass-balance equation to predict receiving water impacts for a reasonable potential analysis, the permit writer simply inputs one value for each variable in the equation and solves the equation for $C_r$, the receiving water concentration of the pollutant of concern. The permit writer selects values that reflect ***critical conditions*** for the discharge and the receiving water. These conditions can vary depending on the particular type of numeric water quality standard (e.g., acute aquatic life, chronic aquatic life, or human health) being considered.

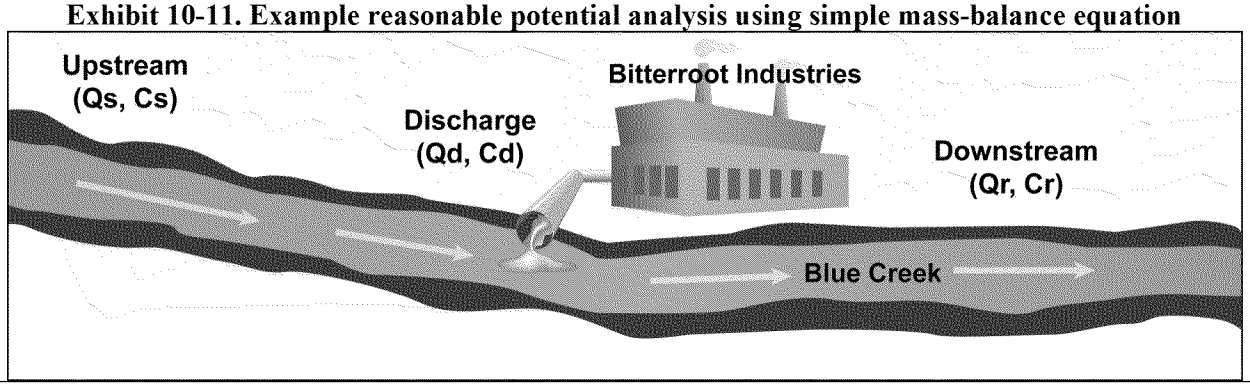
**Exhibit 10-11** is an example of applying this approach to assess reasonable potential for the discharge from Bitterroot Industries. The particular example assumes the following:

- The pollutant of concern is Pollutant X, which is treated as a conservative pollutant.
- The numeric water quality standard being considered is the chronic aquatic life standard (The permit writer would also need to consider other applicable water quality standards for Pollutant X).
- For the discharge of Pollutant X to Blue Creek, Bitterroot Industries has been granted a mixing zone giving it dilution of 1.20 cfs in Blue Creek.
- The permit writer has identified the critical conditions for each of variable in the equation.

In **Exhibit 10-11**, the simple mass-balance equation has been solved for $C_r$, the concentration of Pollutant X in Blue Creek after applying the dilution allowance provided by a mixing zone. Again, the permit writers should remember that, for purposes of developing water quality based effluent limits for MPDES permits, the Department models all parameters as conservative pollutants using this mass-balance equation.

.

**Exhibit 10-11. Example reasonable potential analysis using simple mass-balance equation**




The simple mass balance equation can be used to determine whether the discharge from Bitterroot Industries would cause, have the reasonable potential to cause, or contribute to an exceedance of the numeric water quality standard for Pollutant X, which is treated as a conservative pollutant, in Blue Creek. The effluent and receiving water interaction are such that the discharge from Bitterroot Industries is granted a mixing zone. The mixing zone gives the facility a dilution allowance of 1.20 cfs.

Simple Mass Balance Equation: $\mathbf{Q_sC_s + Q_dC_d = Q_rC_r}$

Arranging the equation to solve for Cr and expressing it in terms of the dilution ratio (D):

$$C_r = \frac{C_d + (D \times C_s)}{(1 + D)}$$

where $C_r$ is the projected receiving water concentration downstream of the discharge

The following values are known for Bitterroot Industries and Blue Creek:
$Q_s$ = critical upstream flow (based on dilution allowance from mixing zone) = 1.20 cfs
$C_s$ = critical upstream concentration of Pollutant X in Blue Creek = 0.75 µg/L

$Q_d$ = critical discharge flow from Bitterroot Industries = 0.55 cfs
$C_d$ = critical effluent concentration of Pollutant X = 2.20 µg/L
$Q_r$ = critical downstream flow after discharge from Bitterroot Industries = $Q_d + Q_s$ = 1.75 cfs

Find the downstream concentration ($C_r$) by inserting the given values into the equation as follows:

$$C_r = \frac{(2.20\,\mu g/L) + (1.20\,cfs / 0.55\,cfs)(0.75\,\mu g/L)}{1 + (1.20\,cfs/0.55\,cfs)}$$
$$= 1.2\,\mu g/L \text{ of Pollutant X}$$

The projected receiving water concentration ($C_r$) of 1.2 µg/L of Pollutant X is compared to the applicable water quality standards for Pollutant X to assess reasonable potential.

If the projected receiving water pollutant concentration, $C_r$, exceeds any applicable numeric water quality standard then there is reasonable potential and the permit writer must calculate WQBELs. If the projected receiving water pollutant concentration, $C_r$, is equal to or less than the applicable numeric water quality standard, then there is no reasonable potential and no demonstrated need to calculate WQBELs. *Permit writers should remember that when the water quality standard for the pollutant of concern is dependent on the background concentration of the pollutant in the receiving water (i.e., a "relative" standard), the projected receiving water concentration is compared to the numeric value determined using the procedure in* ***Exhibit 10-1*** *above.*

## MPDES e-Permit Tool

The MPDES e-Permit Tool can be used to determine reasonable potential for conservative pollutants or other pollutants where near-field effects are the primary concern. The Tool uses the simple mass-balance equation to determine reasonable potential for each parameter for which the permit writer enters effluent and receiving water data, including information needed to determine the applicable dilution factor. The spreadsheet also allows the permit writer to override the "default" dilution factor that is automatically determined based on the effluent and receiving water characteristics entered. The spreadsheet determines where effluent limitations or additional data are needed and provides a summary of the basis for this determination.

A permit writer must repeat the reasonable potential analysis for each applicable numeric water quality standard for the pollutant of concern, remembering that the dilution allowance or mixing zone and the critical conditions could differ depending on the numeric water quality standard. For example, where there is nearly-instantaneous mixing between an effluent and receiving water, a nearly-instantaneous mixing zone might be granted when assessing reasonable potential for a chronic aquatic life numeric water quality standard, but there might be no mixing zone granted when assessing the acute aquatic life numeric standard for the same pollutant. If calculations demonstrate that the discharge of a pollutant of concern would cause, have the reasonable potential to cause, or contribute to an excursion of any one of the applicable numeric standards for that pollutant, the permit writer must develop WQBELs for that pollutant.

In addition, it is important for permit writers to remember that they must repeat the reasonable potential analysis for each pollutant of concern and calculate WQBELs where there is reasonable potential. For each pollutant for which there is no reasonable potential, the permit writer should consider whether there are any existing WQBELs in the previous permit and whether they should be retained. The permit writer also would complete an anti-

backsliding analysis (see **Chapter 12**) to determine whether it is possible to remove any existing WQBELs from the reissued permit.

### 10.4.3. Determining Reasonable Potential With No Effluent Data

If the permit writer so chooses, or if the circumstances dictate, he or she could decide to develop and impose WQBELs without having facility-specific effluent monitoring data. As noted above, where there is a pollutant with applicable TBELs or a pollutant with a WLA from a TMDL, a permit writer must calculate WQBELs, even if there are no available effluent data for the pollutant.

Other types of information that the permit writer might find useful to support the decision to develop a WQBEL in the absence of effluent data include:

- Effluent variability information such as history of compliance problems and toxic impacts;
- Point and nonpoint source controls such as existing treatment technology, the type of industry, POTW treatment system, or best management practices in place;
- Species sensitivity data including in-stream data, adopted water quality criteria, or designated uses; or
- Dilution information such as critical receiving water flows or mixing zones.

The permit writer should provide justification for such WQBELs in the permit fact sheet or statement of basis (ARM 17.30.1371 and 17.30.1370(5)). A thorough rationale is particularly important when the decision to include WQBELs is not based on an analysis of effluent data for the pollutant of concern.

After evaluating all available information characterizing the nature of the discharge in the absence of effluent monitoring data, if the permit writer is not able to decide whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a numeric or narrative water quality standard, he or she might determine that monitoring should be required to gather effluent data. In such cases, the permit writer could require the monitoring prior to permit issuance, if sufficient time exists, or require the monitoring as a condition of the issued (or reissued) permit. The permit writer should consider including a permit condition that would allow the Department to reopen the permit and impose an effluent limitation if the required monitoring establishes that there is reasonable potential that the discharge will cause or contribute to an excursion above a numeric or narrative water quality standard.

## *10.5. Calculating Parameter-specific WQBELs*

When a permit writer has determined that a pollutant or pollutant parameter is or may be discharged at a level that will cause, have reasonable potential to cause, or contribute to an excursion above any state water quality standard, he or she must develop WQBELs for that pollutant parameter. When calculating parameter-specific WQBELs, a permit writer should use much of the same information pertaining to the effluent and receiving water that he or she used in determining the need for WQBELs. This step guides permit writers through the process of calculating WQBELs based on aquatic life and human health numeric water quality standards.

### 10.5.1. Wasteload Allocations (WLAs) for Numeric Standards

Before calculating WQBELs, a permit writer first determines the appropriate wasteload allocations (WLAs) for the point source discharge based on the applicable acute and chronic aquatic life numeric water quality standards and human health numeric water quality standards. A WLA can be determined from a TMDL or calculated for an individual point source directly or both. Where a USEPA-approved TMDL has been developed for a particular pollutant, the WLA for a specific point source discharger is the portion of the TMDL allocated to that point source. Where no TMDL is available, a water quality model generally is used to calculate an individual WLA for the specific point source discharger. This individual WLA is the loading or concentration of a pollutant that the point source can discharge while still assuring that the applicable numeric or narrative water quality standards are attained in the receiving water. Of course, this WLA calculation should take into account all applicable water quality standards regulations or implementation policies, such as Montana's dilution and mixing zone policies.

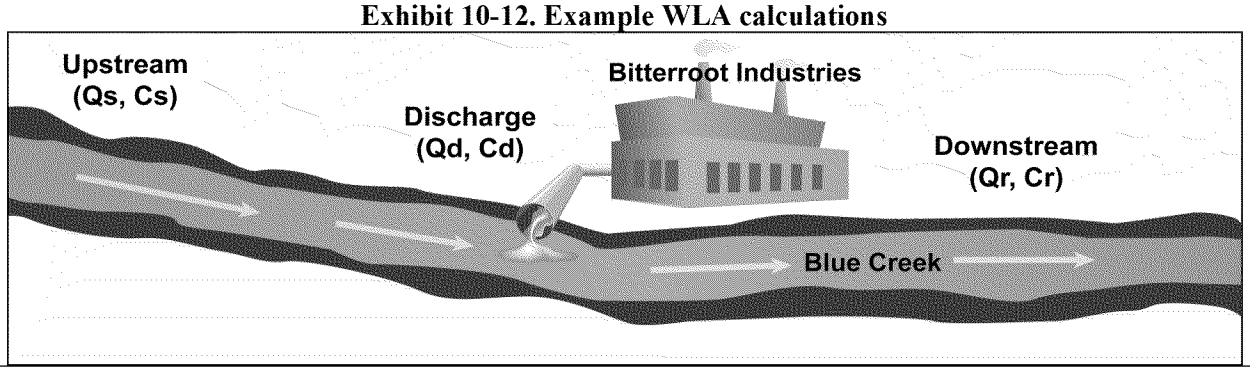
In some cases, a permit writer might need to calculate an individual WLA for the discharge even where a WLA from a TMDL is available. Specifically, where a TMDL and the associated WLAs are designed to protect a downstream water (e.g., allocating nutrient loads to the tributaries of a downstream lake to protect the water quality of the lake), the permit writer should:

- use the WLAs assigned to the discharger to calculate WQBELs that meet the requirements of the TMDL;
- calculate individual WLAs for the discharge directly from any numeric water quality standards for the pollutant of concern that apply to the receiving water at the point of discharge (e.g., numeric standards for nutrients that apply to the tributaries)
- follow the procedures below to calculate the most protective WQBELs
- compare the WQBELs to any TBELs for the pollutant of concern to determine the final calculated effluent limitations (see **Chapter 12** below).

In most instances, a permit writer should be able to use a steady-state water quality model to calculate appropriate WLAs directly from applicable numeric water quality standards. As discussed in **Section 10.3**, steady-state models generally are run using a single set of critical conditions. If a permit writer uses a steady-state model and a set of critical conditions to assess reasonable potential, he or she generally can use the same model and critical conditions to calculate WLAs for the same discharge and pollutant of concern. See **Section 10.3** above for more information on steady-state water quality models.

Where no mixing zone has been granted, there is no need for a water quality model because the WLA is set equal to the numeric water quality standard or numeric translation of the narrative standard. When a mixing zone has been granted and a dilution ratio (D) has been determined, a simple mass-balance equation is use to directly calculate the WLA. Examples of calculating WLAs using a simple mass-balance equation where a mixing zone has been allowed are presented in **Exhibit 10-12**. It is important to note that, for each pollutant of concern for which the permit writer has determined that there is reasonable potential, he or she must calculate a separate WLA for each applicable numeric standard or numeric translation of a narrative standard.

**Exhibit 10-12. Example WLA calculations**




$$Q_sC_s + Q_dC_d = Q_rC_r$$

Where:

| | | |
|---|---|---|
| $Q_s$ | = | background stream flow in mgd or cfs above point of discharge |
| $C_s$ | = | background in-stream pollutant concentration in mg/L |
| $Q_d$ | = | effluent flow in mgd or cfs |
| $C_d$ | = | effluent pollutant concentration in mg/L = **WLA** |
| $Q_r$ | = | resultant in-stream flow, after discharge in mgd or cfs |
| $C_r$ | = | resultant in-stream pollutant concentration in mg/L (after mixing) |

Determine the WLAs for Pollutant X. Rearrange the equation to determine the WLA ($C_d$) for Bitterroot Industries necessary to achieve the acute aquatic life, chronic aquatic life, and human health numeric water quality standards for Pollutant X in Blue Creek ($C_r$) downstream of the discharge:

$$WLA = C_d = \frac{Q_r C_r - Q_s C_s}{Q_d}$$

This equation can be expressed in terms of the dilution ratio $D = Q_s / Q_d$

$$WLA = C_d = C_r + D(C_r - C_s)$$

The following are known for Bitterroot Industries and Blue Creek:

*No dilution allowance or mixing zone granted for acute aquatic life numeric standard*
$Q_{s(acute)}$ = No dilution allowance = 0.00 cfs

*Nearly-instantaneous mixing zone equal to 7Q10 low flow for chronic aquatic life and human health standards*
$Q_{s(chronic,\ human\ health)}$ = 7Q10 low flow = 1.20 cfs
$C_s$ = Upstream concentration of Pollutant X in Blue Creek = 0.75 µg/L
$Q_d$ = Discharge flow = 0.55 cfs
D = Qs/Qd
$Q_r$ = Downstream flow = $Q_s + Q_d$
$C_r$ = Acute Aquatic Life Standard for Pollutant X in Blue Creek = 3.5 µg/L
= Chronic Aquatic Life Standard for Pollutant X in Blue Creek = 1.0 µg/L
= Human Health Standard for Pollutant X in Blue Creek = 30 µg/L

Determine WLAs for Bitterroot Industries by inserting the given values into the simple mass-balance equation as follows:

$$WLA_{acute} \text{ for Bitterroot Industries} = C_d = (3.5\ \mu g/L) - [(0.00\,cfs)/(0.55cfs)](3.5\mu g/L - 0.75\ \mu g/L)$$
$$= 3.5\ \mu g/L \text{ of Pollutant X}$$

$$WLA_{chronic} \text{ for Bitterroot Industries} = C_d = (1.0\ \mu g/L) - [(1.20\,cfs)/(0.55cfs)](1.0\mu g/L - 0.75\ \mu g/L)$$
$$= 1.5\ \mu g/L \text{ of Pollutant X}$$

$$WLA_{human\ health} \text{ for Bitterroot Industries} = C_d = (30\ \mu g/L) - [(1.20\,cfs)/(0.55cfs)](30\mu g/L - 0.75\ \mu g/L)$$
$$= 94\ \mu g/L \text{ of Pollutant X}$$

### 10.5.2. WLAs Where Background Concentration Affects Application of Standards

Permit writers should also be aware that, in certain situations, the background concentration of the receiving water and implementation of the nondegradation policy have an impact on the calculation of the appropriate WLAs. The procedures in **Exhibit 10-13** below are used to determine the allowable ambient pollutant concentration used to calculate the WLA in these situations.

**Exhibit 10-13. Allowable ambient concentration used to calculate WLAs for high quality waters**

| In-stream Condition | Receiving Water Status | New Sources Subject to Nondegradation Criteria | Sources not Subject to Nondegradation Criteria |
|---|---|---|---|
| $C_s < C_{r\text{-}ND} < C_{r\text{-}STD}$ | High Quality - with assimilative capacity | Allow dilution available<br>Set $C_r = C_{r\text{-}ND}$<br>Calculate $C_d$ | $C_{r\text{-}ND}$ does not apply<br>Allow Dilution |

| | | | |
|---|---|---|---|
| | | | Set $C_r = C_{r\text{-}STD}$<br>Calculate $C_d$ |
| $C_{r\text{-}ND} < C_s < C_{r\text{-}STD}$ | High Quality - no assimilative capacity | No dilution is available<br>Set $C_d = C_s$<br>No increase above background | |
| $C_{r\text{-}ND} < C_{r\text{-}STD} < C_s$ | Not High Quality - no assimilative capacity | No assimilation capacity; 17.30.1311(7) applies<br>No dilution is available<br>Set $C_d = C_{r\text{-}STD}$ | No dilution is available<br>Interim(1) $C_d = C_{d\text{-}PER}$<br>Final(2) $C_d = C_{r\text{-}STD}$ |

**Where**:

$C_s$ = critical upstream receiving water pollutant concentration (see **Exhibit 10-7**)
$C_d$ = maximum allowable pollutant concentration = wasteload allocation (WLA)
$C_{r\text{-}ND}$ = allowable in-stream concentration based on applicable nondegradation criterion (see **Exhibit 10-1**)
$C_{r\text{-}STD}$ = allowable in-stream concentration based on applicable water quality standard (see **Exhibit 10-1**)
$C_{d\text{-}PER}$ = maximum allowable pollutant concentration based on current performance, no increase

*Notes*:

(1) Interim limit for 5-year period or duration of permit.
(2) Final limit and compliance schedule to be incorporate into next permit unless TMDL/WLA approved, use reclassification, or, site specific standard approved by BER.

## 10.5.3. Appropriate Expression of Effluent Limitations

After calculating WLAs for each water quality standard that applies to each pollutant of concern, the permit writer begins the process of calculating effluent limitations from the WLAs. The appropriate expression for effluent limitations depends on the type of discharge and, in some cases, on the type of pollutant limited.

### 10.5.3.1. Expression of Effluent Limitations for Continuous Discharges

The MPDES regulations at ARM 17.30.1345(6) contain requirements for expression of effluent limitations for continuous discharges, which ARM 17.30.1304(12) defines as a discharge that occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities. For continuous discharges, all effluent limitations, including those necessary to achieve water quality standards, must, unless impracticable, be stated as both average monthly limitations (AMLs) and maximum daily limitations (MDLs) for all discharges other than POTWs and as both AMLs and average weekly limitations (AWLs) for POTWs. The MDL is the highest allowable daily discharge measured during a calendar day or 24-hour period representing a calendar day. The AWL is the highest allowable value for the average of daily discharges obtained over a calendar week. The AML is the highest allowable value for the average of daily discharges obtained over a calendar month. For pollutants with limitations expressed in units of mass, the daily discharge is the total mass discharged over the day. For limitations expressed in other units, the daily discharge is the average measurement of the pollutant over the day.

In its TSD (USEPA, 1991), USEPA explains why establishing an AWL rather than an MDL for discharges of toxic pollutants from POTWs is impracticable. First, the basis for the AWL for POTWs is the secondary treatment requirements and is not related to the need for assuring attainment of water quality standards. Second, the measurements used to establish compliance with an AWL, which could be the average of up to seven daily discharges, could average out peak toxic concentrations and, therefore, miss the discharge's potential for causing

acute toxic effects. Measuring compliance with an MDL would be more likely to identify potential acutely toxic impacts. This exception to ARM 17.30.1345 could also apply to other pollutants (i.e., those not classified as toxic pollutants) for which acute or short-term effects are a concern.

Furthermore, as discussed in **Chapter 8,** ARM 17.30.1345(8)(a) requires that all pollutants limited in permits must have limitations, standards, or prohibitions expressed in terms of mass, except under the following conditions:

- When limitations are for pH, temperature, radiation, or other pollutants that cannot appropriately be expressed by mass limitations;
- When applicable standards or limitations are expressed in terms of other units of measure; or
- If in establishing technology-based limitations on a case-by-case basis, limitations based on mass are infeasible because the mass or pollutant cannot be related to a measure of production. The limitations, however, must ensure that dilution will not be used as a substitute for treatment.

Most numeric water quality standards are expressed in terms of concentration; therefore, the second condition listed above usually applies when calculating WQBELs. Where WLAs are determined for one specific point source, as shown in **Exhibit 10-12** above, the WLAs generally are expressed in terms of concentration and, therefore, WQBELs calculated from these WLAs should be expressed in terms of concentration. An obvious exception is the case where a WLA for a particular discharge comes from a mass-based TMDL and the WLA assigned to the permitted discharge is expressed in terms of mass. In this case, WQBELs developed to implement the WLA in a permit also should be expressed in terms of mass. If there are WLAs expressed in terms of both concentration (e.g., WLAs calculated directly from concentration-based standards) and mass (e.g., WLAs from a TMDL) it might be necessary to calculate each WLA in more than one form to allow comparison of the resulting effluent limitations.

#### 10.5.3.2. Expression of Effluent Limitations for Non-Continuous Discharges

ARM 17.30.1345(7) regulates the expression of effluent limitations for discharges that are not continuous. The regulation states that these discharges must be particularly described and limited, considering the following factors, as appropriate:

- frequency (for example, a batch discharge must not occur more than once every three weeks);
- total mass (for example, not to exceed 100 kilograms of zinc and 200 kilograms of chromium per batch discharge);
- maximum rate of discharge of pollutants during the discharge (for example, not to exceed 2 kilograms of zinc per minute); and
- prohibition or limitation of specified pollutants by mass, concentration, or other appropriate measure (for example, must not contain at any time more than 0.1 mg/L zinc or more than 250 grams of zinc in any discharge.

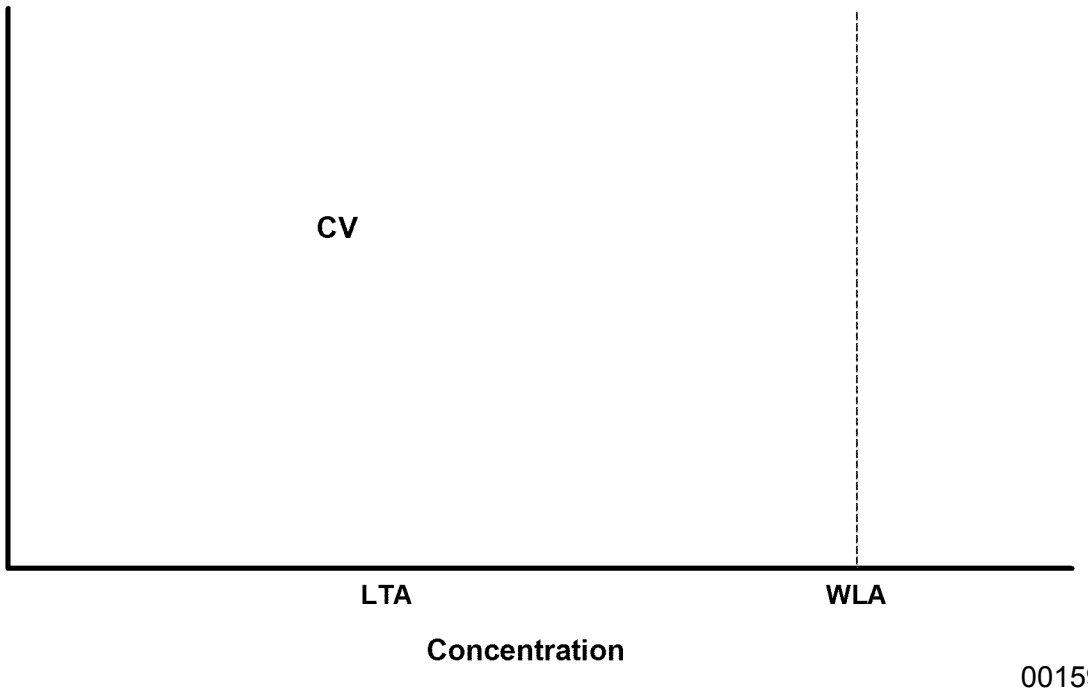
Because the appropriate expression of effluent limitations for a non-continuous discharge depends on the nature of the specific pollutant and discharge, the examples in this Manual do not address non-continuous discharges.

#### 10.5.3.3. Special Considerations for Effluent Limitations for Metals

In accordance with ARM 17.30.1345(5), and consistent with 40 CFR 122.45(c), all effluent limitations for metals must be expressed as total recoverable metal. In some states, numeric water quality standards for metals are expressed in terms of dissolved metals, necessitating development of a translator to express the relationship between total recoverable metal in the effluent and dissolved metal in the receiving water. Because surface water standards for metals in Circular DEQ-7 are expressed in terms of total recoverable metal, no translation between the water quality standards and the effluent limitations is required in MPDES permits.

### 10.5.4. Calculating the AML and MDL

For most pollutants, the acute aquatic life numeric water quality standard is expressed as a 1-hour average concentration and the chronic aquatic life standard is expressed as a 4-day average concentration (with a notable exception being the 30-day average ammonia chronic standard). Human health standards generally are based on a


CV
LTA
WLA
Concentration

#### 10.5.4.1. Calculating LTAs from Acute and Chronic WLAs

In the majority of cases, permit writer will be provided with or will calculate at least two aquatic life WLAs, namely a WLA based on the acute aquatic life standard ($WLA_{acute}$) and at least one WLA based on the chronic aquatic life standard ($WLA_{chronic}$ or $WLA_{30\text{-day chronic}}$). For each of these WLAs, the permit writer determines the corresponding LTA by multiplying the WLA by a factor (WLA multiplier). This multiplier is a statistically-based factor derived from the ratio of the WLA, set at a specific percentile value, to the LTA. The value of the multiplier varies depending on the coefficient of variation (CV) of the data set, the percentile value for the WLA (e.g., 99th percentile, 95th percentile), and whether the WLA is based on an acute (1-hour average) or chronic (typically, 4-day average), or 30-day chronic (for ammonia) water quality standard. The Department's procedure sets the WLA at the 99th percentile on the lognormal distribution. **Exhibit 10-15** provides equations for determining the WLA multipliers ($\text{WLA multiplier}_{acute99}$, $\text{WLA multiplier}_{chronic99}$, $\text{WLA multiplier}_{30\text{-day chronic}99}$ = $e\text{^}(0.5\sigma_{30}^2 - z\sigma_{30})$ and the corresponding LTAs.

**Exhibit 10-15. Determining LTAs from aquatic life WLAs**

$\text{WLA multiplier}_{acute99} = e\text{^}(0.5\sigma^2 - z\sigma)$
$\text{WLA multiplier}_{chronic99} = e\text{^}(0.5\sigma_4^2 - z\sigma_4)$
$\text{WLA multiplier}_{30\text{-day chronic}99} = e\text{^}(0.5\sigma_{30}^2 - z\sigma_{30})$

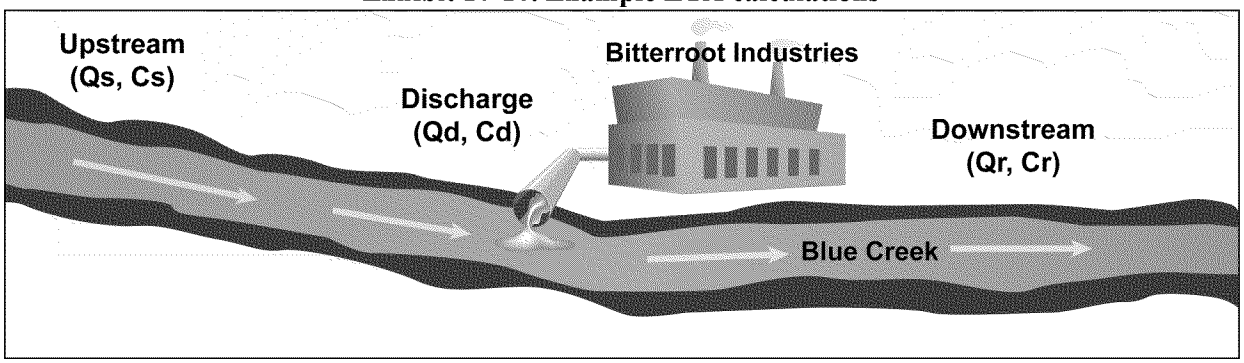
Where

$\sigma$ = standard deviation
$\sigma = [ln(CV^2 + 1)]^{0.5}$
$\sigma^2 = ln(CV^2 + 1)$
$\sigma_4 = [ln(CV^2/4 + 1)]^{0.5}$
$\sigma_4^2 = ln(CV^2/4 + 1)$
$\sigma_{30} = [ln(CV^2/30 + 1)]^{0.5}$
$\sigma_{30}^2 = ln(CV^2/30 + 1)$
z = 2.326 for 99th percentile probability basis

$LTA_{acute} = WLA_{acute} * \text{WLA multiplier}_{acute99}$
$LTA_{chronic} = WLA_{chronic} * \text{WLA multiplier}_{chronic99}$
$LTA_{30\text{-day chronic}} = WLA_{30\text{-day chronic}} * \text{WLA multiplier}_{30\text{-day chronic}99}$

Note that the permit writer must determine the CV for the data set before the WLA multipliers can be determined. The CV used in these equations is the same CV that was used in the reasonable potential analysis in **Step 3**, namely a CV calculated from the available effluent data or a default CV of 0.6. The default CV is used where there are less than 10 data points available for the effluent pollutant concentration. **Exhibit 10-16** demonstrates calculation of the two aquatic life LTAs from the WLAs determined in **Exhibit 10-12** above.

**Exhibit 10-16. Example LTA calculations**



**Calculated WLAs for Bitterroot Industries from Exhibit 10-12:**

- $WLA_{acute}$ for Bitterroot Industries = 3.5 $\mu$g/L of Pollutant X
- $WLA_{chronic}$ for Bitterroot Industries = 1.5 $\mu$g/L of Pollutant X
- $WLA_{human\ health}$ for Bitterroot Industries = 94 $\mu$g/L of Pollutant X

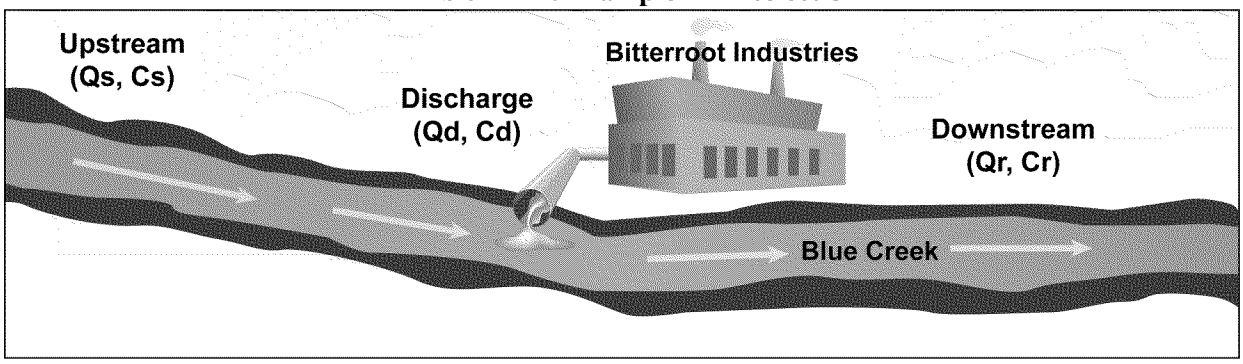
**Set WLAs at the 99th percentile and calculate corresponding LTAs (assuming CV=0.6):**

- $LTA_{acute} = WLA_{acute} \times e^{\wedge}(0.5\sigma^2 - z\sigma) = 3.5\ \mu g/L \times 0.321 = 1.1\ \mu g/L$
- $LTA_{chronic} = WLA_{chronic} \times e^{\wedge}(0.5\sigma_4{}^2 - z\sigma_4) = 1.5\ \mu g/L \times 0.527 = 0.79\ \mu g/L$

### 10.5.4.2. Selecting the Most Protective LTA

Because the calculated LTAs do not have different averaging periods, the permit writer can directly compare them with one another and select the most protective aquatic life LTA (i.e., the one that ensures that both of the aquatic life WLAs are met). This WLA will be the basis for calculating effluent limitations that protect aquatic life from both acute and chronic effects. **Exhibit 10-17** illustrates this step in the process.

**Exhibit 10-17. Example LTA selection**




**Calculated LTAs for Bitterroot Industries from Exhibit 10-16:**

$LTA_{acute}$ = 1.1 $\mu$g/L
$LTA_{chronic}$ = 0.79 $\mu$g/L

**Most protective aquatic life LTA is $LTA_{chronic}$ = 0.79 µg/L**

### 10.5.4.3. Calculating the Aquatic Life AML and MDL

Permit writers calculate effluent limitations for protection of aquatic life by multiplying the most protective aquatic life LTA by multipliers, which are based on the lognormal distribution. Each multiplier is a statistically-based factor reflects the relationship between the LTA and the effluent limitations. The value of the multiplier for each effluent limitation varies depending on:

- the **probability basis** of the effluent limitation (i.e., the percentile value on the lognormal distribution of effluent pollutant concentrations where the limitation will be set, such as 95th percentile or 99th percentile);
- the **CV** of the data set; and
- the **number of samples** (for the AML) that will be averaged in order to measure compliance with the effluent limitation.

For MPDES permits, the Department specifies that the AML and MDL multipliers be based on the following:

- setting the AML at a 95th percentile occurrence probability and the MDL at a 99th percentile occurrence probability; these probability bases are consistent with USEPA's recommendations in the TSD and consistent with the probability bases USEPA uses to derive technology-based requirements in the effluent guidelines;
- the CV used in the reasonable potential determination (i.e., a calculated CV if there are at least 10 data points available or a default CV of 0.6 if a CV cannot be calculated); and
- the actual monthly sampling frequency that will be required in the permit, unless the planned sampling frequency is one time per month or less; if the sampling frequency that will be specified in the permit is one time per month or less, permit writers should use an assumed number of sample of four per month for purposes of calculating the AML.

**Exhibit 10-18** provides the formulae for calculating the AML and the MDL from the most protective aquatic life LTA.

**Exhibit 10-18. Determining the AML and MDL from the most protective aquatic life LTA**

$$AML_{aquatic\ life} = LTA \times AML_{multiplier95}$$
$$MDL_{aquatic\ life} = LTA \times MDL_{multiplier99}$$

$$AML\ multiplier_{95} = e^{\wedge}(z\sigma_n - 0.5\sigma_n^2)$$

Where:
$\sigma_n = [ln(CV^2/n + 1)]^{0.5}$
$\sigma_n^2 = ln(CV^2/n + 1)$
z = 1.645 for 95th percentile probability basis
n = number of samples per month that will be required in the permit

$$MDL\ multiplier_{99} = e^{\wedge}(z\sigma - 0.5\sigma^2)$$

Where:
$\sigma_n = [ln(CV^2 + 1)]^{0.5}$
$\sigma_n^2 = ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis

Note that in the event that an aquatic life water quality standard is expressed as a single numeric value that defines a single acceptable level of effluent quality (e.g., the concentration of Pollutant Z must not exceed 4 µg/L), there will be only a single corresponding WLA. If such a case arises, the Department, consistent with USEPA's recommendations in the TSD, uses the following procedure:

- Consider the single WLA to be $WLA_{chronic}$;
- Using the CV determined in the reasonable potential analysis, calculate an LTA that will allow the effluent to meet $WLA_{chronic}$ using the equations for the chronic WLA in **Exhibit 10-15** above; and
- Derive an AML and MDL based on the LTA and CV using the equations in **Exhibit 10-18** above.

#### 10.5.4.4. Calculating the Human Health AML and MDL

The exposure period of concern for human health water quality standards can be up to 70 years and the average exposure rather than the maximum exposure is usually of concern. Because compliance with effluent limitations is normally determined on a daily or monthly basis, it is necessary to set human health effluent limitations that meet a given WLA for every month. The Department uses the following approach, recommended by USEPA in the TSD, to establish the effluent limitations for protection of human health:

- Set the AML equal to the $WLA_{human\ health}$ (determined in **Step 4.1**)

- Calculate the MDL for human health by multiplying the AML by the ratio MDL:AML ratio derived from the lognormal distribution and the relationships between the LTA, MDL, and AML. **Exhibit 10-19** provides the equation for this ratio based on the CV and the number of samples.

**Exhibit 10-19. Determining the AML and MDL from $WLA_{human\ health}$**

Set AML = $WLA_{human\ health}$

MDL = AML x MDL:AML multiplier

$$\text{MDEL : AMEL multiplier} = \frac{\exp[z_m\sigma - 0.5\sigma^2]}{\exp[z_a\sigma - 0.5\sigma_n^2]}$$

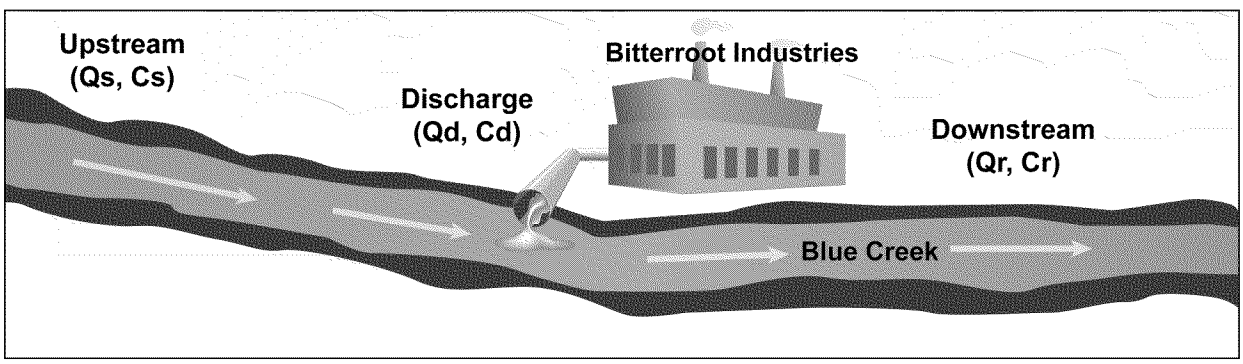
Where:
$\sigma_n^2 = [ln(CV^2/n + 1)]$
$\sigma^2 = ln(CV^2+1)$
CV = the coefficient of variation
n = number of samples per month that will be required in the permit
$z_m$ = 2.326 (i.e., value of z for the 99th percentile probability basis)
$z_a$ = 1.645 (i.e., value of z for the 95th percentile probability basis)

### 10.5.5. Selecting the Most Protective MDL and AML

If a pollutant of concern has both aquatic life and human health numeric water quality standards, the permit writer should calculate the AML and MDL from the aquatic life standards and the AML and MDL from the human health standards and compare them. The most protective AML and the most protective MDL are the WQBELs for that pollutant of concern.

**Exhibit 10-20** illustrates calculation of an AML and MDL from the most protective aquatic life LTA and from the human health WLA.

**Exhibit 10-20. Example AML and MDL calculations**




**Most protective aquatic life LTA from Exhibit 10-17:**

LTA = 0.79 µg/L
Set AML at 95th percentile
Set MDL at 99th percentile
Assume sampling frequency of 4 times per month

Assume CV = 0.6

$AML_{aquatic\ life}$ = LTA x AMLmultiplier95 = LTA x e^(zσn – 0.5σn2) = 0.79 µg/L x 1.55 = 1.2 µg/L

$MDL_{aquatic\ life}$ = LTA x MDLmultiplier99 = LTA x e^(zσ – 0.5σ2) = 0.79 µg/L x 3.11 = 2.4 µg/L

**Human health effluent limitations**

Set $AML_{human\ health}$ = $WLA_{human\ health}$ = 94 µg/L (from **Exhibit 10-12**)

$$MDL_{human\ health} = AML_{human\ health} \times \frac{\exp[z_m\sigma - 0.5\sigma^2]}{\exp[z_a\sigma - 0.5\sigma_n^2]} = 94\ \mu g/L \times 2.01 = 190\ \mu g/L$$

The aquatic life effluent limitations are more protective; therefore, the water quality-based effluent limitations for Pollutant X for Bitterroot Industries are as follows:

AML = 1.2 µg/L
MDL = 2.4 µg/L

These procedures are based on the guidance in Chapter 5 of USEPA's TSD. The objective of these procedures is to establish limitations that result in the effluent meeting all WLAs under normal operating conditions and receiving water conditions virtually all the time. It is not possible to guarantee, through permit limitations, that a WLA will never be exceeded. It is possible, however, using the recommended WQBEL calculation procedures, to account for extreme values and establish low probabilities of exceeding a WLA in conformance with the duration and frequency requirements of the water quality standards.

## *10.6. WQBELs Based on Specific Water Quality Standards*

The specific water quality standards of ARM 17.30.621 through 629 contain both numeric and narrative standards for certain conventional pollutants. Unlike the parameters given in Department DEQ-7, the numeric standards may change depending on the water use classification.

### *10.6.1.* Escherichia coli (E. coli)

*E. coli* is an indicator organism that is used to identify the presence of fecal pollution in ambient water and wastewater. Discharge of sewage or industrial waste that contains human or animal wastes must be evaluated for the presence of *E coli*. For most POTW's a RPA analysis is not necessary to the assumption that human waste is present and a limit must be included in the permit. Due to the short exposure period required to illicit an adverse to human health and the general prohibition that state waters be free from substance that are harmful to human health effluent limits POTW that discharge on a continuous basis must meet the applicable water quality standards at the end of the pipe.

For industrial waste and other discharges that contain human or animal waste, a RPA should be preformed based on the procedures described in this chapter with no allowance for a mixing zone. For new discharges subject to the nondegradation criteria, *E coli* is classified as a harmful parameter and the any increase is limited to 10 percent of the standard. Nondegradation criteria apply outside of a mixing zone but may result in an effluent limits which is more stringent than application of the standard at the end of pipe.

### 10.6.2. Dissolved Oxygen (DO)

The water quality standards for dissolved oxygen are given on Footnote 15 of Department Circular DEQ-7 and depend on water use classification. These standards are expressed in terms of both daily and 7-day (instantaneous) minima and 7-day and monthly mean concentrations. Discharges of sewage and industrial wastes

may have acceptable levels of dissolved oxygen at the point of discharge but due to the presence of oxygen consuming material may cause depletion of oxygen in the receiving water at significant distance downstream and outside of any near field mixing zone. Oxygen consuming material in effluents is measured biochemical oxygen demand ($BOD_5$), carbonaceous biochemical oxygen demand (CBOD) and chemical oxygen demand (COD) depending on the nature of the effluent (See Chapter 13).

The department has adopted a policy that all existing POTWs shall meet the national secondary treatment standards for $BOD_5$ as described in Chapter 5 in the absence of information that DO standards are not maintained. This information would include measured DO violations, evidence of fish kills or nonsupport of designated use such as an impairment listing under section 303(d) listing. The $BOD_5$ limits may not be relaxed to 'treatment equivalent to secondary treatment' unless the permittee has demonstrated through site-specific sampling and modeling that the discharge will not result in the DO levels below the minimum level prescribed in the latest version of DEQ-7. $BOD_5$ limits should be expressed as loads (pound per day) to control total mass of oxygen depleting material.

Discharges of industrial waste may contain significant amounts of oxygen consuming material (BOD, COD, or, TOC). Technology based effluent limits based on units of production and minimum treatment requirement (BCT, BAT or BPT) may not be adequate to protect dissolved oxygen concentrations downstream of the discharge. Existing non-POTW dischargers with TBEL for BOD/COD/TOC that exceed 35 mg/L $BOD_5$ or equivalent concentration of total oxygen demand (TOD) must be evaluated for compliance with the applicable DO standards for the receiving water body. Typically this evaluation includes modeling the existing discharge and must account for other sources in the watershed.

Under Montana nondegradation criteria, dissolved oxygen is listed as a toxic parameter. Any change in water quality that exceeds the trigger value (50 µg/L) or 15 percent of the standard are significant. All new sources including POTWs and non-POTWs that have measurable BOD or COD must be evaluated for conformance with the nondegradation criterion. New dischargers are encouraged to submit studies plans for department review and consideration at least 12 months prior to submittal pf permit applications.

Special Considerations for Critical Design Conditions for DO Studies: ***UNDER DEVELOPMENT***

The Streeter-Phelps model predicts oxygen deficit in a river resulting from the discharge of a oxygen-demanding pollutants. It can be used to determine the allowable discharge concentration of biochemical oxygen demand (BOD). The Streeter-Phelps equation is presented in **Exhibit 10-20** below.

**Exhibit 10-20. Steeter-Phelps equation**

$Dt = DO_{sat} - DO_t = [K_2BOD_u \div (K_1 - K_2)](10^{-K}2^t - 10^{-K}1^t) + D_o(10^{-K}1^t)$ where:

$D_t$ = dissolved oxygen deficit at any time t (days).
$DO_{sat}$ = the dissolved oxygen level at saturation
$DO_t$ = the dissolved oxygen level at any time t (days)
$BOD_u$ = ultimate carbonaceous BOD of the stream immediately after mixing.
$K_1$ = reoxygenation rate constant (Kr).
$K_2$ = deoxygenation rate constant (Kd).
$D_o$ = dissolved oxygen deficit immediately after mixing.

### 10.6.3. pH

pH limits must be evaluated in all discharge permits. WQBEL for pH are not necessary in MPDES permits that include pH limits based on TBEL for industrial discharges or secondary treatment standards for POTWs as these limits are adequate to maintain the in stream standard for pH. Possible exceptions include industrial discharges with high levels of acidity or alkalinity that may adversely affect the pH of the receiving water after mixing.

Since the pH of the receiving water is subject to diurnal variation, WQBELs for pH are based on the background concentration ($C_s$) of the receiving water. The lower limit for pH is based on the 25$^{th}$ percentile estimate minus 0.5 SU (standard units) and the upper limit is based on the 75$^{th}$ percentile estimate plus 0.5 SU. These values are then compared to the range given in the applicable standard and the final range is determined. The limits are applied end-of pipe and do not allow mixing to meet the in stream pH standard.

Under Montana nondegradation criteria, pH is listed as a harmful parameter. Permit limits for new discharges subject to these criteria are nonsignificant if the change outside of any mixing zone designated by the department is less than 10 percent of the applicable standard and the existing water quality is 40 percent of the standard. Because hydrogen ion concentration is measured on a logarithmic scale, percentile calculations do not translate directly SU. For new sources, subject to the harmful nondegradation criteria, the Department will develop WQBEL for pH as previously described. No mixing zone will be granted for pH.

### 10.6.4. Temperature

Temperature standards in ARM 17.30.621 through 629 address both maximum allowable increase and decrease in temperature in the receiving water. Temperature increases contain both a chronic condition expressed as a change in background temperature (1 ºF or 3 ºF) and maximum value or acute limits (67 ºF or 80 ºF). These standards also address decrease in temperature and limit the change to 2 ºF per hour at temperatures above 55 ºF and 2 ºF between 32 and 55 ºF.

In addition to these state standards, thermal discharges may be subject to variances granted under section 316(a) of the federal CWA (se Chapter 1 for information of variances). A 316(a) variance is granted after the applicant has demonstrated to the Department that effluent limits based on these standards are more stringent than necessary to assure the protection of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is made. Effluent limit for existing facilities will be maintained in permit renewal for these facilities unless there is evidence that the designated use of the receiving water is not supported. 316(b) variance for new source subject to nondegradation review will not be granted in the absence of an authorization to degrade pursuant to Montana Nondegradation Policy 75-5-303, MCA.

A temperature limit will be included in the MPDES permit if the discharge has a reasonable potential to exceed the temperature standard. Any discharge which exceed the acute limit for the classification (67 ºF or 80 ºF) without mixing or causes a change in temperature which exceeds the allowable increase or decrease for the receiving water after mixing must contain limits for temperature. In order to minimize acute lethality due to thermal shock in the mixing zone no mixing zone is allowed for acute condition. Up to 10% of the 7Q10 may be allowed for mixing with the chronic standard provided that the applicant has completed a water quality assessment in conformance with ARM 17.30.505.

Permit limits based on these standards may be expressed as maximum effluent temperature and may vary by month. Historically these limits have developed based on mass-balance using a steady state model. Thermal limits based on upstream/downstream monitoring will be discontinued. In the absence of background data provided by the applicant, the department used the assumed monthly temperatures given in **Exhibit 10-21** to calculated allowable changes in temperature and for permit limits.

**Exhibit 10-21. Assumed monthly mean temperatures by classification.**

| Month | Water-Use Classification | |
|---|---|---|
| | A-1, A-Closed B-1, B-2 C-1, C-2 | B-3, C-3 I, and all other |
| | Temperature °F | |
| January | 32 | 32 |
| February | 34 | 35 |
| March | 36 | 38 |
| April | 38 | 41 |
| May | 40 | 44 |
| June | 42 | 47 |
| July | 44 | 50 |
| August | 42 | 47 |
| September | 40 | 44 |
| October | 38 | 41 |
| November | 34 | 38 |
| December | 32 | 35 |

Note: Due to the technical uncertainties associated with using the mass-based model for developing permit limits, the department is revising it's procedure to base effluent limits on thermal load (BTU or kilocalories). ***The revised method will be included in the final version of this document***.

### 10.6.5. Color

***This section is under development***.

### 10.6.6. Turbidity, Suspended Sediment and Settable Solids

The Department uses a combination of TBELs, numeric water quality standards and best management practices (BMP) to regulate the discharge of turbidity, sediment and solids in MPDES permits. BMP are used to control sediment in accordance with ARM 17.30.1344 and 40 CFR and 40 CFR 122.44(k), where numeric limitations are infeasible, such as storm water runoff not subject to federal TBEL. BMP are discussed in Chapter XX.

Montana water quality standards in ARM 17.30.621-629 include a narrative standard prohibiting any increase above naturally occurring concentrations of sediment, suspended sediment, settleable solids, oils or floating solids which will or are likely create a nuisance or render the water harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife. Since EPA has developed TBEL for total suspended solids (TSS) for most categories of discharges for which federal ELG have been developed the inclusion of TBEL in the permit is adequate to maintain compliance with the narrative standards in 621-629. Therefore, an independent WQBEL is not necessary, except where a WLA has been promulgated for a specific facility or there is site-specific information to support a finding that designated uses outside of any mixing zone are impacted.

For discharges that are not subject to federal ELGs or new sources subject to nondegradation provisions, WQBEL must be developed for the discharge based on the applicable turbidity standard (0, 5, or 10 NTU). Turbidity can be used as a surrogate for suspended solids and is easier to measure. Turbidity is considered a harmful parameters under Montana nondegradation criteria and therefore allowable increase are set at 10 % of the applicable water quality standard (.5 or 1 NTU). Because the standard is express as 'maximum allowable increase' effluent limit should be expressed as maximum daily limits (MDL) in the permit. Mixing zones may be authorized for turbidity provided they fulfill the requirements of ARM 17.30.506 and 507. MDL calculated for turbidity based on a mixing zone may not exceed 100 NTU. At concentrations above 100 NTU, create condition or concentrations of material which are toxic or harmful to human, animal, plant or aquatic life, in violation of ARM 17.30.637(1)(d) and ARM 17.30.507(1)(b).

In the absence of adequate background data on turbidity levels in the receiving water, a turbidity limit is calculated based on the allowable dilution ratio, assuming the background value is zero.

## 10.7. WQBELs Based on Prohibitions [ARM 17.30.637]

The general prohibits of ARM 17.30.637(1) contain general provisions that apply to all state waters, including mixing zone and are generally referred to as 'free from' standards. These general prohibitions represent the minimum level of protection that applies to all state water, including within mixing zone quality and ephemeral water and drainage ways not subject the specific standards of ARM 17.30.621 to 620 and 650 to 658.

With few exceptions, facilities that are subject to the minimum treatment requirements and are in compliance with those limits fulfill the requirements of this section, specifically 637(1) (a)-(c) and (e). These narrative provisions should be included in permits that are not subject to federal ELGs or secondary treatment requirements. There are no translator mechanisms for these provisions to convert these requirements into numeric effluent limits. There are two notable exceptions: first, 637(1)(d) prohibits the discharge of materials in concentration or combination of condition that are harmful or toxic to human, plant or aquatic life. This narrative provision provides the basis for whole effluent toxicity (WET) limits and is discussed in detail in Chapter 11. Second, 637(1)(b) prohibits concentrations of oil and grease at or in excess of 10 mg/L. The general prohibition is applied as a daily maximum limit (MDL) and must be included as a permit limit is there is reasonable potential for the discharge to exceed this value. Because these prohibition apply to all state water, including mixing zones, these standard apply prior to dilution with the receiving water.

## 10.8. Performance-based Effluent Limitations

There are several special cases that require a modification of the procedures for calculating WQBELs outlined in **Section 10.5** . These special cases include:

- where the permit for a discharge of a pollutant of concern to a water body that is not meeting a numeric water quality standard for the pollutant of concern and there is no applicable TMDL;
- where the pollutant of concern is linked to an excursion of a narrative standard in the receiving water for the discharge and there is no applicable TMDL;
- where the pollutant of concern is linked to an excursion of a narrative or numeric standard in a water body that is immediately downstream of the receiving water for the discharge, there is no applicable TMDL for the pollutant and water body, and the permit writer determines that the discharge of the pollutant to the receiving water is likely to have an impact on the downstream water body's ability to meet the standard.

In each of these situations, the permit writer will have determined that there is reasonable potential and that WQBELs are required for the pollutant of concern. The permit writer should use the procedures outlined below to calculate WQBELs. Different procedures are specified based on whether the discharge is an existing discharge or a new or expanding discharge.

### 10.8.6.1. Existing Discharges—Numeric Standards Not Met in Receiving Water

Where a permit is issued to an existing discharge to a water body that is not meeting one or more numeric, concentration-based water quality standards for the pollutant of concern in the water column, the procedure and equations for calculating WLAs described in **Section 10.5** would lead to WLAs that require the discharge to perform at a level better than meeting the numeric standards at the point of discharge. The Department does not require an existing discharge to perform better than the numeric standards at the "end of the pipe." If effluent limitations require the facility to meet a wasteload allocation based on attaining the concentration-based numeric standards at the point of discharge, the Department regards that those limitations as being derived from and complying with the applicable water quality standards. Therefore, where an existing discharge is to a water body that is not meeting one or more concentration-based numeric standards in the water column, the WLAs for that pollutant of concern should be set equal to the applicable numeric water quality standards. The permit writer can

then use the WLAs for the pollutant of concern to determine the appropriate AML and MDL using the procedures outlined in **Section 10.5**.

#### 10.8.6.2. Existing Discharges—Narrative Standard Not Met in Receiving Water

Where the pollutant of concern is linked to an excursion of a narrative standard in the receiving water for the discharge and no TMDL has been developed for the pollutant of concern, the permit writer would apply the following procedure to calculate effluent limitations:

1. Assemble three to five years of effluent data for the facility, ensuring that the data are representative of the current discharge.
    a. If the effluent limitations are calculated for nutrients (nitrogen or phosphorus) and the discharge is to a reach composed of flowing water (e.g., a stream), the assembled data and the subsequent analysis should be seasonal for June, July, August, and September. For all other pollutants of concern and for nutrient discharges to lakes, the assembled data and subsequent analysis are for the entire year.
    b. If sufficient data are not available, no effluent limitations can be developed and the permit should include monitoring requirements for the pollutant of concern.
2. From the assembled effluent data, calculate the LTA of the effluent pollutant concentration for the pollutant of concern.
3. Use the equations in **Exhibit 10-18** above to calculate the AML and the MDL from the LTA.
4. Use the critical effluent flow to calculate a mass-based AML and MDL to supplement the concentration-based limitations.
5. Do not recalculate effluent limitations determined using this procedure in subsequent permit renewals. Permit limits calculated using this approach should cap pollutant loads at existing levels.

Pending completion of a facility-specific WLA, adoption of numeric water quality standards for the receiving water, or adoption of a numeric interpretation of the narrative standards, these effluent limitations will remain in effect. During the public comment permit, the discharger may submit a study plan designed to demonstrate that the discharge is not causing or contributing to a violation of the applicable standard. The plan, if approved by the Department, will be included as a condition of the permit; however, the limits will remain in affect until the study is completed and the permit is reissued.

Effluent limitations calculated using this procedure are consistent with the Court's decision in *Friends of the Wild Swan, Inc et al USEPA et al*, CV 97-35-M-DWM, District of Montana, September 21,2000. These effluent limitations should not be confused with limits based on nondegradation criteria, which are discussed earlier in this Chapter.

#### 10.8.6.3. Existing Discharges—Numeric or Narrative Standard Not Met in Water Body Immediately Downstream

Where the pollutant of concern is linked to an excursion of a narrative or numeric standard in a water body immediately downstream of the receiving water for an existing discharge, there is no applicable TMDL, and the discharge being permitted would impact the downstream water body, the permit writer should apply the same procedures that are used to address the situation where the excursion is in the receiving water itself (see above). This situation raises the same concerns regarding the need to meet numeric standards or cap the discharge at current levels and, thus, the same procedures are applicable.

#### 10.8.6.4. New or Expanding Discharges—Numeric or Narrative Standards Not Met in the Receiving Water

For new or expanding discharges, if a pollutant of concern is linked to an excursion of a narrative or numeric standard in the receiving water and there is no applicable TMDL, the permit writer may not issue a permit authorizing the discharge of the pollutant of concern. Permits to new or expanded discharges must meet the requirements of 40 CFR 122.4(i), ARM 17.30.1311(7), and the decision in *Friends of the Wild Swan, Inc et al USEPA et al*, CV 97-35-M-DWM, District of Montana, September 21,2000 that comports with that regulation. Consistent with these requirements, the Department does not issue permits for new or expanding discharges to

water quality-limited water bodies or segments of water bodies. This practice helps to ensure that discharges are capped at current levels until a TMDL is developed.

A new or expanded discharge of a pollutant occurs when there is an increase in the permitted concentration or mass discharge of the pollutant or, if effluent limitations were not previously established, where there is an increase in mass or concentration from the level discharged as of April 29, 1993 (see the discussion of new or increased sources in **Chapter 3**).

The Department will permit a new or expanded discharge of the pollutant of concern to a water quality-limited segment only when:

- TMDLs have been developed for the water quality-limited segment for all pollutants causing the impairment(s);
- WLAs consistent with those TMDLs have been assigned to all existing and proposed new dischargers discharging to the water quality-limited segment; and
- If necessary, each discharge is subject to a compliance schedule designed to ensure that it meets its allocation.

After these requirements have been met, a permit writer may issue a permit for a new or expanding discharge that includes effluent limitations consistent with the requirements of the TMDL(s) and WLA(s) assigned to the new or expanding discharge. The permit writer should use procedures outlined in **Section 10.5** to calculate effluent limitations from the assigned WLA(s**).**

#### 10.8.6.5. New or Expanding Discharges—Numeric or Narrative Standard Not Met in Water Body Immediately Downstream

For new or expanding discharges of a pollutant of concern that is linked to an excursion of a narrative or numeric standard in a water body immediately downstream of the receiving water, the procedures are much the same as for new or expanding discharges that discharge directly to a water quality-limited segment.

If there is no applicable TMDL for the downstream water quality-limited segment and the permit writer determines that the new or expanding discharge to the upstream water body impacts the downstream segment, then the permit writer may not allow a new or expanding discharge of the pollutant concern to the upstream water body. This situation also highlights the need to cap discharges at current levels until a TMDL has been developed.

The Department will permit new or expanded discharges of the pollutant of concern to the upstream water body only when:

1. TMDLs have been developed for the downstream water quality-limited segment for all pollutants causing the impairment(s);
2. WLAs consistent with those TMDLs have been assigned to all existing and proposed new dischargers discharging directly to the downstream water quality-limited segment; and
3. If necessary, each discharge to the downstream water quality-limited segment is subject to a compliance schedule to meet its allocation.

After these requirements have been met, the permit writer may issue a permit for the new or expanding discharge to the upstream water body that includes effluent limitations for the pollutant of concern. These effluent limitations must be consistent with the requirements of the TMDL(s) for the downstream water body and any WLA(s) assigned to the new or expanding upstream discharge.

If the permit writer has determined that the discharge **does not** affect the downstream water body or if the TMDL for the downstream water body **does not** address the upstream dischargers, the effluent limitations for the new or increased discharge to the upstream water body should be derived from and comply with the applicable water quality standards for that upstream water body using the procedures outlined above.

## 10.9. References

(REVISE TO INCLUDE FULL CITATIONS)

Fischer, Hugo B., John E. List, C. Robert Koh, Jorg Imberger, and Norman H. Brooks. *Mixing in Inland and Coastal Waters.* New York. Academic Press. 1979.

*Friends of the Wild Swan, Inc et al USEPA et al*, CV 97-35-M-DWM, District of Montana, September 21,2000

Helsel, 2004

McCarthy, 2005. *Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2002*

USEPA, 1991. *Technical Support Document for Water Quality-Based Toxics Control* (TSD). EPA-505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0264.pdf>.

# Chapter 11. Whole Effluent Toxicity

Whole effluent toxicity, or WET, requirements in Montana Pollutant Discharge Elimination System (MPDES) permits protect aquatic life from the aggregate and synergistic effects of pollutants in the effluent. WET tests measure the degree of response of exposed aquatic test organisms directly to an effluent. The WET approach is useful for complex effluents where it might be infeasible to identify and regulate all toxic pollutants in the effluent or where parameter-specific effluent limitations are set, but the combined effects of multiple pollutants are suspected to be problematic. Like the parameter-specific approach, the WET approach allows permit writers to identify and control toxicity in effluents before toxic impacts occur or can be used to help return water quality to a level that will meet beneficial uses. Specifically, the WET approach implements the general prohibition in ARM 17.30.637 against the discharge of substances that create concentrations of combinations of materials that are toxic or harmful to human, animal, plant, or aquatic life. WET tests measure the degree of response of exposed aquatic test organisms to effluent mixed in some proportion with control water (e.g., a non-toxic receiving water sample or laboratory water). WET testing is used in addition to a parameter-specific approach to implement water quality standards in MPDES permits.

The Department established a Biomonitoring Program in 1987 which was incorporated into the United States Environmental Protection Agency (USEPA) Region VIII NPDES Whole Effluent Toxics Control Program (September, 1989). The Region 8 Guidance was revised several times between 1989 and 1997. The August 1997 Guidance, *Region VIII NPDES Whole Effluent Toxics Control Program, August 1997* (USEPA, 1997) has been the basis for Montana's WET Control Policy. This Chapter updates and replaces the 1997 Region 8 NPDES WET Control Program for the State of Montana (excluding Indian Reservations).

## *11.1. Effluent Characterization*

The first step in the process of determining the need for and establishing WET limitations in an MPDES permit is to characterize the effluent. If a permit writer is drafting a permit for a facility that has completed WET testing of its discharge, either as part of its MPDES permit application or in response to WET testing requirements in the previous permit, he or she can move to **Section 11.2.**, below.

If, on the other hand, there are no WET data available, the permit writer must determine whether to require WET testing in the new permit in order to collect data that can be used to determine the need for WET limitations. The permit writer makes decisions regarding inclusion of acute and chronic WET monitoring requirements in the MPDES permit based on the type of discharger, the results of any prior WET characterizations, and the mixing and dilution characteristics of the effluent and receiving water.

### 11.1.1. Dischargers Required to Conduct WET Testing for Effluent Characterization

The permit writer should include WET testing as requirements in MPDES permits for the following types of facilities:

***POTWs***

- Any facility with a design flow rate equal to or greater than 1 MGD
- Any facility required to have an approved pretreatment program
- Any facility discharging at or above 90 percent of its daily maximum or 30-day average design capacity
- Any facility that has caused or contributed to documented damage to aquatic life in the receiving water
- Any other facility that the Department determines has the potential to discharge known or suspected toxic pollutant parameters, but for which there is insufficient information to determine "reasonable potential" and establish effluent limitations for those individual parameters.

***Non-POTWs (Industrials)***

- Any facility classified as a major facility for purposes of its MPDES permit

- Any discharger with a facility belonging to an industry category listed in 40 CFR Part 122, Appendix A (see **Exhibit 11-2** below)
- Any facility that uses, stores, or produces as a product or waste, or transfers any hazardous substance listed 40 CFR Part 122, Appendix D, Table V, (see **Exhibit 11-3** below) unless the discharger demonstrates to the Department's satisfaction that these substances are kept physically separated at all times from any part of the wastewater collection, treatment, and discharge system
- Any facility that discharge any pollutant parameter identified in Circular DEQ-7 as a toxic pollutant parameter for which there are no numeric standards for protection of aquatic life
- Any facility that has caused or contributed to documented damage to aquatic life in the receiving water
- Any other facility that the Department determines has the potential to discharge known or suspected toxic pollutant parameters, but for which there is insufficient information to determine "reasonable potential" and establish effluent limitations for those individual parameters.

**Exhibit 11-2 Primary industry categories—40 CFR Part 122, Appendix A**

| | |
|---|---|
| Adhesives and sealants | Ore mining |
| Aluminum forming | Organic chemicals manufacturing |
| Auto and other laundries | Paint and ink formulation |
| Battery manufacturing | Pesticides |
| Coal mining | Petroleum refining |
| Coil coating | Pharmaceutical preparations |
| Copper forming | Photographic equipment and supplies |
| Electrical and electronic components | Plastics processing |
| Electroplating | Plastic and synthetic materials manufacturing |
| Explosives manufacturing | Printing and publishing |
| Foundries | Rubber processing |
| Gum and wood chemicals | Steam electric power plants |
| Inorganic chemicals manufacturing | Timber products processing |
| Iron and steel manufacturing | Organic chemicals manufacturing |
| Leather tanning and finishing | Pesticides |
| Mechanical products manufacturing | Pharmaceutical preparations |
| Nonferrous metals manufacturing | Plastics processing |

**Exhibit 11-3 Hazardous substances—40 CFR Part 122, Appendix D, Table V**

| | |
|---|---|
| Acetaldehyde | Kelthane |
| Allyl alcohol | Kepone |
| Allyl chloride | Malathion |
| Amyl acetate | Mercaptodimethur |
| Aniline | Methoxychlor |
| Benzonitrile | Methyl mercaptan |
| Benzyl chloride | Methyl methacrylate |
| Butyl acetate | Methyl parathion |
| Butylamine | Mevinphos |
| Captan | Mexacarbate |
| Carbaryl | Monoethyl amine |
| Carbofuran | Monomethyl amine |
| Carbon disulfide | Naled |
| Chlorpyrifos | Napthenic acid |
| Coumaphos | Nitrotoluene |
| Cresol | Parathion |
| Crotonaldehyde | Phenolsulfanate |
| Cyclohexane | Phosgene |
| 2,4-D (2,4-Dichlorophenoxy acetic acid) | Propargite |
| Diazinon | Propylene oxide |
| Dicamba | Pyrethrins |
| Dichlobenil | Quinoline |
| Dichlone | Resorcinol |
| 2,2-Dichloropropionic acid | Strontium |
| Dichlorvos | Strychnine |
| Diethyl amine | Styrene |
| Dimethyl amine | 2,4,5-T (2,4,5-Trichlorophenoxy acetic acid) |
| Dintrobenzene | TDE (Tetrachlorodiphenylethane) |
| Diquat | 2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid] |
| Disulfoton | Trichlorofan |
| Diuron | Triethanolamine dodecylbenzenesulfonate |
| Epichlorohydrin | Triethylamine |
| Ethion | Trimethylamine |
| Ethylene diamine | Uranium |
| Ethylene dibromide | Vanadium |
| Formaldehyde | Vinyl acetate |
| Furfural | Xylene |
| Guthion | Xylenol |
| Isoprene | Zirconium |
| Isopropanolamine Dodecylbenzenesulfonate | |

### 11.1.2. Types of WET Testing for Effluent Characterization

The Department's procedures for determining the type of WET testing required (i.e., acute or chronic or both) are based on the United States Environmental Protection Agency's (USEPA's) recommendations in the *Technical Support Document for Water Quality-based Toxics Control* (TSD) (USEPA, 1991). The permit writer must include quarterly acute, chronic, or acute and chronic WET testing requirements in the discharger's MPDES permit as follows:

- ~~If the dilution ratio based on the chronic mixing zone is equal to or greater than 1000:1, require acute WET testing only~~
- ~~If the dilution ratio based on the chronic mixing zone is equal to or greater than 100:1 and less than 1000:1 require both acute and chronic WET~~
- ~~If the dilution ratio based on the chronic mixing zone is less than 100:1, require chronic WET testing only~~

A discussion of the required acute and chronic WET test procedures is included at the end of this Chapter.

### 11.1.3. Frequency of WET Testing for Effluent Characterization

If a permittee has not characterized its effluent for WET, the initial WET testing requirement is quarterly WET monitoring for three years. Quarterly samples must be collected on a two day progression; i.e., if the first quarterly sample is on a Monday, the second quarter sample shall be on a Wednesday, etc. Saturdays, Sundays and holidays are skipped in the progression.

The three years of quarterly testing must include quarterly tests conducted during the 12 months prior to submission of application Form 2A where such testing is completed in order to fulfill the application requirements and where none of this testing indicates acute or chronic effluent toxicity. In such cases, the permit writer need only require two additional years of quarterly testing in the permit requirements. As noted above, the results of this effluent characterization will be used in the next permit cycle to determine the need for WET limitations. In some cases, the Department may reopen the permit to include WET limitations if the effluent characterization indicates a need to incorporate WET limitations prior to the next permit cycle.

## *11.2. Determining the Need for WET Limitations*

The federal regulations at 40 CFR 122.44(d)(1)(iv) require that effluent limitations be established for WET when a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a numeric standard for WET. Furthermore, 40 CFR 122.44(d)(1)(v) requires that effluent limitations be established for WET when the Department determines that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative standard within the state water quality standards unless the Department demonstrates that parameter-specific limitations will be sufficient to attain and maintain applicable numeric and narrative standards.

**Fact Sheet II.A.2.f**

Montana's water quality standards do not include any numeric standards for effluent toxicity; however, ARM 17.30.637(1)(d) requires that state surface waters must be free from substances attributable to municipal, industrial, agricultural practices, or other discharges that will create concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life. To assess the need for WET limitations in MPDES permits there must be an interpretation of this general prohibition as it applies to WET. The Department interprets this prohibition in terms of acute and chronic effluent toxicity as follows:

- Acute toxicity occurs when, during an acute toxicity test, 50 percent mortality is observed for any tested species at any effluent concentration (i.e., $LC_{50} \leq 100\%$ effluent)
- Chronic toxicity occurs when, during a chronic toxicity test, the 25% inhibition concentration ($IC_{25}$) for any tested species is less than or equal to the percent effluent represented by the effluent concentration in the receiving water after accounting for any allowable mixing zone.

A permit writer determines the need for WET limitations by directly comparing WET testing data submitted in a permit application or as a result of monitoring requirements in the previous permit) to these definitions of acute and chronic effluent toxicity. A single sample from the submitted data that shows acute toxicity based on the definition above indicates the need for an acute toxicity limitation unless the permittee has demonstrated to the satisfaction of the Department: 1) that the toxicity present in the single sample was not persistent (e.g., through follow-up testing) or 2) through completion of a Toxicity Identification Evaluation (TIE) and Toxicity Reduction Evaluation (TRE), that the toxicity can be addressed through a parameter-specific effluent limitation. Likewise, a single sample from the submitted data that shows chronic toxicity based on the definition above indicates the need for a chronic toxicity limitation unless the permittee demonstrates to the satisfaction of the Department that 1) the toxicity present in the single sample was not persistent or 2) through a TIE and TRE, that the toxicity can be addressed through a parameter-specific effluent limitation.

Where the permit writer has examined three years of quarterly testing data and found that there is no reasonable potential for WET, the permittee will not be required to repeat this characterization in subsequent permits unless the Department determines that:

- the permittee has made changes to processes, materials, or treatment that could result in an increase in effluent toxicity;
- the mean annual flow of the discharge has changed by more than 10 percent due to changes in plant processes or production or, in the case of a POTW or other facility treating sewage, the number of users; or
- a POTW or other facility treating sewage has experienced a change in the character or volume of pollutants reportable under ARM 17.30.1343(1)(b).

Permit writers should note that some POTWs that would not otherwise be required to conduct an effluent characterization for WET in future permit cycles will be required to submit quarterly data for one year to fulfill the WET requirements of Application Form 2A.

## 11.3. WET Limitations and Monitoring Requirements

As noted above, 40 CFR 122.44(d)(1)(v) requires that effluent limitations be established for WET when the Department determines that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative standard within the state water quality standards unless the Department demonstrates that parameter-specific limitations will be sufficient to attain and maintain applicable numeric and narrative standards. In other words, where WET testing indicates "reasonable potential" and the permittee has not demonstrated that a parameter-specific effluent limitation will adequately address the observed toxicity, the permit writer must include WET limitations (acute or chronic or both as appropriate) in the MPDES permit. The MPDES permit should include a reopener clause in the Special Conditions section of the permit allowing the Department to reopen the permit to add WET limitations. Alternatively, the required WET limitations may be included upon permit reissuance.

**Permit I.B.4**

**Fact Sheet II.A.2.g**

### 11.3.1. Acute WET Limitations

Even requiring an $LC_{50}$.of "> 100 percent effluent" would allow for some degree of toxicity until the effluent sufficiently mixes with the receiving water to reduce the lethality of the effluent and receiving water mixture to an acceptable level. Because of this feature of the acute WET test, no additional mixing zone is permitted for acute WET limitations. Where acute WET limitations are required, they should be expressed as follows:

> *There shall be no acute toxicity in the effluent from Outfall <enter outfall number>. Acute toxicity occurs when, during an acute toxicity test, 50 percent mortality is observed for any tested species at any effluent concentration (i.e., $LC_{50} \leq 100\%$ effluent). Acute toxicity tests to determine the $LC_{50}$ of the effluent from Outfall 001 shall be conducted in accordance with the requirements in Section I.C.2 below.*

### 11.3.2. Chronic WET Limitations

Similarly, where chronic WET limitations are required, they should be expressed as follows:

> *There shall be no chronic toxicity in the effluent from Outfall <enter outfall number>. Chronic toxicity occurs when, during a chronic toxicity test, the 25% inhibition concentration ($IC_{25}$) for any tested species is less than or equal to <percent effluent represented by the effluent concentration in the receiving water after accounting for any allowable mixing zone> effluent dilution. Chronic toxicity tests to determine the $IC_{25}$ of the effluent from Outfall 001 shall be conducted in accordance with the requirements in Section I.C.2 below.*

### 11.3.3. Monitoring Requirements

Where WET limitations are required, self-monitoring for acute or chronic toxicity, or both, should be required in the permit at a minimum frequency of once per quarter. POTWs with a mean annual flow equal to or greater than 10 million gallons per day and non-POTWs with a mean annual flow equal to or greater than 20 million gallons

per day should be required to conduct monthly testing for demonstrating compliance with effluent limitations. WET testing to measure compliance with effluent limitations should use the same sampling and test procedures described as for effluent characterization. These requirements are discussed at the end of this Chapter.

### 11.3.4. Reduction in Self-Monitoring Frequency

If the results for four consecutive quarters of routine quarterly self-monitoring indicate no toxicity, the permittee may request a reduction to testing on only one species at a time on an alternating basis. Alternatively, if monthly testing was required in the permit and the results for 12 consecutive months of monthly testing indicate no toxicity, the permittee may request monthly testing on only one species at a time or may request to continue testing two species at a time, but at a frequency of once per quarter. The Department may approve or deny the request based on the results of prior toxicity testing and other available information without an additional public notice as long as this condition is clearly specified in the discharger's MPDES permit. If the request is approved, the test procedures will otherwise remain the same.

## *11.4. Controlling Toxicity in the Effluent*

Conditions that are related to controlling toxicity in the effluent should be included in the **Special Conditions** section of the MPDES permit (see **Chapter 14**). These conditions should include the following:

**Permit II.A.3**

**Fact Sheet II.C.1**

1. **Development of TIE/TRE Plan**: A requirement to develop and submit a Toxicity Identification Evaluation (TIE) and Toxicity Reduction Evaluation (TRE) plan that outlines the steps that the permittee will take if persistent toxicity, as defined in 2.b below, is demonstrated. Because WET testing indicates the degree of toxicity of an effluent, but does not specifically identify the cause of that toxicity, a TIE/TRE is necessary to identify the steps needed to achieve compliance with effluent limitations or other effluent toxicity requirements in NPDES permits. The TIE/TRE must be designed to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for, the toxicity. A special condition requiring the permittee to develop and submit a TIE/TRE plan should be included in MPDES permits as indicated in **Exhibit 11-4** below.

**Exhibit 11-4 TIE/TRE plan requirements**

| Acute or Chronic Toxicity Limitations in the Permit? | WET Monitoring Requirements in the Permit? | Include Special Condition Requiring Development of Preliminary TIE/TRE Plan? |
|---|---|---|
| No | No | No |
| No | Yes | No |
| Yes | Yes | Yes |

The special condition in should require that the permittee submit a TIE/TRE plan to the Department within 45 days of the effective date of the permit. The permit writer should review the plan and provide comments or recommendations to the permittee on improvements to the plan, but the Department will not approve the plan.

2. **Accelerated Testing and TIE/TRE Plan Implementation**: If acute or chronic toxicity occurs in a quarterly self-monitoring test required by the permit and conducted for effluent characterization (prior to WET limitations being placed in a permit) or during routine quarterly self-monitoring to demonstrate compliance with WET limitations in the permit, the permittee must conduct, at a minimum, one additional test per month for three months beginning within 14 days of the date of completion of the initial test in which toxicity was detected. If the permittee is already conducting monthly tests, no increase in testing frequency is required.

a. If the additional testing shows no toxicity present, the permittee is required to report to the Department within 45 days on the possible causes and, if appropriate, preventive measures for the initial toxicity result.
b. If the additional testing confirms the toxicity of the effluent or, if the permittee is already conducting monthly tests, toxicity occurs in two consecutive monthly tests, the permittee must notify the Department within 10 days and:
   i. if the permittee has already developed and submitted a TIE/TRE plan to the Department (see 1 above), it must begin implementing that plan immediately or
   ii. if the permittee has not yet developed and submitted a TIE/TRE plan to the Department, it must develop, submit to the Department, and begin implementing a TIE and TRE plan within 45 days of completion of the additional test that confirmed the toxicity.

USEPA has published several guidance documents for conducting TIEs and TREs. Permittees should review these documents before performing a TIE/TRE and before committing to a particular course of action. USEPA has provided guidance related to TIE/TRE procedures and requirements in the following documents:

- *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants* <http://www.epa.gov/npdes/pubs/tre.pdf> (USEPA, 1999);
- *Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program* <http://www.epa.gov/npdes/pubs/owmfinaltretie.pdf> (USEPA, 2001);
- *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs)* (USEPA, 1989),
- *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures. Second Edition* <http://www.epa.gov/npdes/pubs/owm0330.pdf> (USEPA 1991);
- *Toxicity Identification Evaluations: Characterization of Chronically Toxic Effluents, Phase I* <http://www.epa.gov/npdes/pubs/owm0255.pdf> (USEPA, 1992);
- *Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* <http://www.epa.gov/npdes/pubs/owm0343.pdf> (USEPA, 1993a); and
- *Methods for Aquatic Toxicity Identification Evaluations: Phase III Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* <http://www.epa.gov/npdes/pubs/owm0341.pdf> (USEPA, 1993b).

See the NPDES WET Web page <http://cfpub.epa.gov/npdes/wqbasedpermitting/wet.cfm> for additional information.

The Special Conditions section of the MPDES permit should also include a reopener clause specifying that, at the conclusion of the TIE/TRE, the Department may reopen the permit to include parameter-specific effluent limitations for any parameters identified as causing effluent toxicity.

## 11.5. Effluent Sampling and Test Methods

WET testing effluent samples may be either composite or grab samples. Twenty-four or eight hour composite samples should be used rather than grab samples except when:

- the effluent is expected to be more toxic at a certain time of day;
- toxicity might be diluted during compositing; or
- the size of the sample needed exceeds the composite sampler volume.

Acute and chronic WET tests must be conducted as static renewal tests using a dilution series consisting of six effluent concentrations (generally 100, 75, 50, 25, 12.5, 6.25 percent effluent) and a control. The permit writer may modify the standard dilution series to more closely bracket the effluent concentration of concern if known. Dilution water and the control must be a non-toxic sample of the receiving water unless the Discharger obtains authorization from the Department to use alternate dilution water (e.g., laboratory water).

Acute WET tests must be conducted in general accordance with the procedures set out in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition, EPA-

821-R-02-012 <http://www.epa.gov/waterscience/WET/disk2/atx.pdf> (USEPA, 2002a) (or a subsequent edition) and the "Region VIII EPA NPDES Acute Test Conditions—Static Renewal Whole Effluent Toxicity Test" contained in the *Region VIII NPDES Whole Effluent Toxics Control Program, August 1997* (USEPA, 1997). The permit should specify that the discharger must conduct a 48-hour static renewal acute toxicity test using *Ceriodaphnia dubia* (EPA Method 2002.0) and a 96-hour static renewal acute toxicity test using *Pimephales promelas* (fathead minnow) (EPA Method 2000.0). Acute toxicity is measured by determining the $LC_{50}$ (i.e., the percent of effluent that is lethal to 50 percent of the exposed test organisms) for each type of test. If more than 10 percent control mortality occurs, the test is considered invalid and must be repeated until satisfactory control survival is achieved, unless a specific individual exception is granted by the Department. This exception may be granted if less than 10 percent mortality was observed at the dilutions containing high effluent concentrations.

Chronic WET tests must be conducted in general accordance with the procedures set out in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA-821-R-02-013 <http://www.epa.gov/waterscience/WET/disk3/ctf.pdf> (USEPA, 2002) (or a subsequent edition) and the "Region VIII EPA NPDES Chronic Test Conditions—Static Renewal Whole Effluent Toxicity Test" contained in the *Region VIII NPDES Whole Effluent Toxics Control Program, August 1997* (USEPA, 1997). The permit should specify that the discharger must conduct a 3-brood larval survival and reproduction static renewal chronic toxicity test using *Ceriodaphnia dubia* (EPA Method 1002.0) and a 7-day survival and growth static renewal chronic toxicity test using *Pimephales promelas* (fathead minnow) (EPA Method 1000.0). Chronic toxicity is measured by determining the $IC_{25}$, which is a point estimate of the effluent concentration that would cause a 25 percent reduction in the specified biological measurement (i.e., reproduction, growth) of the test organisms.

A discharger can submit a written request to the Department to use alternate test species and acute or chronic toxicity test methods approved in 40 CFR Part 136. The written request to the Department must specify the proposed alternate test species and test methods and the specific reasons for use of alternate test species and test methods. The alternate test species and test methods may be used only following approval of the request by the Department and modification of the permittee's MPDES permit. If the Department disapproves the request, the Discharger must continue to use the test species and WET test methods described above.

## 11.6. References

USEPA, 1989. *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs)*. EPA/600/2-88-007. U.S. Environmental Protection Agency, Risk Reduction Engineering Laboratory, Cincinnati, Ohio.

USEPA, 1991. *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures. Second Edition.* EPA 600/6-91/003. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC. <http://www.epa.gov/npdes/pubs/owm0330.pdf>.

USEPA, 1992. *Toxicity Identification Evaluations: Characterization of Chronically Toxic Effluents, Phase I.* EPA/600/6-91-005F. U.S. Environmental Protection Agency, Office of Research and Development. Washington, DC. <http://www.epa.gov/npdes/pubs/owm0255.pdf>

USEPA, 1993a. *Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity*. EPA/600/R-92/080. U.S. Environmental Protection Agency, Office of Research and Development. Washington, DC. <http://www.epa.gov/npdes/pubs/owm0343.pdf>.

USEPA, 1993b. *Methods for Aquatic Toxicity Identification Evaluations: Phase III Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity*. EPA/600/R-92/081. U.S. Environmental Protection Agency, Office of Research and Development. Washington, DC. <http://www.epa.gov/npdes/pubs/owm0341.pdf> (USEPA, 1993b).

USEPA, 1997. *Region VIII NPDES Whole Effluent Toxics Control Program, August 1997*. U.S. Environmental Protection Agency, Region 8. Denver, Colorado.

USEPA, 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*. EPA/833B-99/002. U.S. Environmental Protection Agency, Office of Wastewater Management. Washington, DC. <http://www.epa.gov/npdes/pubs/tre.pdf>.

USEPA, 2001. *Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program* U.S. Environmental Protection Agency, Office of Wastewater Management and Office of Regulatory Enforcement. Washington, DC. <http://www.epa.gov/npdes/pubs/owmfinaltretie.pdf> (USEPA, 2001);

USEPA, 2002a. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition. EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <http://www.epa.gov/waterscience/WET/disk2/atx.pdf>

USEPA, 2002b. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition. EPA-821-R-02-013. U.S. Environmental Protection Agency, Office of Water. <http://www.epa.gov/waterscience/WET/disk3/ctf.pdf>

# Chapter 12. Final Effluent Limitations

**Permit I.B**

**Fact Sheet II.A.3**

After calculating all applicable technology-based effluent limitations (TBELs), water quality-based effluent limitations (WQBELs), and any limitations based on nondegradation criteria, the permit writer is ready to determine the final effluent limitations that will be included in the permittee's Montana Pollutant Discharge Elimination System (MPDES) permit. This chapter describes the process that a permit writer uses to determine final effluent limitations, including an anti-backsliding analysis where appropriate.

## *12.1. Determining the Most Protective Calculated Limitations*

The first step in determining the final effluent limitations is to determine which calculated limitations are the most protective for each pollutant or pollutant parameter. As noted in **Chapter 10**, there could be more than one set of WQBELs for the same pollutant of concern. For example, the permit writer might develop WQBELs from a total maximum daily load (TMDL) for a water body downstream of the receiving water and also calculate WQBELs from numeric water quality standards that apply directly to the receiving water. The permit writer should compare the WQBELs and TBELs for each effluent limitation averaging period (e.g., maximum daily, average monthly) to find the most protective effluent limitations for each pollutant of concern. The most protective calculated effluent limitations could be a combination of WQBELs and TBELs. For example, for a single discharger, the most protective limitations might be TBELs for total suspended solids, WQBELs for copper, a mixture of TBELs and WQBELs for zinc, and limitations based on nondegradation criteria for ammonia. After determining the most protective of the calculated limitations, the permit writer must consider the need for an anti-backsliding analysis before determining the final effluent limitations to include in the MPDES permit.

## *12.2. Anti-Backsliding Analysis*

Anti-backsliding is an additional requirement that permit writers must consider during MPDES permit development. Anti-backsliding refers to a provision in the Clean Water Act (CWA) and in the federal regulations at 40 CFR 122.44(l) that prohibits the renewal, reissuance, or modification of an existing permit that contains effluent limitations, permit conditions, or standards that are less stringent than those established in the previous permit. There are, however, exceptions to the prohibition, and determining the applicability and circumstances of the exceptions requires familiarity with both the statutory and regulatory provisions that address anti-backsliding. This step reviews the statutory and regulatory provisions regarding anti-backsliding and is taken from USEPA's anti-backsliding guidance in the *2008 NPDES Permit Writers' Manual*.

### 12.2.1. Statutory Prohibitions and Exceptions

Clean Water Act (CWA) section 402(o) expressly prohibits backsliding from certain existing effluent limitations. CWA section 402(o) consists of three main parts: (1) a prohibition on specific forms of backsliding, (2) exceptions to the prohibition, and (3) a "safety clause" that provides an absolute limitation on backsliding.

#### 12.2.1.1. Prohibitions

First, CWA section 402(o)(1) prohibits the relaxation of effluent limitations for two situations:

- When a permittee seeks to revise an existing technology-based effluent limitation (TBEL) that was developed on a case-by-case basis using best professional judgment (BPJ) to reflect a subsequently promulgated effluent guidelines that would result in a less stringent effluent limitation, and
- When a permittee seeks relaxation of an effluent limitation that is based upon state standards, such as water quality standards or treatment standards, unless the change is consistent with CWA section 303(d)(4). Section 303(d)(4) may be applied independently of section 402(o). Less stringent effluent limitations in compliance with this section of the CWA would not constitute backsliding.

The prohibition against relaxation of effluent limitations is subject to the exceptions in CWA section 402(o)(2) and, for limitations based on state standards, the provisions of CWA section 303(d)(4). These exceptions are outlined below.

#### 12.2.1.2. Exceptions for Case-by-Case Limitations

CWA section 402(o)(2) outlines specific exceptions to the general prohibition against revising an existing TBEL that was developed on a case-by-case basis using BPJ to reflect a subsequently promulgated, less stringent effluent guideline in a renewed, reissued, or modified permit. CWA section 402(o)(2) provides that relaxed limitations may be allowed where:

- There have been material and substantial alternations or additions to the permitted facility that justify this relaxation.
- New information (other than revised regulations, guidance, or test methods) is available that was not available at the time of permit issuance and which would have justified a less stringent effluent limitation. If the effluent limitation was based on water quality standards, any changes must result in a decrease in pollutants discharged.
- Technical mistakes or mistaken interpretations of the law were made in issuing the permit under CWA section 402(a)(1)(b).
- Good cause exists due to events beyond the permittee's control (e.g., natural disasters) and for which there is no reasonably available remedy.
- The permit has been modified under CWA sections 301(c), 301(g), 301(h), 310(i), 301(k), 301(n), or 316(a).
- The permittee has installed and properly operated and maintained required treatment facilities but still has been unable to meet the effluent limitations (relaxation may only be allowed to the treatment levels actually achieved).

#### 12.2.1.3. Exceptions for Limitations Based on State Standards

EPA has consistently interpreted CWA section 402(o)(1) to allow relaxation of WQBELs and limitations based on state standards if the relaxation is consistent with the provisions of CWA section 303(d)(4) or if the one of the exceptions in CWA section 402(o)(2) is met. These two provisions constitute independent exceptions to the prohibition against relaxation of permit limitations. If either is met, relaxation is permissible.

CWA section 303(d)(4) has two parts: paragraph (A), which applies to “non-attainment waters,” and paragraph (B), which applies to “attainment waters”.

- **Non-attainment water:** CWA section 303(d)(4)(A) allows the establishment of a less stringent effluent limitation when the receiving water has been identified as not meeting applicable water quality standards (i.e., a “non-attainment water”) if the permittee meets two conditions. First, the existing effluent limitation must have been based on a total maximum daily load (TMDL) or other wasteload allocation (WLA) established under CWA section 303. Second, relaxation of the effluent limitation is only allowed if attainment of water quality standards will be ensured or the designated use not being attained is removed in accordance with the water quality standards regulations. This subsection does not provide an exception for establishing less stringent limitations where the original limitation was based on state permitting standards (e.g., state treatment standards) and was not based on a TMDL or WLA.
- **Attainment water:** CWA section 303(d)(4)(B) applies to waters where the water quality equals or exceeds levels necessary to protect the designated use, or to otherwise meet applicable water quality standards (i.e., an “attainment water”). Under CWA section 303(d)(4)(B), a limitation based on a TMDL, WLA, other water quality standard, or any other permitting standard may only be relaxed where the action is consistent with State's antidegradation policy.

Although the statute also identifies six exceptions in section 402(o)(2) where effluent limitations otherwise subject to the prohibition in section 402(o)(1) may be relaxed, the exceptions for technical mistakes or mistaken interpretations and permit modification, which are described above, would not apply to water quality-based effluent limitations (WQBELs).

#### 12.2.1.4. "Safety Clause"

CWA section 402(o)(3) is a "safety clause" that provides an absolute limitation on backslidng. This section of the CWA prohibits the relaxation of effluent limitations in all cases if the revised effluent limitation would result in a violation of applicable effluent guidelines or water quality standards, including antidegradation requirements. Thus, even if one or more of the backsliding exceptions outlined in the statute is applicable and met, CWA section 402(o)(3) acts as a floor and restricts the extent to which effluent limitations may be relaxed. This requirement affirms existing provisions of the CWA that require permit limitations, standards, and conditions to ensure compliance with applicable technology and water quality standards.

### 12.2.2. Regulatory Prohibitions and Exceptions

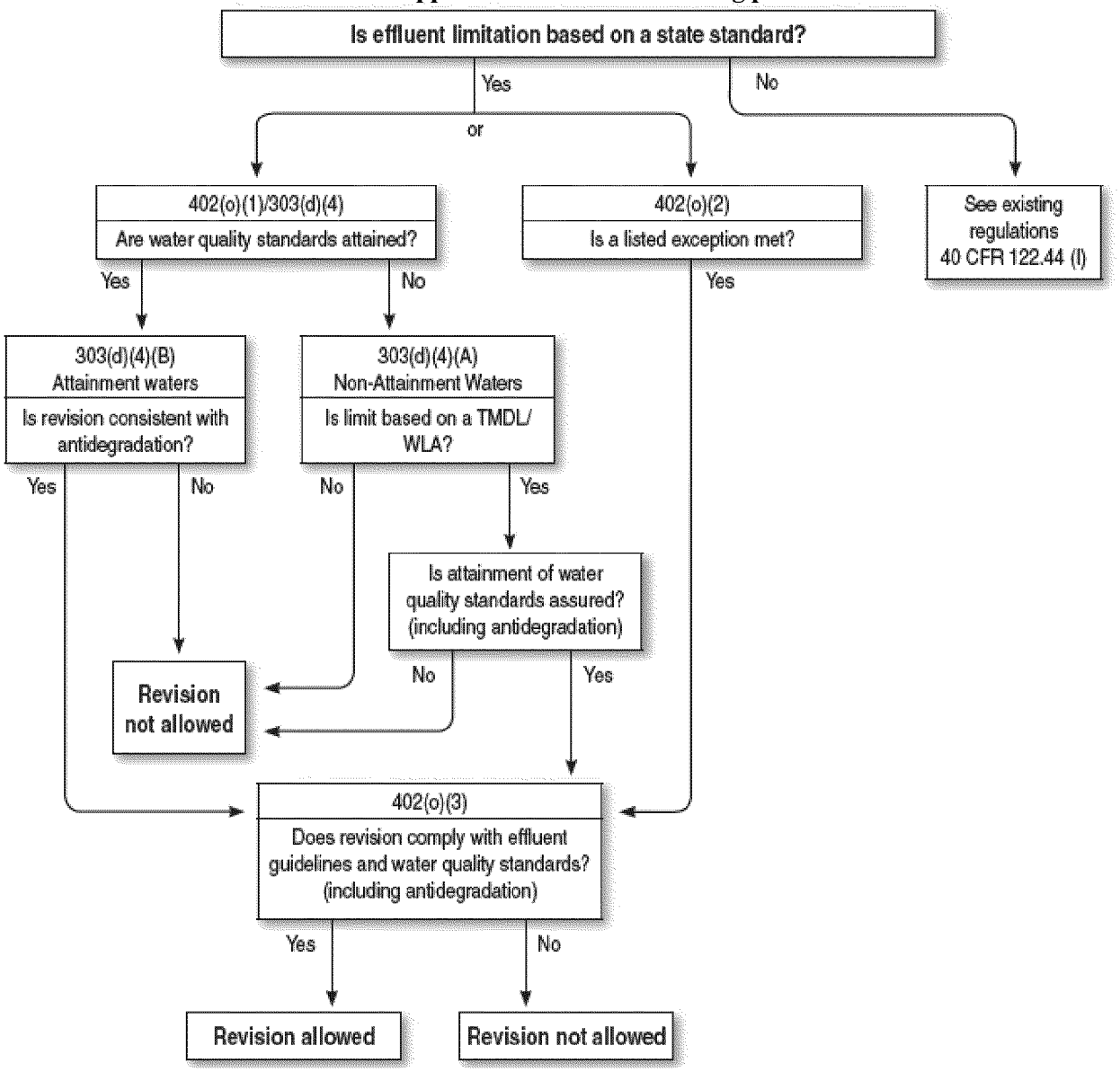
Anti-backsliding regulations are also found at Title 40 of the *Code of Federal Regulations* (40 CFR) 122.44(l). These regulations are incorporated by referenced in to the Administrative Rules of Montana at ARM 17.30.1344(b). These regulations do not specifically address backsliding in the case where a permittee seeks relaxation of an effluent limitation that is based upon a state treatment standard or water quality standard (i.e., based on CWA sections 301(b)(1)(C) or 303(d) or 303(e)). They do, however, address all other forms of backsliding.

- First, the regulations at § 122.44(l)(1) restrict the relaxation of "final effluent limitations" and the relaxation of "standards or conditions" contained in existing permits. Thus, these regulations, in effect, addresses all types of backsliding not already addressed in the CWA provisions in section 402(o)(1). Examples would include backsliding from limitations based on existing source performance standards in effluent guidelines, from new source performance standards, from existing case-by-case limitations to new case-by-case limitations, or from conditions such as monitoring requirements that are not "effluent limitations." Under this regulation, for a reissued permit to allow relaxation of such limitations, standards, or conditions, a permittee must meet one of the causes for modification under § 122.62. These requirements are reflected in Montana regulations at ARM 17.30.1361.
- Second, the regulations at § 122.44(l)(2) repeat the same specific prohibition imposed by CWA section 402(o) on backsliding where a permittee seeks to revise an existing case-by-case TBEL developed using BPJ to reflect a subsequently promulgated effluent guideline that is less stringent than the case-by-case requirement. These regulations also include the same exceptions to this prohibition that are contained in CWA section 402(o)(2)) and the same "safety clause" contained in CWA section 402(o)(3).

Thus, if the permit condition being considered for relaxation is any limitation, standard, or condition other than an effluent limitation based on a state standard, the permit writer can apply the requirements in § 122.44(l). For effluent limitations based on state standards, the permit writer should apply the provisions of CWA sections 402(o) and 303(d)(4) directly as discussed in the section above. **Exhibit 12-1** illustrates this process.

In its *2009 NPDES Permit Writers Manual*, the United States Environmental Protection Agency (USEPA) provides several examples of scenarios where a permittee might seek to backslide and analyzes these situations in light of the statutory and regulatory provisions regarding backsliding. Two of these examples most relevant to MPDES permits have been adapted for this Manual and are presented below as **Exhibit 12-2**.

**Exhibit 12-1. Application of anti-backsliding provisions**



## Exhibit 12-2. Examples of applying anti-backsliding provisions

### Example 1

A publicly owned treatment works (POTW) seeks to relax a water quality-based effluent limitation for Pollutant X. The current effluent limitation for Pollutant X is based on a wasteload allocation for the POTW taken from an approved TMDL. The POTW is in compliance with its existing effluent limitation, and the applicable water quality standards for Pollutant X are attained. The POTW has developed new models with new river flow information. These models indicate that the water quality standards for Pollutant X would be maintained with a relaxed effluent limitation.

**Question:**
May the effluent limitation for Pollutant X be relaxed?

**Answer:**
Possibly. As discussed above, WQBELs may be relaxed where one of the exceptions in CWA sections 402(o)(1) or (2) are met. In this case, although the new information from the models might meet the exception criteria under CWA section 402(o)(2)(B)(i), CWA section 402(o)(2) will not justify the request unless the Department reduces the pollutant loadings from other point sources or nonpoint sources of pollution. This is because, as discussed above, CWA section 402(o)(2) restricts the use of new information to justify a relaxed effluent limitation to cases where there is a decrease in the amount of pollutants being discharged.

The CWA section 402(o)(1) exceptions, on the other hand, might justify the request. In this case, the reference to CWA section 303(d)(4)(B) in CWA section 402(o)(1) is the relevant exception. CWA section 303(d)(4)(B) provides that, for receiving waters that meet water quality standards, permit limitations based on a TMDL or other wasteload allocation or other permit standard may be relaxed if the State's nondegradation policy requirements are met.

### Example 2

Based on WET testing data or other information, the State found that the discharge from an industrial facility would cause, have the reasonable potential to cause, or contribute to an excursion of the water quality standards in the receiving water—specifically the narrative water quality standard prohibiting concentrations or combinations of materials that are toxic or harmful to aquatic life
The Department imposed a WET limitation in the industrial facility's MPDES permit based on the requirements in 40 CFR 122.44(d)(1)(v). The permittee determines that Pollutant Z is the cause of WET measured in its discharge and can demonstrate through sufficient data (including WET testing data) that an effluent limitation for Pollutant Z will assure compliance with the narrative water quality standard as well as the State's numeric standard for Pollutant Z, as required by § 122.44(d)(1)(v).

**Question:**
May the Department modify the permit to delete the WET limitation and to add the effluent limitation for Pollutant Z?

**Answer:**
Possibly. CWA section 303(d)(4) might justify this action. The applicable provision is CWA section 303(d)(4)(B) because the narrative water quality criterion is currently attained. The permittee is currently complying with the existing WET limitation to attain and maintain the criterion. Under CWA section 303(d)(4)(B), the existing effluent limitation may be relaxed as long as nondegradation requirements are met and the relaxed limitation will not cause a violation of any effluent guidelines or water quality standards applicable to the discharge. In this case, the new limitation for Pollutant Z will assure compliance with both the narrative and numeric water quality criteria. To relax the limitation, the Department would have to determine that all nondegradation policy requirements are met.

# Chapter 13. Monitoring and Reporting Conditions

This chapter describes the monitoring and reporting requirements that a permit writer establishes in Montana Pollutant Discharge Elimination System (MPDES) permits. The monitoring and reporting conditions require the permittee to conduct routine or episodic self-monitoring of the permitted discharges and, possibly, internal operations and report the analytical results to the Department with the information necessary to evaluate discharge characteristics and compliance status. Periodic monitoring and reporting establish an ongoing record of the permittee's compliance status and, where violations are detected, create a basis for any necessary enforcement actions. Influent monitoring can be used to assess the efficiency of treatment methods and receiving water monitoring can be used to characterize receiving waters.

The monitoring and reporting conditions section of an MPDES permit contains specific requirements for the following items:

- Monitoring locations;
- Monitoring frequencies;
- Sample collection methods;
- Analytical methods; and
- Reporting and recordkeeping requirements.

The following sections provide an overview of the considerations involved in determining appropriate monitoring, reporting, and recordkeeping requirements, and how to properly incorporate the appropriate requirements in a MPDES permit.

## *13.1. Establishing Monitoring Conditions*

ARM 17.30.1351 stipulates that all permits must specify requirements concerning the proper use, maintenance, and installation of monitoring equipment or methods (including biological monitoring methods when appropriate). This regulation also includes requirements for recording and reporting monitoring results. Among these is that all permits include the required monitoring type, intervals, and frequency sufficient to yield data that are representative of the monitored activity including, when appropriate, continuous monitoring. In addition, Title 40 of the Code of Federal Regulations (CFR) 122.44(i), incorporated by reference into ARM 17.39.1344(2)(b)), states that, to assure compliance with effluent limitations, permits must include requirements to monitor the mass or other measurements specified in the permit for each pollutant limited in the permit, the volume of effluent discharged from each outfall, and other measurements as appropriate, such as internal waste streams or intake water. In addition, MPDES permits can require the permittee to monitor for parameters or processes not directly linked to the process wastewater discharge, such as storm water (see, for example, ARM 17.30.1351(3)).

Required monitoring must use test procedures approved under Part 136 for the analyses of pollutant for which there are approved test methods and according to a test procedure specified in the permit for pollutants with no approved methods. The minimum reporting frequency is once per year except as noted in 40 CFR 122.44(i)(4) and (5).

A permit writer should consider several factors when determining the specific monitoring requirements to include in an MPDES permit. Inappropriate or incomplete monitoring requirements might lead inaccurate compliance determinations and inadequate implementation of national effluent limitations guidelines and standards (effluent guidelines) or Montana water quality standards. Factors that affect sampling location, sampling method, and sampling frequency are:

- applicability of effluent guidelines;
- waste stream and process variability;
- access to sample locations;
- permit limits;
- approved methods;
- discharge frequencies (e.g. continuous vs. intermittent);

- effect of flow and pollutant load on the receiving water;
- characteristics of the pollutants discharged; and
- permittee's compliance history.

### 13.1.1. Purpose of Monitoring

**Permit I.B Table 2**

**Fact Sheet II.B**

Most effluent monitoring associated with an MPDES permit is performed to primarily to determine compliance with effluent limitations established in the permit or to establish a basis for enforcement actions. In addition effluent monitoring might be used to characterize effluent to provide data for development of conditions in future MPDES permits. There are two basic approaches for monitoring effluent quality: self-monitoring and compliance monitoring. Self-monitoring is performed when the permittee is responsible for the sampling and analysis and is the routine monitoring required in MPDES permits. Permit writers should clearly detail monitoring and reporting requirements in the permit to prevent or minimize potential problems such as, improper sample collection procedures, improper sample preservation, improper or poor analytical techniques, unrepresentative samples, and poor or improper report preparation and documentation. Routine self-monitoring requirements are included in Table 2 of the Effluent Limitations and Monitoring & Reporting Requirements section of the permit (Section I). The results of this monitoring are reported on Discharge Monitoring Report (DMR) forms according to the schedule specified in the permit. Compliance monitoring is often performed by the Montana Department of Environmental Quality (Department) during a compliance inspection and is done primarily to validate the permittee's self-monitoring data.

> Flow monitoring generally is required only for the effluent discharged from a facility. Permit application requirements, however, generally include influent and effluent flow data as well as a flow diagram or schematic showing treatment units, influent and effluent flow, and flow rates between treatment processes.

Other monitoring, such as monitoring associated with a receiving water characterization or mixing study, should be included in the Special Conditions section of the permit (Section II). Permit writers must specified the format and frequency for reporting the results of any monitoring included as part of the Special Conditions of the permit.

### 13.1.2. Monitoring Location

The regulations do not prescribe exact monitoring locations; rather, as noted above, the permit writer is responsible for determining the appropriate monitoring requirements that will measure compliance with effluent limitations and provide results representative of the permitted discharge. Where possible, the permit writer should explicitly identify the monitoring location(s) in the permit. Ultimately, however, the permittee is responsible for providing a safe and accessible sampling point that is representative of the discharge.

The permit writer should consider the following questions when selecting a monitoring location:

- Is the monitoring location on the facility's property?
- Is the sampling location accessible to the permittee and the Department?
- Will the results be representative of the targeted waste stream?
- Is monitoring at internal points needed?

Permit writers should establish monitoring locations where the wastewater is well mixed, such as near a Parshall flume or at a location in a sewer with hydraulic turbulence. Weirs tend to enhance solids settling immediately upstream and accumulation of floating oil or grease immediately downstream. Permit writers should avoid specifying such locations for sampling.

Monitoring locations will vary depending on the type of monitoring required. The MPDES Permit Template Tool includes a table, reproduced here in **Exhibit 13-1**, for specifying monitoring locations for both routine monitoring and monitoring requirements included in the Special Conditions section of the permit. Each monitoring location is

assigned a name consisting of a three letter abbreviation followed by a number. Monitoring locations could include the following types:

- Influent (INF-001, INF-002…)
- Effluent (EFF-001, EFF-002 for different outfalls, or EFF-001A, EFF-001B for different monitoring locations on the same outfall)
- Internal (INT-001, INT-002…)
- Receiving Surface Water (RSW-001, RSW-002, etc.; optionally RSW-001U, RSW-001D, RSW-002U, RSW-002D, etc. for upstream and downstream reference in a stream or river)
- Receiving Ground Water (RGW-001, RGW-002…)
- Land Discharge (LND-001, LND-002…)
- Reclamation Discharge (REC-001, REC-002…)
- Water Supply Monitoring (SPL-001, SPL-002...)
- Pretreatment Monitoring (POTWs only) (PRE-001, PRE-002…)
- Biosolids Monitoring (POTWs only) (BIO-001, BIO-002…)
- Sediment Monitoring (SED-001, SED-002…)

**Exhibit 13-1. Monitoring location table from MPDES Permit Template Tool**

| Discharge Point Name | Monitoring Location Name | Monitoring Location Description (include Latitude and Longitude when available) |
|---|---|---|
| -- | <INF-001> | <influent monitoring location description; latitude and longitude> |
| <Outfall 001> | <EFF-001A> | <monitoring location description> |
| <Outfall 002> | <EFF-002> | <monitoring location description> |
| -- | <RSW-001> | <surface water monitoring location description> |
| <Discharge Point Name> | <Monitoring Location Name> | <monitoring location description> |

The following sections discuss monitoring location considerations for each type of monitoring.

#### 13.1.2.1. Influent and source water monitoring locations

Influent monitoring consists of monitoring a waste stream prior to that waste stream receiving treatment. The permit writer should require influent monitoring only when characterization of the influent is needed to determine compliance with a permit condition. For example, the permit must require monitoring of influent biochemical oxygen demand and total suspended solids concentrations to determine compliance with the 85 percent removal limitations from the secondary treatment requirements. Influent flow monitoring typically is not required in MPDES permits.

Permit writers should require monitoring of source water prior to its use as process water (e.g., river water used as contact cooling water) if intake credits are established as specified in ARM 17.30.1345(9). Influent and source water monitoring locations should ensure a representative sample of influent or intake water prior to any processes or treatment that could alter its properties.

#### 13.1.2.2. Internal monitoring locations

Internal monitoring consists of monitoring waste streams at a location within the facility prior to discharge to the receiving water. ARM 17.30.1345(10) allows permit writers to establish internal monitoring points when needed to determine compliance with a standard and in cases where setting an effluent limitation and monitoring location at the point of discharge is impractical or infeasible. For example, the permit writer might require internal monitoring to determine compliance with technology-based effluent limitations (TBELs) for a waste stream at a point prior to the point where the waste stream commingles with other process or non-process waste streams (see examples below). Internal monitoring generally is not appropriate for determining compliance with water quality-based effluent limitations (WQBELs).

Examples of reasons for requiring designation of internal monitoring locations include:

- **Ensuring compliance with effluent guidelines**: When non-process wastewaters dilute process wastewaters subject to effluent limitations guidelines, monitoring the combined discharge may not accurately allow determination of whether the facility is complying with the effluent limitations guidelines. Under these circumstances, the permit writer might consider requiring monitoring for compliance with TBELs before the process wastewater is combined with the other dilute or non-effluent guidelines wastewaters.
- **Ensuring compliance with secondary treatment standards (for POTWs)**: Some POTWs include treatment processes that are ancillary to their biological treatment processes and that could impact their ability to monitor for compliance with secondary treatment standards. Other facilities that treat sewage might combine sewage treated using biological treatment with process wastewater that has been treated using another treatment system. Under these circumstances, the permit writer could consider requiring POTWs to monitor for compliance with effluent limitations based on secondary treatment standards or other facilities treating sewage to monitoring for compliance with their effluent limitations for conventional pollutants just after the biological treatment process (e.g., require monitoring of effluent after secondary clarification and prior to disinfection).
- **Allowing detection of a pollutant**: There can be instances where the combination of process and non-process wastewaters result in dilution of a pollutant of concern such that it would not be detectable using approved analytical methods. Internal monitoring would enable characterization of the pollutant prior to dilution with other wastewaters.

Internal monitoring locations should provide a representative sample of the wastewater to ensure compliance with TBELs or to detect a pollutant of concern. When establishing internal monitoring points, permit writers need to consider the location of wastewater treatment units within the facility. This consideration is particularly important when establishing internal monitoring locations for determining compliance with TBELs. A facility will most likely not be able to comply with TBELs if the permit writer establishes the monitoring location prior to the wastewater treatment unit.

#### 13.1.2.3. Effluent monitoring locations

Effluent monitoring is the monitoring of the final effluent after all treatment processes. The permit writer should require effluent monitoring to determine compliance with final or interim effluent limits established in the permit. Effluent monitoring data might also be used to characterize the effluent and assess the possible impact of the discharge on the receiving water.

Effluent monitoring locations should provide a representative sample of the effluent being discharged into the receiving water and should be established after all industrial uses and treatment processes. Most importantly, the point where the limit applies and the point where monitoring is required must be the same. A logical effluent monitoring point is just prior to discharge to the receiving water, particularly for ensuring compliance WQBELs.

#### 13.1.2.4. Ambient monitoring locations

Ambient monitoring of water quality conditions that might be affected by the discharge can be part of a regional or watershed monitoring program or required as part of a special study to gather information needed to characterize background conditions of the receiving water and determine the need for WQBELs. Special monitoring studies are discussed further in **Chapter 14**. Ambient monitoring locations generally include locations far enough upstream or away from the point of discharge to accurately characterize the receiving water without the influence of the discharge and points downstream or near the discharge sufficient to accurately characterize the effects of the discharge on the receiving water.

#### 13.1.2.5. Other monitoring locations

The permit writer should be sure to specify any other monitoring locations needed to determine compliance with permit conditions based on site- and discharge-specific concerns.

### 13.1.3. Monitoring Frequency

The permit writer should establish monitoring frequencies sufficient to detect noncompliance events without requiring needless or burdensome monitoring. In general, monitoring frequency should be determined on a case-by-case basis,, however, the Department has developed baseline influent and effluent monitoring requirements for certain conventional, nonconventional, and toxic pollutants for POTWs. These baseline monitoring requirements are included in **Exhibit 13-2 and Exhibit 13-3.**.

To modify a baseline monitoring frequency from **Exhibit 13-2 or Exhibit 13-3** or to establish a monitoring frequency for facilities, pollutants, or monitoring locations not addressed in these Exhibits, the permit writer should consider the variability of the concentration of various parameters by reviewing data for the facility (e.g., from DMRs) or, in the absence of actual data, information from similar permittees and should carefully describe the rationale in the permit fact sheet. A highly variable discharge generally requires more frequent effluent monitoring than a discharge that is relatively consistent over time. Other factors that should be considered when establishing appropriate effluent monitoring frequencies include:

- **Design capacity of the treatment facility.** The monitoring frequency might need to be increased at facilities where the treatment facility is nearing design capacity. For example, at equivalent average flow rates, a large lagoon system that is not susceptible to bypasses would require less frequent monitoring than an overloaded treatment facility that experiences fluctuating flow rates due to infiltration or large batch discharges from an industrial user. The effluent from the lagoon system should have a relatively low variability compared to the effluent from the facility receiving batch discharges;
- **Treatment method used.** The monitoring frequency will be similar for similar treatment processes. An industrial facility employing biological treatment would have similar monitoring frequency needs as a secondary treatment plant with the same units used for wastewater treatment. If the treatment method is appropriate and achieving high pollutant removals on a consistent basis, monitoring would be needed less frequently than for a plant with little or insufficient treatment;
- **Compliance history.** The monitoring frequency might need to be adjusted to reflect the compliance history of the facility. A facility with problems achieving compliance generally should be required to perform more frequent monitoring to characterize the source or cause of the problems or to detect noncompliance;
- **Cost of monitoring relative to permittee's capabilities.** The monitoring frequency should not be excessive and should be what is necessary to provide sufficient information about the discharge;
- **Location of the discharge.** The monitoring frequency might be increased if the discharge is to sensitive waters or is near a public water supply;
- **Nature of the pollutants.** To accurately characterize the discharge, the monitoring frequency might be increased for wastewaters with highly toxic pollutants or where the nature of the pollutants in the effluent varies;
- **Frequency of the discharge.** The monitoring frequency for a wastewater discharged in batches on an infrequent basis should differ from that for a continuous discharge of highly concentrated wastewater or a wastewater containing a pollutant that is found infrequently and at very low concentrations. Permit writers should consider the production schedule of the facility (e.g., seasonal, daily), the plant washdown schedule, and other similar factors;
- **Number of monthly samples used in developing permit limit.** The monitoring frequency should reflect the number of monthly samples used in developing average monthly WQBELs or the monitoring frequencies used to develop any applicable effluent guidelines; and
- **Tiered Limits.** The monitoring frequency requirements should correspond to the applicable tiers in cases where the permit writer has included “tiered” limits. If a facility has seasonal discharge limits, it might be appropriate to increase the monitoring frequency during the higher production season, and reduce the frequency during the off-season.

The quantitative approach described in USEPA's *Technical Support Document for Water Quality-Based Toxics Control (TSD)* <http://www.epa.gov/npdes/pubs/owm0264.pdf> provides an alternative method that permit writers can use to establish effluent monitoring frequencies. The TSD approach involves comparing the calculated long-term average pollutant concentration (accounting for the expected variability of the discharge) to the permit limit to determine the likelihood of noncompliance. Where the long-term average is close to the permit limit, more frequent monitoring should be required. Obviously, this quantitative approach requires a reasonable data set from which to calculate the long-term average. Permit writers should refer to Section 5.5.3 of the TSD for more information regarding this approach.

In 1996, USEPA issued *Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies* <http://www.epa.gov/npdes/pubs/perf-red.pdf>. Under this guidance MPDES reporting and monitoring requirements can be reduced based on a demonstration of excellent historical performance. Facilities can demonstrate this historical performance by meeting a set of compliance and enforcement criteria and by demonstrating their ability to consistently discharge pollutants below the levels necessary to meet their existing MPDES permit limits. Reductions are determined parameter-by-parameter, based on the existing monitoring frequency and the percentage below the limit at which the parameter is being discharged. The reductions are incorporated when the permit is reissued. To remain eligible for these reductions, permittees are expected to maintain the parameter performance levels and good compliance on which the reductions were based.

### 13.1.4. Sample Collection

The permit writer must specify the sample collection method for all parameters for which there are monitoring requirements in the permit. The permit writer should determine the sample collection method based on the characteristics of each specific discharge. Certain sample collection methods are required as part of the analytical methods specified in Part 136 (see **Section C** of this Chapter for additional discussion of analytical methods). The two most frequently used sampling types are grab and composite. For more information on sample collection methods, permit writers should refer to Chapter 5 of the National Pollutant Discharge Elimination System Compliance Inspection Manual <http://www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesinspect5.pdf>.

#### 13.1.4.1. Grab Samples

Grab samples are individual samples collected over a period of time not exceeding 15 minutes and that are representative of conditions at the time the sample is collected. Grab samples are appropriate when the flow and characteristics of the waste stream being sampled are relatively constant. The sample volume depends on the type and number of analyses to be performed. A grab sample is appropriate when a sample is needed to:

- sample an effluent that does not discharge on a continuous basis;
- provide information about instantaneous concentrations of pollutants at a specific time;
- allow collection of a variable sample volume;
- corroborate composite samples; and
- monitor parameters not amenable to compositing (e.g., pH, temperature, dissolved oxygen, chlorine, purgeable organics, oil and grease, coliform bacteria, and others specified by the MPDES permit, which could include phenols, sulfites, and hexavalent chromium). Volatile organics, sulfides, phenols, and phosphorus samples can be composited using special handling procedures.

Grab samples can also be used to determine the spatial variability of a parameter (i.e., variability through the cross section or depth of a stream or a large body of water), information on variability over a short period, or for intermittent wastewater flows from well-mixed batch process tanks.

#### 13.1.4.2. Composite Samples

Composite samples are collected over time to represent the average characteristics of the waste stream during the sample period. Composite samples provide a more representative measure of the discharge of pollutants over a given period than grab samples, and are used when:

- average pollutant concentration during the compositing period is determined;
- mass per unit time loadings is calculated; and

- wastewater characteristics are highly variable.

MPDES permits require that composite samples must, at a minimum contain at least four samples collected over the compositing period. The compositing period must be at least 6 hours and not more than 24 hours. The permit writer should specify the duration of the compositing time period, the time frame within which the each aliquot is to be collected, and the number of individual aliquots to be used in the composite.

Composite samples can be collected in a single sample bottle or by using discrete sequential monitoring, which refers to collecting discrete samples in individual containers in regular succession. Discrete sequential sampling can be done with an automatic sampling device. Such a device collects small amounts of a waste stream with the interval between sampling proportioned based on either time or effluent flow. The sequential sampling device automatically retrieves a sample and holds it in a bottle separate from other automatically retrieved samples, allowing many individual samples to be stored and analyzed separately and providing characteristics of the waste stream over a given time. Automatically timed and collected composite samples are usually preferable over manually collected composites. Composite samples collected by hand are appropriate for infrequent analyses and screening or if the subsamples have a fixed volume at equal time intervals.

There are two general types of composite sampling: **time-proportional** and **flow-proportional**. The permit writer should clearly express which type is required in the permit.

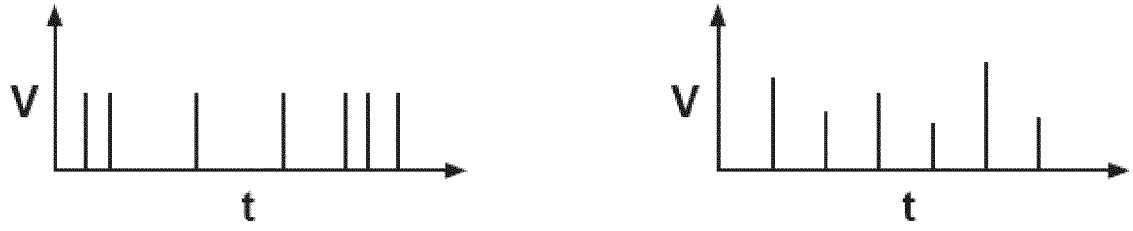
- **Time-Proportional Composite Sample:** This method collects a fixed volume (V) of discrete sample aliquots in one container at constant time intervals (t) as shown in **Exhibit 13-4**. This method is appropriate when the flow of the sampled stream is constant (flow rate does not vary more than ±10 percent of the average flow rate) or when flow monitoring equipment is not available.

**Exhibit 13-4. Visual interpretation of time-proportional composite sampling**

Time-proportional composite monitoring is appropriate when the flow of the sampled stream is constant (flow rate does not vary more than ±10 percent of the average flow rate) or when flow-monitoring equipment is not available.

- **Flow-Proportional Composite Sample:** There are two methods used for this type of sample: **constant volume** when the interval time varies between samples of constant volume, or **constant time** when the volume collected varies between samples collected at constant time intervals. These types of composite sampling are illustrated in **Exhibit 13-5**. Flow-proportional composite monitoring is usually preferred over time-proportional composite sampling when the effluent flow volume varies appreciably over time. If there is no effluent flow-measuring device, effluent samples can be manually composited using the influent flow measurement without any correction for time lag. The error in the influent and effluent flow measurement is insignificant except in those cases where extremely large volumes of water are impounded, as in reservoirs.

**Exhibit 13-5. Visual interpretation of flow-proportional composite sampling**




- The **constant volume flow-proportional composite monitoring** method collects a constant sample volume at varying time intervals proportional to the flow of the stream being sampled (e.g., 200 milliliters sample collected for every 5,000 gallons of flow).
- The **constant time flow-proportional composite monitoring** method collects the sample by increasing the volume of each aliquot as the flow being sampled increases, while maintaining a constant time interval between the aliquots. The flow volume may be proportional to
  - the flow rate at the time of sampling or
  - the total flow (volume) since the last sample.

Flow proportional composite samples can be collected in a single sample bottle or by using discrete sequential sampling, which refers to collecting discrete samples in individual containers in regular succession. Discrete sequential sampling can be done with an automatic sampling device. Such a device collects small amounts of a waste stream with the interval between sampling proportioned based on either time or effluent flow. The sequential sampling device automatically retrieves a sample and holds it in a bottle separate from other automatically retrieved samples, allowing many individual samples to be stored and analyzed separately and providing characteristics of the waste stream over a given time. Automatically timed and collected composite samples are usually preferable over manually collected composites. Composite samples collected by hand are appropriate for infrequent analyses and screening or if the subsamples have a fixed volume at equal time intervals.

#### 13.1.4.3. Continuous Monitoring

Continuous monitoring is an option for a limited number of parameters such as flow, total organic carbon (TOC), temperature, pH, conductivity, residual chlorine, fluoride and dissolved oxygen. Regulations at ARM 17.30.1345(12)(e) concerning pH limitations allow for a period of excursion when the effluent is being continuously monitored as long as the total time during which pH values are outside the required range does not exceed 7 hours and 26 minutes in any calendar month (i.e., 1 percent of a 31-day month) and no individual excursion exceeds 60 minutes.

The reliability, accuracy, and cost of continuous monitoring vary with the parameter monitored. The permit writer should consider the environmental significance of the variation of any of these parameters in the effluent and the cost of continuous monitoring before establishing continuous monitoring requirements in the permit.

### 13.1.5. Economic Considerations

The regulations do not specifically require a permit writer to evaluate costs when establishing monitoring conditions in a permit. As a practical matter, however, permit writers should consider the cost of the sampling requirements imposed on the permittee. The National Environmental Methods Index (NEMI) <http://www.nemi.gov> maintains a list of approximate cost per procedure of a typical analytical measurement using the specified methods (i.e., the cost of analyzing a single sample). Searching by a specific analyte provides the relative costs: $ (less than $50), $$ ($50 - $200), $$$ ($201 - $400), $$$$ (greater than $400).

In addition to the costs of the analytical method, the permit writer should note additional considerations that affect total project costs such as labor, equipment or supplies for typical sample preparation, QA/QC requirements to validate results reported, the number of samples being analyzed, and the frequency of required sampling. Complex and expensive sampling requirements might not be appropriate if the permit writer cannot justify the need for such analyses.

## 13.2. Additional Monitoring Requirements

In addition to regulating discharges of specific parameters by POTW or industrial wastewater discharges, might also include requirements for WET testing or requirements for other activities such as storm water discharges. WET testing is discussed in detail in **Chapter 11**.

### 13.2.1. Sanitary Sewer Overflow (SSO) Monitoring

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A facility's permit may also contain monitoring requirements for sanitary sewer overflows. These requirements would be developed on a case-by-case basis. Reporting, recordkeeping, and public notification requirements for SSOs should include:

- Immediate reporting of any overflow that could endanger human health or the environment
- A special written reports of any overflow that could endanger human health or the environment including reporting steps taken or planned to mitigate the impacts of the overflow and to reduce, eliminate, and prevent reoccurrence of the overflow; and
- Reporting in Discharge Monitoring Reports of any overflow for which immediate reporting or a special written report, as described above, are not required.

### 13.2.2. Storm Water Monitoring

Storm water monitoring requirements vary according to the type of permit regulating the storm water discharge and the activity. Municipal separate sewer systems (MS4s) serving over 100,000 people (and some serving less than 100,000) generally are issued individual permits with monitoring requirements specific to the MS4. Montana currently does not have any large MS4s.

Small MS4s regulated under the storm water Phase II rule are not required to conduct water quality monitoring as a condition in their NPDES general permit; however, Montana's general permit for small MS4s (Permit No. MTR040000, <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/MTR040000GeneralPermit.pdf>) includes monitoring requirements for the cities of Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, and Missoula.

Montana's general permit for storm water discharges associated with industrial activity (Permit No. MTR000000, <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/StormWaterIndustrial/Signed2006SWIndustrialGeneralPermit.pdf>) includes analytical monitoring requirements based on the type of industrial activity.

Finally, construction activity regulated under Montana's construction general permit (Permit No. MTR100000 <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/Storm%20Water%20Construction/MTR100000%20GP1.pdf>) is not required to conduct water quality monitoring; however, the permit includes requirements to inspect erosion and sediment control measures.

Additional documents from USEPA on storm water monitoring include:

- *Urban Stormwater BMP Performance: A Guidance Manual for Meeting the National Stormwater BMP Database Requirements* <http://www.epa.gov/npdes/pubs/montcomplete.pdf> (USEPA, 2002)
- *Guidance Manual for the Monitoring and Reporting Requirements of the NPDES Stormwater Multi-Sector General Permit (MSGP)* <http://www.epa.gov/npdes/pubs/dmr-fin.pdf> (USEPA, 1999).

## 13.3. Analytical Methods

The standard conditions of the permit indicate that the permittee must use methods specified in Part 136 <http://ecfr.gpoaccess.gov/> unless other procedures are specified in the permit (ARM 17.30.1342(10)(d)). Furthermore, 40 CFR 122.44(i)(iv), which is incorporated by reference in ARM 17.30.1344(2)(b), indicates that permits must include monitoring requirements according to test procedures in Part 136 for the analysis of pollutants having approved methods under that part and according to a test procedure specified in the permit for

pollutants with no approved methods. The Office of Science and Technology's Analytical Methods Web page <http://www.epa.gov/ost/methods/> contains information about analytical methods.

### 13.3.1. Approved Methods

Part 136 references methods in the following:

- Test methods in Appendix A of Part 136;
- *Standard Methods for the Examination of Water and Wastewater, 21st Edition* <No Link – see endnote for ordering instructions> (American Public Health Association, *et al.*, 2005);
- *Methods for the Chemical Analysis of Water and Wastewater* <No Link – see endnote for ordering instructions> (USEPA, 1993); and
- *Test Methods: Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* <No Link – see endnote for ordering instructions> (USEPA, 1996b).

In the absence of analytical methods for a particular parameters, the permit writer should specify the analytical methods that the permittee must use.

An excellent source of analytical method information is in the National Environmental Methods Index (NEMI) <http://www.nemi.gov/>, funded by the United States Geological Survey (USGS) and USEPA. NEMI supersedes USEPA's Environmental Monitoring Methods Index and is a web-based, free, searchable clearinghouse of methods. In addition to providing the relative cost, the database provides the method number, applicable regulation, method source, method name, citation, detection level, detection level type, accuracy, precision, spiking level, instrumentation, plus additional method information.

### 13.3.2. Method Detection Limits, Required Reporting Values, and Minimum Levels

When establishing monitoring requirements for a specific parameter limited in the permit, the permit writer should consider where the limit value falls relative to the method detection limit (MDL) and the minimum level (ML) established by the approved analytical method(s). The MDL represents the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. That is, the permittee can confidently say the pollutant is present, but not how much is there.

The Required Reporting Value (RRV) is a value established in Circular DEQ-7 for a particular pollutant that is the Department's best determination of a level of analysis that can be achieved by the majority of commercial, university, or governmental laboratories using USEPA approved methods or methods approved by the Department; The minimum level (ML) is similar to the RRV and used when an ML is available but no RRV is available for a particular parameter. The ML is defined as the concentration at which the entire analytical system gives a recognizable signal and acceptable calibration point. (Quantification below an established ML requires extrapolation of the calibration relationship). Once analytical instruments are calibrated to the RRV or ML, one can accurately say the pollutant is present at the reported concentration.

Where multiple approved methods are available, the permittee is free to select any method that meets the RRV or, where an RRV is not available, a method that has an ML sufficient to ensure that the method can accurately measure compliance. The permit writer may specify a reporting limit greater than the RRV given in Circular DEQ-7 if it is no more than one-tenth of the lowest effluent limitation for the parameter. For example, if the lowest limitation for copper in a permit is 20 µg/L, the reporting limit may be relaxed from the default reporting limit of 1 µg/L (the RRV) to 2 µg/L. Furthermore, if a permittee believes that there is matrix interference, it may conduct a matrix-specific study to determine an appropriate MDL and ML. This study must follow the procedures outlined in 40 CFR Part 136, Appendix B (Definition and Procedure for the Determination of the Method Detection Limit--Revision 1.11)

### 13.3.3. Determining Compliance

If an effluent limitation is above both the MDL and RRV or ML, it is clear that any valid effluent monitoring results above the effluent limitation demonstrate that the effluent limitation has been exceeded. Where the limitation falls below either the MDL or RRV/ML, the calculated effluent limitation must be included in the permit. The permit writer should clearly identify in the permit how compliance with that limit will be determined. The Department's procedure for determining compliance is as follows:

- **Single value limitations** (e.g., instantaneous or a maximum daily limitation for which compliance is determined using a single sample)
  - a result of "less than" the RRV, ML, or MDL should be considered in compliance
  - the permittee must report the analytical reporting limit reported by the laboratory with a less than value preceding the value—this procedure serves as a check to ensure the reporting level meets the level specified in the permit (RRV, ML, MDL)
  - when coded into USEPA's Integrated Compliance Information System (ICIS), the value is entered as a zero
  - if the permittee has not used a method that meets the specified reporting value in the result is considered invalid and the permittee potentially is out of compliance with the permit if a sufficient number of valid results are not available for the required monitoring period
- **Average value limitations** (e.g., weekly averages or monthly averages based on multiple samples):
  - substitute zero ("0") for the sample when averaging multiple samples
  - report the average as calculated on the Discharge Monitoring Report form and in ICIS
  - if also required to report individual values in addition to the average, the permittee must follow the procedures listed above for single value limitations

## 13.4. Reporting Monitoring Results

The MPDES regulations require the permittee to maintain records and periodically report on monitoring activities. The regulations at ARM 17.30.1342(12)(d)(i) require that monitoring results be reported on a Discharge Monitoring Report (DMR) <http://www.epa.gov/npdes/pubs/dmr.pdf>. Data reported include both data required by the permit and any additional data the permittee has collected consistent with permit requirements. Reporting frequency is established in the permit based on the nature and effect of the discharge or sludge use or disposal, but in no case may it be less than once per year (40 CFR 122.44(i)(2) incorporated by reference in ARM 17.30.1344(2)(b)). POTWs with pretreatment programs are required to submit a pretreatment report at least annually as required by 40 CFR 403.12(i).

## 13.5. Recordkeeping Requirements

Generally, the permittee is required by ARM 17.30.1342(10)(b) to retain records for at least three years, subject to extension by the Director. Recordkeeping requirements for sewage sludge [40 CFR 122.41(j)] and the CAFO program [40 CFR 122.42(e)(2)] require records be retained for at least five years. The permit writer should designate in the permit where records should be kept.

- Monitoring records must include:
- Date, place, time of sampling;
- Name of sampler;
- Date of analysis;
- Name of analyst;
- Analytical methods used; and
- Analytical results.

ARM 17.30.1342(10)(a) states that monitoring records must be representative of the discharge. Monitoring records, which must be retained, include, but are not limited to, continuous strip chart recordings, calibration data, copies of all reports for the permit, and copies of all data used to compile reports and applications.

Sludge regulations under 40 CFR 503.17, 40 CFR 503.27, and 40 CFR 503.47 establish recordkeeping requirements that vary depending on the use and disposal method for the sludge. The same recordkeeping requirements should be applied to other sludge monitoring parameters not regulated by the Part 503 rule.

## 13.6. References

(REVISE TO INCLUDE FULL CITATIONS)

USEPA, 1991. *Technical Support Document for Water Quality-Based Toxics Control (TSD)* <http://www.epa.gov/npdes/pubs/owm0264.pdf>

USEPA, 1993. *Methods for the Chemical Analysis of Water and Wastewater* <No Link – see endnote for ordering instructions>

USEPA, 1996a. *Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies* <http://www.epa.gov/npdes/pubs/perf-red.pdf>.

USEPA, 1996b. *Test Methods: Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* <No Link – see endnote for ordering instructions>.

USEPA, 1999. *Guidance Manual for the Monitoring and Reporting Requirements of the NPDES Stormwater Multi-Sector General Permit (MSGP)* <http://www.epa.gov/npdes/pubs/dmr-fin.pdf>

USEPA, 2002. *Urban Stormwater BMP Performance: A Guidance Manual for Meeting the National Stormwater BMP Database Requirements* <http://www.epa.gov/npdes/pubs/montcomplete.pdf>

USEPA, 2004. *National Pollutant Discharge Elimination System Compliance Inspection Manual*

American Public Health Association, *et al.*, 2005. *Standard Methods for the Examination of Water and Wastewater, 21st Edition* <No Link – see endnote for ordering instructions>

# Chapter 14. Special Conditions

Special conditions in Montana Pollutant Discharge Elimination System (MPDES) permits supplement numeric effluent limitations and help reduce pollutant discharges to receiving waters. Special conditions require the permittee to undertake activities designed to reduce the overall quantity of pollutants being discharged, to reduce the potential for discharges of pollutants, to implement programmatic requirements, or to collect information that could be used in determining future permit requirements. These special conditions generally are not included in the effluent limitations section of a permit because they do not contain specific numeric limitations.

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Most special conditions could apply to all types of permittees, while some special conditions are applicable only to a specific category of facilities such as publicly-owned treatment works (POTWs), treatment works treating domestic sewage (TWTDS), or industrial facilities. MPDES permits might include the following types of special conditions:

- Additional Monitoring and Special Studies;
  - Supplemental Monitoring and Studies;
  - Toxicity Identification Evaluation / Toxicity Reduction Evaluation (TIE/TRE); and
  - Infiltration/Inflow (I/I) [POTWs]
- Best Management Practices and Pollution Prevention;
- Compliance Schedules;
- Reopener Provisions;
- Storm Water Management [Associated with Industrial Activity]; and
- Sanitary Sewer Overflows [POTWs].

The remaining sections of this chapter briefly summarize the types of special conditions that are included in MPDES permits.

## *14.1. Additional Monitoring and Special Studies*

**Permit II.A.1**

**Fact Sheet II.C.1**

This section of the permit would contain special studies and additional monitoring requirements imposed beyond those required under the effluent limits section of the permit. These requirements are useful for collecting data that was not available to the permit writer for consideration during permit development and are generally used to supplement numeric effluent limits or support future permit development activities. Examples of the types of special studies may be required in an MPDES permit include:

### 14.1.1. Supplemental Monitoring and Studies

Supplemental monitoring and special studies that could be included in an MPDES permit are:

- **Ambient water quality studies**: Can be included as part of participation in a watershed study or regional monitoring program or to collect data for future permit development
- **Mixing or mixing zone studies:** Might be required in a permit to assist in determining how and effluent and receiving water mix and in establishing a source-specific mixing zone that can be applied when developing WQBELs
- **Sediment monitoring:** Could be included in a permit if pollutants contained in wastewater discharges are expected to accumulate in the sediments of the receiving water
- **Bioaccumulation studies:** Might be required in a permit to determine whether pollutants contained in wastewater discharges bioaccumulate in aquatic organisms (e.g., fish, invertebrates). These types of studies are usually recommended when WQBELs for pollutants that bioaccumulate are established below analytical detection levels. Additional guidance related to evaluating the bioaccumulation potential of a pollutant can be found in the *EPA Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors* (USEPA, 1995)

- **Treatability studies:** Could be required in a permit when treatability information is lacking for a pollutant or pollutants that would prohibit a permit writer from developing defensible technology-based effluent limitations. Treatability studies can also be required when the permit writer suspects that a facility might not be able to comply with an effluent limit.

When requiring a special study, permit writers should ensure that any particular requirements related to the study (e.g., special sampling or analytical procedures) are included in the special condition. In addition, permit writers should establish a reasonable schedule for completion and submission of the study, including any interim progress report dates (see section **C. Compliance Schedules and Interim Effluent Limitations**, below).

### 14.1.2. Toxicity Identification Evaluation/Toxicity Reduction Evaluation

Permit II.A.2

Fact Sheet II.C.1

One type of special study that applies to some permittees is a toxicity identification evaluation/toxicity reduction evaluation (TIE/TRE). MPDES permits should require permittees to develop and submit a TIE/TRE plans when the permit includes acute or chronic whole effluent toxicity limitations or when the permit requires routine WET testing and that testing reveals persistent toxicity. The Special Conditions section of the permit also should require that when a wastewater discharge is found to be toxic through WET testing, the permittee must implement this TIE/TRE plan. **Chapter 11** of this Manual provides further discussion of the Department's policies and procedures regarding WET testing, WET limitations, and control of effluent toxicity through development and implementation of TIE/TRE studies. The discussion includes examples of WET limitations as well as permit special conditions that address implementation of measures to identify and control toxicity.

## *14.2. Best Management Practices*

Best Management Practices (BMPs) are actions or procedures to prevent or reduce the pollution of waters of the U.S. The MPDES regulations, at ARM 17.30.1304(9), include the following in the definition of BMPs:

- Schedules of activities;
- Prohibitions of practices;
- Maintenance procedures;
- Treatment requirements;
- Other management practices to prevent or reduce the pollution of state waters; and
- Operating procedures and practices to control
  - Plant site runoff;
  - Spillage or leaks;
  - Sludge or waste disposal; and
  - Drainage from raw material storage areas.

BMPs are inherently pollution prevention practices. Traditionally, BMPs have focused on good housekeeping measures and good management techniques that attempt to avoid contact between pollutants and water resulting from leaks, spills, and improper waste disposal; however, based on the authority granted under the regulations, BMPs can include a range of pollution prevention options, including production modifications, operational changes, materials substitution, and materials and water conservation.

### 14.2.1. When to Use BMPs

Clean Water Act (CWA) section 304(e) authorizes USEPA to require BMPs as part of effluent limitations guidelines and standards (effluent guidelines) to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage which it determines are associated with or ancillary to the industrial manufacturing or treatment process and may contribute significant amounts of pollutants to navigable waters. Where effluent guidelines require specific BMPs or development of a BMP plan (e.g., the effluent guidelines for concentrated aquatic animal production facilities in 40 CFR Part 451), permit writers must include such requirements in permits. In addition, CWA section 402(p) provides authority for including BMPs in permits

for storm water discharges. Finally, CWA section 402(a)(1) gives Department the ability to include BMPs in permits on a case-by-case basis to meet the intent of the CWA.

In addition to these citations from the CWA, the NPDES regulations at Title 40 of the Code of Federal Regulations (40 CFR) 122.44(k) (incorporated by reference in ARM 17.30.1344(2)(b)) state that BMPs should be included as permit conditions (when applicable) when numeric effluent limitations are infeasible, or when BMPs are necessary to achieve limitations or carry out the purpose and intent of the CWA. Numeric effluent limitations could be infeasible under certain circumstances, including:

- a pollutant for which limited treatability or aquatic impact information are available to allow development of TBELs or WQBELs and
- the types of pollutants and the discharge rate vary greatly over time

A permit writer might also consider using BMPs when:

- chemical analyses are inappropriate or impossible,
- there is a history of leaks and spills or when housekeeping is sloppy,
- a complex facility lacks data for a pollutant or pollutants, or
- other discharge control options are prohibitively expensive.

### 14.2.2. BMPs in MPDES Permits

Permit II.B

Fact Sheet II.C.2

Permit writers can include BMP requirements in permits in two basic ways depending on the type of permit being developed: (1) site-, process-, or pollutant-specific BMPs or (2) a requirement to develop a BMP plan. Site-, process-, or pollutant-specific BMPs could be appropriate in the case of an individual permit where a permit writer has the opportunity to review the circumstances at the facility. On the other hand, it might not be appropriate to include site-, process-, or pollutant-specific BMPs as conditions in a general permit or a permit for a particularly complex facility with multiple processes not familiar to the permit writer. Instead, complicated facilities and discharges covered under a general permit could be required to develop a BMP plan that allows the permittee to determine appropriate BMPs based the particular facility.

#### 14.2.2.1. Specific BMPs

Specific BMPs are designed to address conditions particular to a site, process, or pollutant. Often, compliance inspections or other permit-related activities reveal the need for specific BMPs at a facility. Poor housekeeping observed during a pre-permitting site visit or a history of spills, for example, could indicate a need for specific BMPs to supplement the quantitative effluent limits for specific pollutants in the permit.

Specific BMPs are most effectively used in conjunction with effluent limitations in permits and may include water conservation, secondary containment, nondestructive testing, materials engineering, covering, sealing, packaging, waste stream segregation, source elimination, alarm systems, diverting, paving, runoff control, sludge management, monitoring and security. BMPs should not substitute for quantitative controls where such controls are feasible. Furthermore, BMPs should not tell managers how to run their plants or require costly methods when inexpensive ones will suffice. Specific BMPs have been developed for combined sewer overflows (CSOs) and storm water discharges and are discussed below.

#### 14.2.2.2. BMP Plans

USEPA's *Guidance Manual for Developing Best Management Practices* <http://www.epa.gov/npdes/pubs/owm0274.pdf> (USEPA, 1993c) describes the activities and materials at an industrial or municipal facility that are best addressed by BMP plans. The manual also describes how BMPs work and gives examples of the types of BMPs that can be used.

If a permit writer requires a BMP plan, it is the responsibility of the facility to prepare, develop, implement, and reevaluate the success or shortfalls of its own plan. Often, a BMP committee (i.e., a group of individuals within the plant organization) is responsible for developing the BMP plan and assisting the plant management in

implementing and updating the BMP plan. Plant management, not the committee, has overall responsibility and accountability for the quality of the BMP plan.

USEPA has identified several recommended components for effective BMP plans and detailed each component in the *Guidance Manual for Developing Best Management Practices* (USEPA 1993c). The minimum suggested components of a general BMP plan are:

General Requirements

- Name and location of facility
- Statement of BMP policy and objective
- Review by plant manager

Specific Requirements

- BMP committee
- Risk identification and assessment
- Reporting of BMP incidents
- Materials compatibility
- Good housekeeping
- Preventive maintenance
- Inspections and records
- Security
- Employee training

BMP plans used to supplement effluent limitations can be submitted for review by the Department or kept onsite and made available to the Department upon request. A general schedule for BMP plan development and implementation should be included in the permit (e.g., complete and submit the plan within six months of permit issuance, and begin implementing the plan within nine months of permit issuance).

Currently, specific types of BMP plans are required as conditions of several MPDES general permits. For example:

- Permittees applying for coverage under Montana's General Permit for Concentrated Animal Feeding Operations (MTG010000) <http://www.deq.state.mt.us/wqinfo/MPDES/Permits/CAFO/MTG010000_FinalPERMIT.pdf> must develop and submit a Nutrient Management Plan
- Permittees covered under Montana's General Permit for Storm Water Discharge Associated with Small Municipal Separate Storm Sewer Systems (MS4s) (MTR040000) <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/MTR040000GeneralPermit.pdf> must develop and implement a Storm Water Management Program (SWMP)
- Permittees covered under Montana's General MPDES Permit for Storm Water Discharges Associated with Industrial Activity (MTR000000) <http://www.deq.state.mt.us/wqinfo/mpdes/StormWater/StormWaterIndustrial/Signed2006SWIndustrialGeneralPermit.pdf> must develop and implement a Storm Water Pollution Prevention Plan
- Permittees covered under Montana's General Permit for Storm Water Discharges Associated with Mining and with Oil and Gas Activities (MTR300000) <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/StormWaterMining/MTR300000GeneralPermit.pdf> also must develop and implement a Storm Water Pollution Prevention Plan.
- Permittees covered under Montana's General Permit for Storm Water Associated with Construction Activity (MTR100000) <http://www.deq.state.mt.us/wqinfo/MPDES/StormWater/Storm%20Water%20Construction/MTR100000%20GP1.pdf> must develop and implement a Storm Water Pollution Prevention Plan

If a permittee would otherwise be required to develop some type of BMP plan under a general permit, but the Department determines that the permittee's discharge should be covered under an individual MPDES permit, the

individual permit should include requirements for a BMP plan similar to what would have been required under the general permit.

## 14.3. Compliance Schedules and Interim Effluent Limitations

The MPDES regulations at ARM 17.30.1350 allow permit writers to establish schedules of compliance to give permittees additional time to achieve compliance with the Montana Water Quality Act (MWQA) and the CWA when such time is necessary. Schedules developed under this provision must require compliance by the permittee "as soon as possible," but may not extend the date for final compliance beyond compliance dates established by the MWQA or CWA. Compliance schedules that exceed one year from the date of permit issuance must set forth interim requirements and the dates for their achievement. In most cases, the Department recommends that a permit containing a compliance schedule for final effluent limitations also include interim effluent limitations that apply prior to the final effluent limitations compliance deadline. This section considers development of compliance schedules and interim effluent limitations consistent with statutory and regulatory requirements.

### 14.3.1. Appropriateness of a Compliance Schedules

Permit II.C

Fact Sheet II.C.3

As noted above, some compliance dates established by the MWQA and CWA have passed. Thus, compliance schedules in permit are not appropriate for every type of permit requirement. Specifically, a permit writer may not establish a compliance schedule in a permit for TBELs because the statutory deadlines for meeting technology-based standards (i.e., secondary treatment standards and effluent guidelines) have passed. This restriction generally applies to both existing and new discharges.

Permit writers should note, however, that 17.30.1350(1)(b) allows the first MPDES permit issued to a new source or a new discharger to contain a schedule of compliance, but only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised after commencement of construction but less than three years before commencement of the relevant discharge. For recommencing discharges, a compliance schedule is available only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised less than three years before recommencement of the discharge. Also, ARM 17.30.1340(8) requires a new source, new discharger, or recommencing discharger that does not have a compliance schedule to "start-up" all pollution control equipment required to meet all permit conditions before beginning to discharge, but allows up to 90 days to actually meet all permit conditions.

Examples of situations where a compliance schedule in an MPDES permit ***might*** be appropriate include BMP plan development and implementation or effluent limitations derived from new or revised water quality standards. In situations where a permittee will be unable to meet permit conditions and a compliance schedule pursuant to ARM 17.30.1350 is not available, the practical alternative is to initiate a compliance order under the MWQA at 75-5-613 MCA concurrent with permit issuance.

An EPA Administrator's decision specifically addresses compliance schedules for effluent limitations derived from new or revised water quality standards. In the decision *In the Matter of Star-Kist Caribe, Inc.*, 3 E.A.D. 172,175,177 (1990) <http://www.epa.gov/npdes/pubs/owm0121.pdf> the EPA Administrator interpreted section 301(b)(1)(C) of the CWA to mean that 1) after July 1, 1977, permits may not contain compliance schedules for effluent limitations based on water quality standards adopted before July 1, 1977, and 2) compliance schedules are allowed for effluent limitations based on standards adopted after that date only if the state has clearly indicated in its water quality standards or implementing regulations that it intends to allow them.

### 14.3.2. Considerations for Establishing Compliance Schedules

USEPA recommends that permit writers apply the following principles when assessing whether a compliance schedule for achieving a WQBEL is consistent with statutory and regulatory requirements. MPDES permit writers also should account for these considerations when documenting the basis for a compliance schedule in the MPDES permit fact sheet. Permit writers should:

1. demonstrate that the permittee cannot immediately comply with the new effluent limitation on the effective date of the permit;
2. include an enforceable final effluent limitation and a date for achievement in the permit;
3. justify and document the appropriateness of the compliance schedule; factors relevant to a determination that a compliance schedule is appropriate include how much time the permittee had to meet the WQBEL under prior permit(s), whether there is any need for modifications to treatment facilities, operations, or other measures and, if so, how long it would take to implement such modifications;
4. justify and demonstrate that compliance with the final WQBEL is required "as soon as possible"; factors relevant to a determination that a compliance is required "as soon as possible" include the steps needed to modify or install treatment facilities, operations, or other measures and the time those steps would take;
5. include an enforceable sequence of events leading to compliance with interim milestones for schedules longer than one year; and
6. recognize that a schedule solely to provide time to develop a total maximum daily load (TMDL) or to conduct a use attainability analysis (UAA) is not appropriate.

Most of these principles could be more generally applied to compliance schedules for requirements other than WQBELs as well.

### 14.3.3. Calculating Interim Effluent Limitations

Permit I.B.5

Fact Sheet II.A.4

The final effluent limitations in an MPDES permit are the most protective of the calculated effluent limitations, subject to the results of any required nondegradation and anti-backsliding analysis. If the permittee is not to immediately comply with the final effluent limitations and a compliance schedule is included in the MPDES permit, the permit also should include interim effluent limitations in the permit. Interim effluent limitations can be calculated using procedures very similar to those outlined in **Chapter 10** for calculating effluent limitations for existing discharges where a narrative water quality standard is not met in the receiving water. The procedures are designed to hold the discharge to the existing performance level. These procedures are as follows:

1. Assemble three to five years of effluent data for the facility, ensuring that the data are representative of the current discharge.
    a. If the effluent limitations are calculated for nutrients (nitrogen or phosphorus) and the discharge is to a reach composed of flowing water (e.g., a stream), the assembled data and the subsequent analysis should be seasonal for June, July, August, and September. For all other pollutants of concern and for nutrient discharges to lakes, the assembled data and subsequent analysis are for the entire year.
    b. If sufficient data are not available, no effluent limitations can be developed and the permit should include monitoring requirements for the pollutant of concern.
2. From the assembled effluent data, calculate the long-term average (LTA) of the effluent pollutant concentration for the pollutant of concern.
3. Use the equations in **Exhibit 14-1** below to calculate the interim average monthly effluent limitation (AML) and interim maximum daily effluent limitations (MDL) from the LTA.
4. Use the critical effluent flow and the equation in **Exhibit 14-1** to calculate a mass-based interim AML and interim MDL to supplement the concentration-based limitations. The critical effluent flow is determined as follows:
    a. When permitting **publicly-owned treatment works (POTWs)**, the critical effluent flow ($Q_d$) used in steady-state water quality modeling for MPDES permits is the **design flow** reported in Part A.6 of application Form 2A or otherwise determined from information reported by the facility.
    b. For **non-POTWs**, the critical effluent flow ($Q_d$) is:
        i. For calculating the **AML—the maximum 30-day average flow** reported in Part V.A of application form 2C or calculated from flow data from a minimum of the past three years (3) and a maximum of the past five (5) years of data that are representative of the discharge that will be permitted

ii. For calculating **MDL**—the **highest maximum daily flow** reported in Part II.C or Part V.A of application form 2C or calculated from flow data from a minimum of the past three years (3) and a maximum of the past five (5) years of data that are representative of the discharge that will be permitted.

**Exhibit 14-1. Interim AML and MDL calculations**

$$AML = LTA \times AML_{multiplier95} = LTA \times e^{\wedge}(z\sigma_n - 0.5\sigma_n^2)$$
$$\text{Mass-based AML} = \text{Concentration-based AML} \times (Q_d) \times 8.34$$

$$MDL = LTA \times MDL_{multiplier99} = LTA \times e^{\wedge}(z\sigma - 0.5\sigma^2)$$
$$\text{Mass-based MDL} = \text{Concentration-based MDL} \times (Q_d) \times 8.34$$

Where:
$Q_d$ = critical effluent flow

For the AML:
$\sigma_n = [ln(CV^2/n + 1)]^{0.5}$
$\sigma_n^2 = ln(CV^2/n + 1)$
z = 1.645 (95th percentile probability basis)
n = number of samples per month that will be required in the permit

For the MDL:
$\sigma_n = [ln(CV^2 + 1)]^{0.5}$
$\sigma_n^2 = ln(CV^2 + 1)$
z = 2.326 (99th percentile probability basis)

Interim limitations should be effective immediately and continue in effect until the ending date of the compliance schedule (i.e., when final effluent limitations become effective). Permit writers should carefully document the data and procedures used to calculate interim effluent limitations in the MPDES permit fact sheet.

## 14.4. Reopener Provisions

Permit II.D.

Fact Sheet II.C.4

The MPDES regulations at ARM 17.30.1361 address causes for modifying an MPDES permit based on information obtained after permit issuance. In some cases, however, it might be desirable to include a reopener provision in an MPDES permit that specifically states conditions under which the Department would consider reopening and modifying the permit (e.g., completion of a TMDL or special receiving water study).

## 14.5. Sanitary and Combined Sewer Overflows [POTWs]

This portion of the special conditions section in an MPDES permit includes any requirements for control of sanitary or combined sewer overflows and applies to POTWs only.

### 14.5.1. Sanitary Sewer Overflows (SSOs)

Permit II.F

Fact Sheet II.C.6

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into them to a POTW; however, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system. These types of discharges are called sanitary sewer overflows (SSOs). SSOs have a variety of causes including, but not limited to, severe weather, improper system operation and maintenance, and vandalism. For example, infiltration and inflow (I&I) occurs when ground water infiltrates the sewer system through defects in the piping or when excess water inflows to the system through direct connections such us yard or roof drains. I/I can hydraulically overload sewer system piping and lead to sanitary sewer overflows (SSOs).

USEPA estimates that there are at least 40,000 SSOs each year. The untreated sewage from these overflows can cause serious water quality problems and back-up into basements, causing property damage and threatening public health. Many municipalities have asked for national consistency in the way permits are considered for wastewater discharges, including SSOs, and in enforcement of the law prohibiting unpermitted discharges.

USEPA has developed draft model permit conditions addressing SSOs that include:

- General provisions stating that discharges from unauthorized locations are prohibited, that the permittee must properly manage, operate and maintain, at all times, all parts of the collection system that it owns or over which it has operational control; and that the permittee must take all feasible steps to stop, and mitigate the impact of, sanitary sewer overflows in portions of the collection system the permittee owns or over which it has operational control.
- Requirements to develop and implement a Capacity, Management, Operations, and Maintenance program.
- Reporting, recordkeeping, and public notification requirements (discussed further in Chapter **13**). including
    - Immediate reporting of any overflow that could endanger human health or the environment
    - Written reports of overflows that could endanger human health or the environment including reporting steps taken or planned to mitigate the impacts of the overflow and to reduce, eliminate, and prevent reoccurrence of the overflow
    - Reporting in Discharge Monitoring Reports of any overflow for which immediate reporting or a special written report, as described above, are not required.

For information on the latest policy developments related to SSOs, see USEPA's Sanitary Sewer Overflows Web site <http://cfpub.epa.gov/npdes/home.cfm?program_id=4>.

### 14.5.2. Combined Sewer Overflows (CSOs)

Combined sewer systems were designed and built in the 19th and early 20th centuries to collect sanitary and industrial wastewater and storm water runoff. During dry weather, combined sewers carry sanitary wastes and industrial wastewater to a treatment plant. In periods of heavy rainfall, however, storm water is combined with untreated wastewater, which can overflow and discharge directly to a water body without being treated. These overflows are called combined sewer overflows (CSOs).

On April 19, 1994, USEPA published a CSO Control Policy in the Federal Register (59 FR 18688). This Policy represents a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a comprehensive and coordinated planning effort to achieve cost effective CSO controls that ultimately meet appropriate health and environmental objectives.

CSOs are point source discharges subject to both the technology-based requirements of the CWA and applicable State water quality standards. Under the CWA, CSOs must comply with BAT for nonconventional and toxic pollutants and BCT for conventional pollutants. However, there are no promulgated BAT or BCT effluent guidelines and limitations for CSOs. As a result, permit writers must use best professional judgment in developing technology-based permit requirements for controlling CSOs. Permit conditions also must achieve compliance with applicable water quality standards. Because controlling CSOs typically requires substantial long-term planning, construction, financing and continuous reassessment, the implementation of CSO controls occur over several permit cycles.

Montana does not have combined sewer systems with CSOs and, therefore, MPDES permits do need to not incorporate USEPA's CSO Control Policy.

## 14.6. References

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# Chapter 15. Standard Conditions

Standard conditions are pre-established requirements that must be incorporated into every MPDES permit, including both individual and general permits. Standard conditions play an important supporting role to numeric effluent limitations by delineating the legal, administrative, and procedural requirements of the permit. They cover a variety of topics, including definitions, testing procedures, records retention, notification requirements, penalties for noncompliance, and permittee responsibilities.

MPDES permits include the standard conditions required by the federal NPDES regulations. The Administrative Rules of Montana (ARM) incorporate these federal standard conditions. ARM 17.30.1342 details the conditions applicable to all permits, and ARM 17.30.1343 details the additional conditions applicable to specified categories of MPDES Permits (e.g., POTWs). In addition to what is required by federal regulation, the Department of Environmental Quality (Department) has developed some additional standard conditions.

Under the federal requirements, permitting authorities may decide to insert standard conditions in permits verbatim or to incorporate them into permits by reference to the appropriate regulations. The Department has decided to include standard conditions verbatim and has developed specific standard condition text to include in all MPDES permits. This approach ensures consistency in these important permit requirements across MPDES permits and assures that permits comply with State and federal regulations.

The standard conditions are incorporated into Part III of MPDES permits include both standard conditions required by federal regulations along with one additional standard conditions developed by the Department related to permit fees under ARM 17.30.201. Some of these standard conditions apply only to specific categories of permittees (e.g., publicly-owned treatment works). Although permit writers do not have the authority to change these standard conditions, they should be aware of their contents and be able to explain what they mean to a permittee or to another interested party.

The remaining sections of this chapter briefly summarize the standard conditions that are included in MPDES permits. Following each summary are references to where the standard condition is found in the Code of Federal Regulations (CFR) and the Montana Code Annotated (MCA) or ARM, if it is a condition required by regulation or statute.

The standard conditions summarized in Subsections 16.A through 16.C apply to all discharges regulated by MPDES permits: Monitoring, Recordkeeping, and Reporting; Compliance Responsibilities; and General Requirements. Each standard condition is presented by its title, followed by a brief summary of what is required by the standard condition, and regulatory citations. Subsection 16.D summarizes requirements in the standard conditions portion of the regulations that apply to certain categories of permits.

Permit writers should refer to the MPDES Permit Template to view the full text of the standard conditions as they actually appear in MPDES permits.

## *15.1. Standard Conditions Applicable to All Permits—Monitoring Recording and Reporting Requirements*

### 15.1.1. Representative Sampling

Permit III.A

Samples and measurements must be representative of the monitored activity. [40 CFR 122.41(j)(1)] [ARM 17.30.1342(10)(a)]

### 15.1.2. Monitoring and Reporting Procedures

Wastewater measurements must be conducted in accordance with 40 CFR Part 136 or other specified procedures. ARM incorporates 40 CFR Part 136 by reference. [40 CFR 122.41(j)(4)] [ARM 17.30.1342(10)(d)] [ARM 17.30.1342(15)(a)]. Monthly monitoring results must be submitted on a Discharge Monitoring Report (DMR). [40 CFR 122.41(l)(4)(i)] [ARM 17.30.1342(12)(d)(i)]

### 15.1.3. Penalties for Tampering

Falsification, tampering, or knowingly rendering inaccurate any monitoring device or method required in the permit is prohibited and punishable by fine, imprisonment, or both. [40 CFR 122.41(j)(5)] [75-5-633 MCA]

### 15.1.4. Compliance Schedule Reporting

Reports required by a compliance schedule in the permit must be submitted within 14 days of the interim or final requirement compliance date. [40 CFR 122.41(l)(5)] [ARM 17.30.1342(12)(e)]

### 15.1.5. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required in the permit using approved test procedures, the results must be included in the data submitted in a DMR. [40 CFR 122.41(l)(4)(ii)] [ARM 17.30.1342(12)(d)(ii)]

### 15.1.6. Records Contents

Monitoring records must identify the sampling dates and personnel, the sample location and time, and the corresponding analytical results. [40 CFR 122.41(j)(3)] [ARM 17.30.1342(10)(c)]

### 15.1.7. Retention of Records

Records must be retained for 3 years (5 years for sludge and CAFO records) subject to extension at the request of the Department. [40 CFR 122.41(j)(2)] [ARM 17.30.1342(10)(b)]

### 15.1.8. Twenty-Four Hour Notification

The permittee must report any noncompliance that may endanger human health or the environment within 24 hours after becoming aware of the circumstance. Within 5 days, the permittee must provide a written submission providing details about the noncompliance and its cause. Other events requiring 24-hour notice are unanticipated bypasses exceeding effluent limitations, upsets, and violations of maximum daily limitations for pollutants listed for 24-hour notification by the Department. [40 CFR 122.41(l)(6)] [ARM 17.30.1342(12)(f)]

### 15.1.9. Other Noncompliance Reporting

The permittee must report all instances of noncompliance not reported under other specific reporting requirements at the time monitoring reports are submitted. [40 CFR 122.41(l)(7)] [ARM 17.30.1342(12)(g)]

### 15.1.10. Inspection and Entry

The permittee must, upon presentation of valid credentials by a representative of the Department, allow entry into the premises where the regulated activity or records are present. The Department must have access to and be able to make copies of any required records, inspect facilities, practices, operations, and equipment, and sample or monitor at reasonable times. [40 CFR 122.41(i)] [ARM 17.30.1342(9)]

## *15.2. Standard Conditions Applicable to All Permits—Compliance Responsibilities*

The subsections below provide brief summaries and regulatory citations for standard conditions pertaining to compliance responsibilities. Readers should refer to the MPDES Permit Template for the exact wording of each standard condition.

### 15.2.1. Duty to Comply

Permit III.B



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The permittee must comply with all conditions of the permit. Noncompliance is a violation of the CWA and is grounds for injunctive relief, substantial monetary penalties, incarceration, changes or terminations to the permit, or denial of permit renewal. [40 CFR 122.41(a)] [ARM 17.30.1342(1)]

### 15.2.2. Penalties for Violations of Permit Conditions

Violations of permit conditions are potentially subject to civil, criminal, or administrative penalties under the Montana Water Quality Act. [MCA 75-5-631], [ARM 17.30.1342(1)(b)]; [MCA 75-5-632], [ARM 17.30.1342(1)(b)]; [MCA 75-5-611(9)(a)]

### 15.2.3. Need to Halt or Reduce Activity not a Defense

The permittee may not, as a defense in an enforcement action, use the reasoning that it could only achieve compliance by halting or reducing the permitted activity. [40 CFR 122.41(c)] [ARM 17.30.1342(3)]

### 15.2.4. Duty to Mitigate

The permittee is required to take all reasonable steps to prevent any discharge in violation of the permit that has a reasonable likelihood of adversely affecting human health or the environment. [40 CFR 122.41(d)] [ARM 17.30.1342(4)]

### 15.2.5. Proper Operation and Maintenance

The permittee must properly operate and maintain all equipment and treatment systems used for compliance with the terms of the permit and must provide appropriate laboratory controls and quality assurance procedures. Backup systems are required when needed to ensure compliance. [40 CFR 122.41(e)] [ARM 17.30.1342(5)]

### 15.2.6. Bypass of Treatment Facilities

Intentional diversions of untreated waste streams from any portion of a treatment facility are prohibited unless (a) the bypass does not cause effluent to exceed effluent limitations and is necessary for essential maintenance to ensure efficient operation or (b) the bypass is unavoidable to prevent loss of life, personal injury, or severe property damage, there are no feasible alternatives, and the proper notification is submitted. [40 CFR 122.41(m)] [ARM 17.30.1342(13)]

### 15.2.7. Upset Conditions

An upset can be used as an affirmative defense in actions brought to the permittee for noncompliance with a technology-based effluent limitation. The permittee (who has the burden of proof) must have operational logs or other evidence showing (a) when the upset occurred and its causes; (b) that the facility was being operated properly; (c) proper notification was made; and (d) remedial measures were taken as required by the duty to mitigate standard condition. [40 CFR 122.41(n)] [ARM 17.30.1342(14)]

## *15.3. Standard Conditions Applicable to All Permits—General Requirements*

The subsections below provide brief summaries and regulatory citations for standard conditions pertaining to general administrative requirements of MPDES permit requirements. Readers should refer to the MPDES Permit Template for the exact wording of each standard condition.

### 15.3.1. Planned Changes

Permit III.C.

Notice must be given to the department as soon as possible of any planned physical alterations or additions to the facility if the changes or additions may cause the facility to meet the criteria for a new source or if the changes affect the nature and concentration of pollutants discharged but not limited in the permit or for which other notification requirements do not apply. [40 CFR 122.41(l)(1)] [ARM 17.30.1342(12)(a)] The permittee also must give advance notice of any planned changes at the permitted facility

or of an activity that could result in noncompliance with permit requirements. [40 CFR 122.41(l)(1)] [ARM 17.30.1342(12)(b)]

### 15.3.2. Anticipated Noncompliance

The permittee must give advance notice of any conditions that could result in noncompliance. [40 CFR 122.41(l)(2)] [ARM 17.30.1342(12)(b)]

### 15.3.3. Permit Actions

The permit may be modified, revoked, reissued, or terminated for cause. The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition. [40 CFR 122.41(f)] [ARM 17.30.1342(6)]

### 15.3.4. Duty to Reapply

If a permittee desires to continue its activities after the date of expiration of its current permit it must reapply for and obtain a new permit. [40 CFR 122.41(b)] [ARM 17.30.1342(2)]

### 15.3.5. Duty to Provide Information

The permittee must provide any information needed for the Department to determine compliance with the permit or to evaluate the need for modifying, revoking, reissuing, or terminating the permit. [40 CFR 122.41(h)] [ARM 17.30.1342(8)]

### 15.3.6. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in its application, or submitted incorrect information in its application or other reports, it must promptly submit such information. [40 CFR 122.41(l)(8)] [ARM 17.30.1342(12)(h)]

### 15.3.7. Signatory Requirements

Applications, reports, or information submitted to the Department must be signed and certified by the appropriate officials. [40 CFR 122.41(k)(1)] [ARM 17.30.1342(11)]

### 15.3.8. Penalties for Falsification of Reports

Knowingly making false statements, representations, or certifications is subject to penalties. [40 CFR 122.41(k)(2)] [MCA 75-5-633]

### 15.3.9. Property or Water Rights

The permit does not convey any property rights of any sort, or any exclusive privilege. [40 CFR 122.41(g)] [ARM 17.30.1342(7)]

### 15.3.10. Transfers

The permit is not transferable except after written notice to the Department, and the Department may require modification or revocation and reissuance, as necessary. [40 CFR 122.41(l)(3)] [ARM 17.30.1342(12)(c)]

### 15.3.11. Fees

The permittee is required to submit payment of an annual fee as set forth in ARM 17.30.201.

## *15.4. Standard Conditions Applicable to Certain Categories of Permits*

In addition to standard conditions specified in 40 CFR 122.41 and ARM 17.30.1342 that are applicable to all permittees, 40 CFR 122.42 and ARM 17.30.1343 include additional conditions applicable to certain categories of NPDES permits. Below are summaries of these additional standard conditions by type of facility.

Permit III.D.

### 15.4.1. Non-Municipal (Industrial) Permits

Additional standard conditions applicable to non-municipal permits are found in 40 CFR 122.42(a) and ARM 17.30.1343(1), specify that the permittee must notify the department as soon as they know or have reason to believe that the discharge has or will exceed certain notification levels specified in 40 CFR 122.42(a)(1) and (2) and ARM 17.30.1343(1)(a) and (b). The Montana rules at ARM 17.30.1343(3), which incorporates 40 CFR 122.44(f) by reference, allows permittees allows the Department to establish alternate notification levels upon petition by the permittee or by its own initiative.

### 15.4.2. Municipal Permits

Additional standard conditions applicable to POTWs are found in 40 CFR 122.42(b) and ARM 17.30.1343(2). These standard conditions specify that the permittee must provide adequate notice to the Department of the new introduction of certain pollutants into the POTW from an indirect discharger and of substantial changes in the volume or character of pollutants introduced into the POTW. This notice must include information on the quality and quantity of effluent introduced to the POTW and information on the impact to the quality and quantity of the POTW's effluent.

### 15.4.3. Storm Water

#### 15.4.3.1. Municipal Separate Storm Sewer Systems

Additional standard conditions applicable to large, medium or USEPA-designated municipal separate storm sewer systems are found in 40 CFR 122.42(c). These standard conditions require that the permittee must submit an annual report addressing the status, and changes to, the storm water management program, water quality data and other information specified in 40 CFR 122.42(c)(1)-(6).

#### 15.4.3.2. Individual Storm Water Permits

Initial permits for discharges composed entirely of storm water and permitted under 40 CFR 122.26(e)(7) (storm water associated with industrial activities and large and small municipal separate storm sewer systems) must require compliance as expeditiously as practicable, but in no event later than three years after permit issuance.

### 15.4.4. CAFOs

The regulations at 40 CFR 122.42(e) specify conditions that must be included in all permits for CAFOs. Although these conditions are required and are specified in the regulations with other standard conditions, they are included in the Special Conditions section of the MPDES General Permit for Concentrated Animal Feeding Operations (MTG0100000).

# Chapter 16. Permit Documentation

The regulations at ARM 17.30.1304(18) describe a draft permit as a document prepared under ARM 17.30.1364 indicating the Department of Environmental Quality's (Department's) tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a permit. The administrative record and the fact sheet describes the rationale behind the draft permit, provides a sound basis for future permit issuance or modification, and is used to support and defend the permit during an administrative or legal appeal. Properly documenting a draft permit requires the permit writer to be organized and logical throughout the permit development process. Some of the content of the fact sheet is specified by federal and State regulation, and the remainder is suggested by good project management

## *16.1. Administrative Record*

An administrative record is the library of information supporting a permit and is required for permits issued by the U.S. Environmental Protection Agency (USEPA). The contents of the administrative record for a USEPA permit are prescribed by regulation. 40 CFR 124.9 identifies the required content of the administrative record for a draft permit and 40 CFR 124.18 describes the requirements for final permits. When the Department is the permit issuing authority, there is no specific regulatory requirement for an administrative record; however, the supporting information for the permit is made available to the public and can be examined during the public comment period and any subsequent public hearing. Thus, maintaining permit records in a neat, orderly, complete, and retrievable form is extremely important. A strong record for the permit allows the Department to reconstruct the rationale for the permit conditions and defend the permit during any administrative or court proceedings. The typical elements of an permit record for a draft MPDES permit are shown is **Exhibit 17-1**

The permit record should include all meeting reports and

**Exhibit 17-1. Elements of the administrative record for a draft MPDES permit**

Permit application and supporting data
Draft permit
Fact sheet
All items cited in the fact sheet, including calculations used to derive the effluent limitations
Meeting reports
Correspondence with the applicant and regulatory personnel
All other items in the supporting file
For new sources, any Environmental Assessment or EA, draft or final Environment Impact Statement, or other such background information, such as a Finding of No Significant Impact prepared pursuant to the requirements of the Montana Environmental Policy Act

correspondence with the permit applicant and other regulatory agency personnel, trip reports, and records of telephone conversations. All correspondence, notes, and calculations should be dated and indicate the name of the writer and all other persons involved. Because correspondence is subject to public scrutiny, references or comments that do not serve an objective purpose should be avoided. Finally, presentation of calculations and documentation of decisions should be organized in such a way that they can be reconstructed and the logic supporting the calculation or decisions is easily retrievable.

The Department has developed several tools to assist permit writers with developing strong documentation for MPDES permits. The MPDES Permit and Fact Sheet Templates provide detailed outlines and permit text for both municipal and industrial permits. In addition, the output from the MPDES e-Permit Tool is a series of spreadsheets that the permit writer should use to document the reasonable potential analysis and calculation of water quality-based effluent limitations. Finally, the Department has developed an MPDES Permit Administrative Record Checklists that permit writers should use to ensure that they compile a complete administrative record for each MPDES permit.

## 16.2. Fact Sheets

A fact sheet is a document that briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. When a permit is in the draft stage, the fact sheet and supporting documentation serve to explain the rationale and assumptions used in deriving the limitations to the permittee, the public, and other interested parties.

The MPDES regulations in ARM 17.30.1371(1) require preparation of a fact sheet for every draft permit for a major facility or a facility that the Department finds is subject to widespread public interest. For all other MPDES permits, there are no regulatory requirements to prepare a fact sheet; however, the Department recommends that permit writers thoroughly document the rationale for all permit conditions, even where a detailed fact sheet is not required. (When USEPA is the permit-issuing authority, the federal regulations at 40 CFR 124.7 require a statement of basis for all NPDES permits for which a fact sheet is not explicitly required. A statement of basis briefly describes the derivation of the conditions of the draft permit and the reasons for them.)

A well-documented rationale for all permit decisions reduces the work necessary to reissue a permit by eliminating conjecture concerning the basis for development permit conditions and providing the information needed to determine which conditions should be carried forward to the next permit and which should be modified. The required contents of a fact sheet, as specified in ARM 17.30.1371(2) and 1344(2)(c), which incorporates 40 CFR 124.56 by reference, are listed in **Exhibit 17-2**.

**Exhibit 17-2 Required elements of a fact sheet**

| Required element | Regulatory citation ARM 17.30 |
|---|---|
| | |
| **General facility information**<br>• Description of the facility or activity<br>• Sketches or a detailed description of the discharge location<br>• Type and quantity of waste or pollutants discharged | 1371(2)<br>1344(2)(c)<br>1371(2) |
| **Summary rationale of permit conditions**<br>• Summary of the basis for the draft permit conditions<br>• References to the applicable statutory or regulatory provisions<br>• References to the administrative record | 1371(2) |
| **Detailed rationale of permit conditions**<br>• Explanation and calculation of effluent limitations and conditions<br>• Specific explanations of:<br>a. Toxic pollutant limitations<br>b. Limitations on internal waste streams<br>c. Limitations on indicator pollutants<br>d. Decisions to regulate non-publicly owned treatment works (POTWs) under a separate permit<br>• For EPA-issued permits, the requirements of any state certification<br>• For permits with a sewage sludge land application plan, a description of how all required elements of the land application plan are addressed in the permit<br>• Reasons why any requested variances do not appear justified, if applicable | 1344(2)(c)<br><br>1371(2) |
| **Administrative Requirements**<br>• A description of the procedures for reaching a final decision on the draft permit, including:<br>a. Public comment period beginning and ending dates<br>b. Procedures for requesting a hearing<br>c. Other procedures for public participation<br>• Name and telephone number of person to contact for additional information | 1371(2) |

The fact sheet should include detailed discussions of the development of effluent limitations for each pollutant and include information such as:

- Calculations and assumptions related to production and flow;
- Type of limitations (i.e., effluent guideline-, water quality-, or BPJ-based);
- Whether the effluent guidelines used were Best Practicable Control Technology Currently Available (BPT), Best Available Technology Economically Achievable (BAT), or Best Conventional Pollutant Control Technology (BCT);
- The water quality standards or criteria used;
- Whether any pollutants were indicators for other pollutants; and
- Citations to appropriate total maximum daily load (TMDL) or wasteload allocation (WLA) studies, guidance documents, other references.

Often, it is as important to keep a record of items that were not included in the draft permit, such as the following:

- Why were effluent limitations based on effluent guidelines used as final effluent limitations instead of water quality-based limitations or vice versa (i.e., were the limitations checked to see that the final effluent limitations met both technology and water quality standards)?
- Why were pollutants that were reported as present in the permit application not specifically limited in the permit?
- Why is a previously limited pollutant no longer limited in the draft permit?

Finally, the fact sheet should address the logistics of the permit issuance process, including the beginning and ending dates of the public comment period, procedures for requesting a hearing, and the other opportunities for public involvement in the final decision.

# Chapter 17. Permit Issuance Process and Administration

**Exhibit 17-1** provides a flow diagram of the Montana Pollutant Discharge Elimination System (MPDES) permit administrative process. In general, the administrative process includes:

- Documenting all permit decisions;
- Coordinating United States Environmental Protection Agency (USEPA) review of the draft permit;
- Providing public notice, conducting hearings (if appropriate), and responding to public comments; and
- Defending the permit and modifying it (if necessary) after issuance.

Note that the general framework for MPDES permits issued by the Montana Department of Environmental Quality (Department) and USEPA are similar. State requirements need not be identical to federal regulatory requirements, provided they are at least as stringent. The same holds true for the appeal process. This Manual presents the State of Montana's procedures for MPDES permit issuance, hearings, and appeals, but also notes requirements that specifically apply only to permits issued by USEPA.

## *17.1. Items to Address Prior to Issuing a Final Permit*

This section describes the public participation activities that must be conducted in the permit issuance process. These include providing public notices, collecting and responding to public comments, and holding public hearings as necessary.

### 17.1.1. Public Notice

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft MPDES permit or other significant actions with respect to an MPDES permit or permit application. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to NPDES permits. The exact scope, required contents, and methods for effecting public notices may be found in 40 CFR 124.10 [CROSS REFERENCE TO ARM AS APPROPRIATE]. The MPDES permit-related actions for which public notice is required are shown in **Exhibit 17-2**.

The permit writer should be primarily concerned with the first three items in **Exhibit 17-2**. It is important to note that no public notice is required when a request for a permit modification, revocation, reissuance, or termination is denied.

**Exhibit 17-1. MPDES permitting administrative process**

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**Exhibit 17-2. Actions for which public notice is required**

Tentative denial of an MPDES permit application (not necessarily applicable to state programs)
Preparation of a draft MPDES permit, including a proposal to terminate a permit
Scheduling of a public hearing
An appeal has been granted by the Board of Environmental Review
Major permit modifications (after permit issuance)

New Source determinations (USEPA-issued permits only)

Public notice of MPDES permit-related activities should be provided using the following methods:

- For major permits, publication of a notice in daily or weekly newspaper within the area affected by the facility or activity;
- For general permits issued by USEPA, publication in the FR is required; and
- For all permits, direct mailing to various interested parties. This mailing list should include the following:
  - The applicant;
  - Any interested parties on the mailing list;
  - Any other agency that has issued or is required to issue a Resource Conservation and Recovery Act (RCRA), Underground Injection Control (UIC), Prevention of Significant Deterioration (PSD) (or other permit under the Clean Air Act), NPDES, 404, sludge management, or ocean dumping permit under the Marine Research Protection and Sanctuaries Act for the same facility or activity;
  - Federal and state agencies with jurisdiction over fish, shellfish, and wildlife resources and over coastal zone management plans, the Advisory Council on Historic Preservation, State Historic Preservation Officers, including any affected States and tribes;
  - State agencies conducting area-wide and continuing planning under CWA sections 208(b)(2), 208(b)(4) or 303(e) and the U.S. Fish and Wildlife Service, National Marine Fisheries Service and U.S. Army Corps of Engineers;
  - Users identified in the permit application of a privately owned treatment work;
  - Persons on any mailing lists developed by including those who request inclusion in writing and persons solicited for "area lists" from participants in past permit proceedings in the area; and
  - Any local government having jurisdiction over the locality of the facility.

A public notice must contain the information shown in **Exhibit 17-3**.

**Exhibit 17-3. Contents of the public notice**

- Name and address of the office processing the permit action.
- Name and address of the permittee or applicant and, if different, of the facility or activity regulated by the permit.
- A brief description of the business conducted at the facility or activity described in the permit.
- Name, address, and telephone number of a contact from whom interested persons can obtain additional information.
- A brief description of the comment procedures required, the time and place of any hearing to be held including procedures to request a hearing.
- For USEPA-issued permits, the location and availability of the administrative record and the times at which record will be open for public inspection and a statement that all data submitted by the applicant is available as part of the administrative record.
- A description of the location of each existing or proposed discharge point and the name of the receiving water and the sludge use and disposal practice(s) and the location of each sludge treatment works treating domestic sewage and use or disposal sites known at the time of permit application.
- Requirements applicable to cooling water intake structures under CWA section 316(b) in accordance with Part 125, Subpart I and J.
- Any additional information considered necessary.

Public notice of the preparation of the draft permit (including a notice of intent to deny a permit application) must provide at least 30 days for public comment. The draft permit is usually submitted for public notice after it has undergone internal review by the regulatory agency that is issuing the permit. MPDES permits typically undergo public notice after USEPA has reviewed and commented on the draft permit. In the special case of those USEPA-issued permits that require an EIS, public notice is not given until after a draft EIS is issued.

### 17.1.2. Public Comments

Public notice of a draft permit may elicit comments from concerned individuals or agencies. Frequently, such comments are simply requests for additional information. However, some comments are of a substantive nature and suggest modifications to the draft permit or indicate that the draft permit is inappropriate for various reasons. In such cases, commenters must submit all reasonable arguments and factual material in support of their positions and comments must be considered in making final decisions. If the approach is technically correct and clearly stated in the fact sheet, it will be difficult for commenters to find fault with the permit. Commenters may always suggest alternatives, however. In addition, an interested party may also request a public hearing.

To the extent possible, it is desirable to respond to all public comments as quickly as possible. In some cases, it may be possible to diffuse a potentially controversial situation by providing further explanation of permit terms and conditions. Additionally, permit writers should also consider notifying commenters that their comments have been received and are being considered.

The permitting agency is obliged to respond to all significant comments, in accordance with 40 CFR 124.17, at the time a final permit decision is reached (in the case of NPDES permits issued by USEPA) or at the same time a final permit is actually issued (in the case of MPDES permits issued by the Department). The response should incorporate the following elements:

- Changes in any of the provisions of the draft permit and the reasons for the changes; and
- Description and response to all significant comments on the draft permit or the permit application raised during the public comment period or during any hearing.

In the event that any information submitted during the public comment period raises substantial new questions about the draft permit, one of the following actions might occur:

- A new draft permit with a revised fact sheet or statement of basis is prepared;
- A revised statement of basis, a fact sheet, or revised fact sheet is prepared, and the comment period is reopened; or
- The comment period is reopened but is limited only to new findings.

If any of these actions are taken, a new public notice, as described earlier, must be given.

For USEPA-issued permits, any documents cited in the response to comments must be included in the administrative record. If new points are raised or new material is supplied during the public comment period, USEPA may document its response to these new materials by adding new materials to the administrative record.

### 17.1.3. Public Hearings

Any interested party may request a public hearing. The request should be in writing and should state the nature of the issues proposed to be raised during the hearing. However, a request for a hearing does not automatically necessitate that a hearing be held. A public hearing should be held when there is a significant amount of interest expressed during the public comment period or when it is necessary to clarify the issues involved in the permit decision.

Thus, the decision of whether or not to hold a public hearing is actually a judgment call. Such decisions are usually made by someone other than the permit writer. However, the permit writer will be responsible for ensuring that all of the factual information in support of the draft permit is well documented.

Public notice of a public hearing must be given at least 30 days prior to the public meeting. Public notice of the hearing may be given at the same time as public notice of the draft permit and the two notices may be combined. The public notice of the hearing should contain the following information:

- Brief description of the nature and purpose of the hearing, including the applicable rules and procedures;
- Reference to the dates of any other public notices relating to the permit; and
- Date, time, and place of the hearing.

Scheduling a hearing automatically extends the comment period until at least the close of the hearing (40 CFR 124.12(c)) and the public comment period may be extended by request during the hearing. Anyone may submit written or oral comments concerning the draft permit at the hearing. A presiding officer is responsible for scheduling the hearing and maintaining orderly conduct, including setting reasonable time limitations for oral statements. Note that a transcript or recording of the hearing must be available to interested persons.

### 17.1.4. State/Tribal Roles in Reviewing Draft Permits

Draft MPDES permits must be submitted to USEPA for review if they relate to:

- Discharges that may affect waters of another state;
- Discharges proposed to be regulated by general permits;
- Discharges from a POTW with a daily average discharge exceeding 1 million gallons per day;
- Discharges of uncontaminated cooling water with a daily average discharge exceeding 500 million gallons per day;
- Discharges from any major discharger or from any primary industry category;
- Discharges from other sources with a daily average discharge exceeding 500,000 gallons per day (however, USEPA may waive review for non-process wastewater); and
- Class I sludge management facilities.[5]

Permits issued by USEPA require State or tribal review and certification under CWA section 401. Such certification ensures that the permit will comply with applicable federal CWA standards as well as with state or tribal water quality standards. This state or tribal certification also ensures that state and tribal initiatives or policies are addressed in USEPA-issued NPDES permits, and promotes consistency between State- and USEPA-issued permits.

Under CWA section 401(a)(1), USEPA may not issue a permit until a certification is granted or waived. If USEPA is preparing the draft permit, State certification is usually accomplished by allowing the Department to review and certify the application prior to draft permit preparation. Regulations at 40 CFR 124.53 (State Certification) and 40 CFR 124.54 (Special provisions for state certification and concurrence on applications for CWA section 301(h) variances) describe procedures an USEPA permit writer should follow to obtain State or tribal certification.

Under 40 CFR 124.53, when a draft permit is prepared by USEPA but State certification has not yet been granted, USEPA must send the Department a copy of the draft permit along with a notice requesting State certification. If the Department does not respond within a specified reasonable time, which cannot exceed 60 days, it is deemed to have waived its right to certify. If the Department chooses to certify the draft permit, it may only require changes to incorporate more stringent State laws, and must send USEPA a letter justifying the changes and citing State regulations that support the changes. When a permit applicant requests a CWA section 301(h) variance (40 CFR 124.54), the State certification process is very similar to the process described above.

### 17.1.5. Schedule for Final Permit Issuance

The final permit may be issued after the close of the public notice and comment period and after State/tribal certification has been received (for permits issued by USEPA). The public notice period includes:

- A 30-day period that gives notice of intent to issue or deny the permit;
- A 30-day period advertising a public hearing (if applicable); and
- Any extensions or reopening of the comment period.

MPDES permits issued by the Department are effective [WHEN?]

Final USEPA permit decisions are effective immediately upon issuance unless commenters request changes in the draft permit, in which case the effective date of the permit is 30 days after issuance (or a later date if specified in the permit). In addition, permit decisions will not be immediately effective if review is requested on the permit

under 40 CFR 124.19. As discussed earlier, any comments that are received must be answered at the time of final permit issuance (in the case of NPDES states or tribes) or after a final decision is reached (in the case of USEPA). The administrative record for the final permit consists of the items in **Exhibit 17-4**.

**Exhibit 17-4. Elements of the administrative records for a final permit**

- All elements for the draft permit administrative record
- All comments received during the comment period
- The tape or transcript of any public hearing
- Any materials submitted at a hearing
- Responses to comments
- For NPDES new source permits, the draft or final EIS
- The final permit

## *17.2. Administrative Actions after Final Permit Issuance*

Once the final permit has been issued, the Department enters the permit limitations and any special conditions the Integrated Compliance Information System for the NPDES program (ICIS-NPDES) (see **Chapter 1** for more on ICIS-NPDES). Entering permit information into ICIS-NPDES will ensure that the facility's performance is tracked and the Department is alerted to the need for corrective action in the event of violations of permit limitations, terms, or conditions.

Permits may be modified, revoked, and reissued or terminated in accordance with the provisions of 40 CFR 122.44, 40 CFR 122.62 to 40 CFR 122.64, 40 CFR 125.62, and 40 CFR 125.64. Causes for taking such actions include, but are not limited to, failure to comply with any condition of the permit or endangerment to human health or the environment resulting from the permitted activity. Causes for modification actions include, but are not limited to, substantial alterations or additions to the permitted facility or activity, or acquisition of new information not available at the time of permit adoption that would have justified the application of different conditions.

After final permit issuance, interested parties have opportunities to change the permit thorough permit appeals, major/minor permit modifications, termination and revocation, or transfer. These administrative procedures are described below.

### 17.2.1. Permit Appeals

Throughout the process of developing a permit and during the public notice period, the permit writer should carefully consider all legitimate concerns of the permittee and any other interested party. Nevertheless, there will inevitably be situations in which a permit is issued in spite of the objections of the permittee or a third party. In such instances, the permittee or interested party may choose to legally contest or appeal the NPDES permit. Permit appeals are the process by which a permittee may contest the final limitations and conditions in a permit.

Under 75-5-402(2) MCA, a permittee may appeal a permit to the Board of Environmental Review, asking the Board to reverse the decision of the Department. Other parties must file challenges of MPDES permits in District Court.

Appeals of USEPA-issued permits consist of petitioning the Environmental Appeals Board (EAB) for review. Such review must be requested within 30 days of issuance of the final permit, and challenges must be limited to issues raised during the draft permit's public comment or hearing processes, although persons that did not participate in these processes may seek review of changes in the permit from draft to final permit. During the appeals process, only those conditions of an existing permit that are being contested are stayed. Within a

[5] Note that USEPA also receives for review from other state permitting authorities permits for discharges to the territorial seas.

reasonable time following the filing of the petition for review, the EAB must grant or deny the petition. Only individual permits may be appealed to the EAB; general permits may be challenged in court or an individual permit may be sought and appealed.

Permit writers will, from time-to-time, be involved in permit appeals and will need to address the types of issues discussed below. Aside from preparation of the administrative record and notices, the permit writer may not be directly involved in the procedural matters relating to permit appeals. A permit writer's first involvement with the appeals process will probably come as a result of designation of the appeals staff and his/her role will be limited to that of a technical advisor to legal counsel and, where a state uses an evidentiary hearing procedure, possibly a witness.

#### 17.2.1.1. Deposition and Testimony

In a hearing procedure such as may be used in some states, a permit writer may be required to give a deposition during which the appellant attorney conducts the questioning that would otherwise occur in the hearing. The deposition is transcribed and presented as evidence. The appellant attorney may ask some of the same questions at the hearing.

To prepare for a deposition and testimony, the permit writer should be familiar with laws, regulations, and policies that may affect the permit. The permit writer should also be thoroughly familiar with the technical basis for the permit conditions. For example, if the effluent limitations are based on water quality requirements, the permit writer should thoroughly study any applicable water quality standards and water quality modeling used to develop the effluent limitations and should be prepared to defend any assumptions inherent in the plan or simulation.

A permit appeal relies on the information presented petitions and briefs, and possibly includes oral argument, but typically does not use depositions and direct testimony.

#### 17.2.1.2. The Permit Writer's Role in the Appeals Process

As technical advisor to legal counsel, the permit writer's most important function is to develop support for contested permit conditions. No attempt should be made to support technically indefensible conditions. Contested permit conditions that are not technically defensible and are not based on any legal requirement should be brought to counsel's attention, with advice that the Department withdraw those conditions.

The second most important advisory function of the permit writer is assisting counsel in identifying weaknesses in the permittee's arguments. This function could include developing questions for cross-examination of the opposing witnesses. Questions should be restricted to the subject material covered by the witness' direct testimony and should be designed to elicit an affirmative or negative response, rather than an essay-type response.

Finally, the permit writer should remember that in petitioning for review, the permittee has declared an adversarial relationship with the regulatory agency, and the permit writer must therefore refrain from discussions about the case without prior consultation with legal counsel. In the role of technical advisor and/or witness, the permit writer should:

- cultivate credibility;
- never imply or admit weakness in his or her area of expertise;
- never attempt to testify about subjects outside his or her area of expertise; and
- always maintain good communication with counsel.

The Board generally will attempt to resolve permit appeal issues in the initial stage of granting review. If this is not possible, formal review of the contested conditions is conducted, and a written opinion is published (an Environmental Administrative Decision). Under certain circumstances, decisions of the Board against the permittee may be appealed in District Court. As noted above, for third parties, the appeal process for MPDES permits begins in District Court (i.e., there is no administrative appeal process for third parties).

### 17.2.2. Modification or Revocation and Reissuance of Permits

In most cases, a permit will not need to be modified (or revoked and reissued) during the term of the permit if the facility can fully comply with permit conditions. However, under certain circumstances, it may be necessary to modify the permit prior to its expiration date. A permit modification may be triggered in several ways. For example, a representative of the regulatory agency may inspect the facility and identify a need for the modification (i.e., the improper classification of an industry), or information submitted by the permittee may suggest the need for a change. Of course, any interested person may make a request for a permit modification.

Modifications differ from revocations and reissuance. In a permit modification, only the conditions subject to change are reconsidered while all other permit conditions remain in effect. Conversely, the entire permit may be reconsidered when it is revoked and reissued.

Permit modifications are limited to specific "causes" identified in 40 CFR 122.62(a) and 40 CFR 122.62(b) and summarized in **Exhibit 17-5**. Most permit modifications the Department to conduct the public notice and participation activities of 40 CFR Part 124, similar to the issuance or reissuance of the permit; however, only those specific conditions being modified are open to review and comment. The Department may revoke and reissue a permit during its term for the causes identified in 40 CFR 122.62(b) (i.e., the final two bulleted items in **Exhibit 17-5**)

**Exhibit 17-5 Causes for permit modification**

**Alterations**: When there are material and substantial alterations or changes to the permitted facility or activity occur that justify new conditions that are different from the existing permit.
**New information**: When information is received that was not available at the time of permit issuance.
**New regulations**: Under limited circumstances, when standards or regulations on which the permit was based have been changed by the modification, withdrawal or promulgation of amended standards or regulations or by judicial decision.
**Compliance schedules**: To modify the compliance schedule when good cause exists, such as an act of God, strike, or flood.
**Variance requests**: When requests for variances or fundamentally different factors are filed within the specified time but not granted until after permit issuance.
**Toxics**: To insert CWA section 307(a) toxic effluent standard or prohibition.
**Reopener**: Conditions in the permit that require it to be reopened under certain circumstances.
**Net limits**: Upon request of a permittee who qualifies for effluent limitations on a net basis under 40 CFR 122.45(g) or when a permittee is no longer eligible for net limitations, as provided in 40 CFR 122.45(g)(1)(ii).
**Pretreatment**: As necessary under 40 CFR 403.8 (e) to put a compliance schedule in place for the development of a pretreatment program or to change the schedule for program development.
**Failure to notify**: Upon failure of an approved State to notify another State whose waters may be affected by a discharge from the approved State.
**Non-limited pollutants**: When the level of any pollutant that is not limited in the permit exceeds the level that can be achieved by the technology-based treatment requirements appropriate to the permit.
**Notification levels**: To establish notification levels for toxic pollutants as provided in 40 CFR 122.44(f).
**Compliance schedules for innovative or alternative facilities**: To modify the compliance schedule in light of the additional time that may be required to construct this type of facility.
**Small municipal separate storm sewer system (MS4) minimum control measures**: For a small MS4 to include required minimum control measures when the permit does not include such measure(s) based on the determination that another entity was responsible for implementation and the other entity fails to fulfill its responsibility to implement such measure(s).
**Technical mistakes**: To correct technical mistakes or mistaken interpretations of law made in developing the permit conditions.

**Failed BPJ compliance**: When BPJ technology is installed and properly operated and maintained but the permittee is unable to meet its limitations, the limitations may be reduced to reflect actual removal; however, they may not be less than the guideline limits. If BPJ operation and maintenance costs are extremely disproportionate to the costs considered in a subsequent guideline, the permittee may be allowed to backslide to the guideline limitations.
**Land application plans**: When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.
**Cause exists for termination**: Cause exists under 40 CFR 122.64, and the Director determines that modification is appropriate
**Notification of proposed transfer**: Director may modify the permit upon receipt of ownership transfer notification.

There are certain "minor" modifications that, upon consent of the permittee, may be processed by the Department without following the procedures of 40 CFR Part 124. Minor modifications are generally non-substantive changes (e.g., typographical errors) and are exempt from the administrative procedures, that is, a draft permit and public review are not required. The specific permit changes that can be processed as minor modifications, described in 40 CFR 122.63, may only:

- Correct typographical errors;
- Incorporate more frequent monitoring or reporting;
- Revise an interim compliance date in the schedule of compliance, provided the new date is not more than 120 days after the date specified in the permit and does not interfere with attainment of the final compliance date requirement;
- Allow for a change of ownership, provided no other change is necessary (see Section 11.4.4 of this Manual);
- Change the construction schedule for a new source;
- Delete a point source outfall when that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits; and
- Incorporate an approved local pretreatment program.

### 17.2.3. Permit Termination

Situations may arise during the life of the permit that are causes for termination of the permit. Such circumstances, described in 40 CFR 122.64(a), include the following:

- Noncompliance by the permittee with any condition of the permit;
- Misrepresentation or omission of relevant facts by the permittee;
- Determination that the permitted activity endangers human health or the environment, and can only be regulated to acceptable levels by permit modification or termination; or
- A change in any condition that requires either a temporary or permanent reduction or elimination of a discharge (e.g., plant closure).

Terminations are used to retract a permittee's privileges to discharge during the permit term. A notice of intent to terminate a permit is a type of draft permit which follows the same procedures as any draft permit prepared under 40 CFR 124.6. Administrative procedures such as public notice must be followed in permit termination proceedings. If a permittee with a terminated permit wishes to obtain permit coverage, it would have to submit an application and apply for a new permit.

### 17.2.4. Permit Transfer

Regulatory agencies will occasionally receive notification of a change in ownership of a facility covered by an MPDES permit. Such changes require that a permit be transferred by one of two provisions:

- **Transfer by modification or revocation**: The transfer may be made during the process of a major or minor permit modification. It may also be addressed by revoking and subsequently reissuing the permit; or

- **Automatic transfer**: A permit may automatically be transferred to a new permittee if three conditions are met:
  - The current permittee notifies the Director 30 days in advance of the transfer date;
  - The notice includes a written agreement between the old and new owner that contains the specific date for transfer of permit responsibility, coverage and liability between them; and
  - The Director of the regulatory agency does not notify the old permittee and the proposed new permittee that the subject permit will be modified or revoked and reissued.

# Appendix A. Acronyms and Glossary

# Appendix B. Priority Pollutants

The table below presents the list of 126 priority pollutants from 40 CFR 423 Appendix A, which are further discussed in **Sections 2.D.2** and **6.A** of this Manual. Note that the list goes up to 129 because 017, 049, and 050 were deleted.

**Priority Pollutants from 40 CFR 423, Appendix A**

| # | Pollutant name | # | Pollutant name |
|---|---|---|---|
| 001 | Acenaphthene | 067 | Butyl benzyl phthalate |
| 002 | Acrolein | 068 | Di-N-Butyl Phthalate |
| 003 | Acrylonitrile | 069 | Di-n-octyl phthalate |
| 004 | Benzene | 070 | Diethyl Phthalate |
| 005 | Benzidine | 071 | Dimethyl phthalate |
| 006 | Carbon tetrachloride (tetrachloromethane) | 072 | 1,2-benzanthracene (benzo(a) anthracene |
| 007 | Chlorobenzene | 073 | Benzo(a)pyrene (3,4-benzo-pyrene) |
| 008 | 1,2,4-trichlorobenzene | 074 | 3,4-Benzofluoranthene (benzo(b) fluoranthene) |
| 009 | Hexachlorobenzene | 075 | 11,12-benzofluoranthene (benzo(b) fluoranthene) |
| 010 | 1,2-dichloroethane | 076 | Chrysene |
| 011 | 1,1,1-trichloreothane | 077 | Acenaphthylene |
| 012 | Hexachloroethane | 078 | Anthracene |
| 013 | 1,1-dichloroethane | 079 | 1,12-benzoperylene (benzo(ghi) perylene) |
| 014 | 1,1,2-trichloroethane | 080 | Fluorene |
| 015 | 1,1,2,2-tetrachloroethane | 081 | Phenanthrene |
| 016 | Chloroethane | 082 | 1,2,5,6-dibenzanthracene (dibenzo(,h) anthracene) |
| 018 | Bis(2-chloroethyl) ether | 083 | Indeno (,1,2,3-cd) pyrene (2,3-o-pheynylene pyrene) |
| 019 | 2-chloroethyl vinyl ether (mixed) | 084 | Pyrene |
| 020 | 2-chloronaphthalene | 085 | Tetrachloroethylene |
| 021 | 2,4, 6-trichlorophenol | 086 | Toluene |
| 022 | Parachlorometa cresol | 087 | Trichloroethylene |
| 023 | Chloroform (trichloromethane) | 088 | Vinyl chloride (chloroethylene) |
| 024 | 2-chlorophenol | 089 | Aldrin |
| 025 | 1,2-dichlorobenzene | 090 | Dieldrin |
| 026 | 1,3-dichlorobenzene | 091 | Chlordane (technical mixture and metabolites) |
| 027 | 1,4-dichlorobenzene | 092 | 4,4-DDT |
| 028 | 3,3-dichlorobenzidine | 093 | 4,4-DDE (p,p-DDX) |
| 029 | 1,1-dichloroethylene | 094 | 4,4-DDD (p,p-TDE) |
| 030 | 1,2-trans-dichloroethylene | 095 | Alpha-endosulfan |
| 031 | 2,4-dichlorophenol | 096 | Beta-endosulfan |
| 032 | 1,2-dichloropropane | 097 | Endosulfan sulfate |
| 033 | 1,2-dichloropropylene (1,3-dichloropropene) | 098 | Endrin |
| 034 | 2,4-dimethylphenol | 099 | Endrin aldehyde |
| 035 | 2,4-dinitrotoluene | 100 | Heptachlor |
| 036 | 2,6-dinitrotoluene | 101 | Heptachlor epoxide (BHC-hexachlorocyclohexane) |
| 037 | 1,2-diphenylhydrazine | 102 | Alpha-BHC |
| 038 | Ethylbenzene | 103 | Beta-BHC |
| 039 | Fluoranthene | 104 | Gamma-BHC (lindane) |
| 040 | 4-chlorophenyl phenyl ether | 105 | Delta-BHC (PCB-polychlorinated biphenyls) |
| 041 | 4-bromophenyl phenyl ether | 106 | PCB-1242 (Arochlor 1242) |
| 042 | Bis(2-chloroisopropyl) ether | 107 | PCB-1254 (Arochlor 1254) |
| 043 | Bis(2-chloroethoxy) methane | 108 | PCB-1221 (Arochlor 1221) |

| | | | |
|---|---|---|---|
| 044 | Methylene chloride (dichloromethane) | 109 | PCB-1232 (Arochlor 1232) |
| 045 | Methyl chloride (dichloromethane) | 110 | PCB-1248 (Arochlor 1248) |
| 046 | Methyl bromide (bromomethane) | 111 | PCB-1260 (Arochlor 1260) |
| 047 | Bromoform (tribromomethane) | 112 | PCB-1016 (Arochlor 1016) |
| 048 | Dichlorobromomethane | 113 | Toxaphene |
| 051 | Chlorodibromomethane | 114 | Antimony |
| 052 | Hexachlorobutadiene | 115 | Arsenic |
| 053 | Hexachloromyclopentadiene | 116 | Asbestos |
| 054 | Isophorone | 117 | Beryllium |
| 055 | Naphthalene | 118 | Cadmium |
| 056 | Nitrobenzene | 119 | Chromium |
| 057 | 2-nitrophenol | 120 | Copper |
| 058 | 4-nitrophenol | 121 | Cyanide, Total |
| 059 | 2,4-dinitrophenol | 122 | Lead |
| 060 | 4,6-dinitro-o-cresol | 123 | Mercury |
| 061 | N-nitrosodimethylamine | 124 | Nickel |
| 062 | N-nitrosodiphenylamine | 125 | Selenium |
| 063 | N-nitrosodi-n-propylamin | 126 | Silver |
| 064 | Pentachlorophenol | 127 | Thallium |
| 065 | Phenol | 128 | Zinc |
| 066 | Bis(2-ethylhexyl) phthalate | 129 | 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) |

# Appendix C. Beneficial Uses by Water Body Classification

The table below presents the 18 water body classifications in the Montana Surface Water Quality Standards and Procedures and the beneficial uses associated with each classification.

**Beneficial Uses by Water Body Classification in Montana Water Quality Standards**

| Classification | Beneficial Uses |
|---|---|
| A-Closed | Drinking, culinary and food processing purposes after simple disinfection<br>Swimming and recreation<br>Growth and propagation of fish and associated aquatic life (although access restrictions to protect public health may limit actual use of A-closed waters for these uses) |
| A-1 | Drinking, culinary and food *processing purposes after conventional treatment for removal of naturally present impurities*<br>Bathing, swimming, and recreation<br>Growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| B-1 | Drinking, culinary and food processing purposes after conventional treatment<br>Bathing, swimming, and recreation<br>Growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| B-2 | Drinking, culinary and food processing purposes after conventional treatment<br>Bathing, swimming, and recreation<br>Growth and *marginal* propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| B-3 | Drinking, culinary and food processing purposes after conventional treatment<br>Bathing, swimming, and recreation<br>Growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| C-1 | Bathing, swimming, and recreation<br>Growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| C-2 | Bathing, swimming, and recreation<br>Growth and *marginal* propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply |
| I | Drinking, culinary and food processing purposes after conventional treatment<br>Bathing, swimming, and recreation<br>Growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers<br>Agricultural and industrial water supply<br>(An analysis will be performed during the triennial review process to determine the factors limiting attainment of these uses. Based on these analyses, the specific numeric and narrative standards associated with this classification will be adjusted to reflect any improvements that have occurred in water quality as a result of water quality control of nonpoint source pollution) |
| C-3 | Bathing, swimming, and recreation<br>Growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers<br>Quality of water is naturally marginally suitable for drinking, culinary and food processing purposes, agriculture, and industrial water supply. |

| | |
|---|---|
| D-1 | Agricultural purposes<br>Secondary contact recreation |
| D-2 | Agricultural purposes<br>Secondary contact recreation<br>Marginally suitable for aquatic life |
| E-1 | Agricultural purposes<br>Secondary contact recreation<br>Wildlife |
| E-2 | Agricultural purposes<br>Secondary contact recreation<br>Wildlife<br>Marginally suitable for aquatic life |
| E-3 | Agricultural purposes<br>Secondary contact recreation<br>Wildlife |
| E-4 | Aquatic life<br>Agricultural purposes<br>Secondary contact recreation<br>Wildlife |
| E-5 | Agricultural purposes<br>Secondary contact recreation<br>Saline tolerant aquatic life<br>Wildlife |
| F-1 | Secondary contact recreation<br>Wildlife<br>Aquatic life (not including fish) |
| G-1 | Watering wildlife and livestock<br>Aquatic life (not including fish)<br>Irrigation after treatment or with mitigation measures |

Currently, no water bodies in Montana have one of the classifications that does not include the "fishable and swimmable" uses (i.e., classifications D-1, D-2, E-1, E-2, E-3, E-4, E-5, F-1, and G-1). These classifications would be limited to waters in constructed irrigation ditches and drain ditches that are State waters as defined in 75-5-103 MCA (D-1, D-2); waters in ephemeral streams (E-1, E-2); waters in seasonal lakes and ponds (E-3), waters in semi-permanent lakes and ponds (E-4, E-5); streams with low or sporadic flow that, because of natural hydro-geomorphic and hydrologic conditions are not able to support fish (F-1); and waters in constructed ponds and reservoirs that hold water produced from coal bed methane development and are not located in drainage systems. To reclassify a water body into one of these classifications, the Board would have conduct a Use Attainability Analysis in accordance with 40 CFR 131.10(g), hold a public hearing in accordance with 75-5-307 MCA, and submit the reclassification to USEPA for approval (see ARM 17.30.615(2)).

# Appendix D. Spawning Times of Montana Fishes

The following table below lists the known or expected spawning times for most fishes in Montana. This table was prepared for the purpose of identifying periods when "early life stages" of fish may be present. EPA has defined the early life stage for salmonids to be 30 days after emergence/swim-up; for all other species it is 34 days after spawning. This information is necessary when applying Dissolved Oxygen and Ammonia water quality standards to individual water bodies.

# Spawning Times of Montana Fishes

The code for the table is as follows: J1,J2, F1, F2 refer to the half month increments of January 1-15, January 16-31, February 1-14, February 15-29, and so on. In the table S=spawning period, I = incubation period for eggs of salmonids, E=time period in which salmonid sac-fry are in the gravels

| Species | J 1 | J 2 | F 1 | F 2 | M 1 | M 2 | A 1 | A 2 | M 1 | M 2 | J 1 | J 2 | J1 | J 2 | A 1 | A 2 | S 1 | S 2 | O 1 | O 2 | N 1 | N 2 | D 1 | D 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White sturgeon | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Pallid sturgeon | | | | | | | | | | S | S | S | S | S | | | | | | | | | | |
| Shovel. Sturgeon | | | | | | | | | | S | S | S | S | S | | | | | | | | | | |
| Paddlefish | | | | | | | | | S | S | S | S | S | S | | | | | | | | | | |
| Goldeye | | | | | | S | S | S | S | S | S | | | | | | | | | | | | | |
| Cisco | I | I | I | I | I | I | | | | | | | | | | | | | | | S | S | S | S |
| Lake whitefish | I | I | I | I | I | I | | | | | | | | | | | | | S | S | S | S | S | S |
| Mount. whitefish | I | I | I | I | I | I | | | | | | | | | | | | S | S | S | S | S | I | I |
| Pygmy whitefish | | | | | | | | | | | | | | | | | | | | | S | S | S | S |
| Kokanee | I | I | I | I | I | | | | | | | | | | | | | S | S | S | S | S | I | I |
| Chinook salmon | | | | | | | | | | | | | | | | | | | S | S | | | | |
| Golden trout | | | | | | | | | | | S | S | S | S | I | I,E | | | | | | | | |
| Cutthroat trout | | | | | | | S | S | S | S | S | S | S | I | I | E | | | | | | | | |
| Rainbow trout | | | | | S | S | S | S | S | S | S | S | I | I | E | | | | | | | | | |
| Brook trout | I | I | I | I | E | E | E | E | E | | | | | | | | S | S | S | S | I | I | I | I |
| Bull trout | E | E | E | E | E | E | E | E | E | | | | | | | S | S | S | S | S | I | I | I | I |
| Lake trout | I | I | I | I | I | I | I | I | | | | | | | | | | | S | S | S | S | S | I |
| Brown trout | S | I | I | I | I | I | I | I,E | | | | | | | | | | S | S | S | S | S | S | S |
| A. grayling | | | | | | | | S | S | S | S | S | S, I | | | | | | | | | | | |
| Redband trout | | | | | | | | | | | | S | S | I | | | | | | | | | | |
| Northern pike | | | | | S | S | S | S | S | | | | | | | | | | | | | | | |
| Carp | | | | | | | | | S | S | S | S | S | S | S | S | | | | | | | | |
| Golden shiner | | | | | | | | | S | S | S | S | S | S | | | | | | | | | | |
| Pearl dace | | | | | | | | | | | | | | | | | | | | | | | | |
| Creek chub | | | | | | S | S | S | S | S | S | S | | | | | | | | | | | | |
| N. redbelly dace | | | | | | | | | S | S | S | S | S | S | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finescale dace | | | | | | | S | S | S | S | | | | | | | | | | | | | | |
| Utah chub | | | | | | | | | S | S | S | S | S | S | | | | | | | | | | |
| Flathead chub | | | | | | | | | S | S | S | S | S | S | S | | | | | | | | | |
| Sturgeon chub | | | | | | | | | | S | S | S | S | S | S | | | | | | | | | |
| Lake chub | | | | | | | | | | S | S | | | | | | | | | | | | | |
| Sicklefin chub | | | | | | | | | | | S | S | S | S | S | S | | | | | | | | |
| Peamouth | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Emerald shiner | | | | | | | | | | | | | S | S | S | S | | | | | | | | |
| Spottail shiner | | | | | | | | | | | S | S | S | S | S | S | | | | | | | | |
| Sand shiner | | | | | | | | | S | S | S | S | S | S | S | S | | | | | | | | |
| Brassy minnow | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Plains minnow | | | | | | | S | S | S | S | S | S | S | S | S | | | | | | | | | |
| W.Silveryminno w | | | | | | | | | S | S | S | S | S | S | | | | | | | | | | |
| Fathead minnow | | | | | | | | | S | S | S | S | S | S | S | S | | | | | | | | |
| N. Pike minnow | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Longnose dace | | | | | | | | | S | S | S | S | S | S | S | | | | | | | | | |
| Redside shiner | | | | | | | | | | S | S | S | S | S | S | | | | | | | | | |
| River carpsucker | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Blue sucker | | | | | | | S | S | S | S | S | | | | | | | | | | | | | |
| Small. Buffalo | | | | | | | | | S | S | S | | | | | | | | | | | | | |
| Big. Buffalo | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Short. Redhorse | | | | | | | S | S | S | S | S | S | | | | | | | | | | | | |
| Longnose sucker | | | | | | S | S | S | S | S | S | S | S | | | | | | | | | | | |
| White sucker | | | | | | | S | S | S | S | S | S | | | | | | | | | | | | |
| Largesc. Sucker | | | | | | | S | S | S | S | | | | | | | | | | | | | | |
| Mountain sucker | | | | | | | | | | | S | S | S | S | | | | | | | | | | |
| Black bullhead | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Yellow bullhead | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Channel catfish | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Stonecat | | | | | | | | | | | S | S | S | S | S | S | | | | | | | | |
| Burbot | | | S | S | S | S | | | | | | | | | | | | | | | | | | |
| Brook stickleback | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Rock bass | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Green sunfish | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Pumpkinseed | | | | | | | | | | S | S | | | | | | | | | | | | | |
| Bluegill | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |

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| Smallmouth bass | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Largemouth bass | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| White crappie | | | | | | | | | | S | S | S | S | | | | | | | | | | | |
| Black crappie | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Yellow perch | | | | | | S | S | S | S | S | S | S | | | | | | | | | | | | |
| Sauger | | | | | | S | S | S | S | S | | | | | | | | | | | | | | |
| Walleye | | | | | | | S | S | S | S | | | | | | | | | | | | | | |
| Iowa darter | | | | | | | | | S | S | S | S | S | | | | | | | | | | | |
| Mottled sculpin | | | | | | | | | S | S | S | S | | | | | | | | | | | | |
| Slimy sculpin | | | | | | | | | | | | | | | | | | | | | | | | |
| Torrent sculpin | | | | | | | | | | | | | | | | | | | | | | | | |
| Shorthead sculpin | | | | | | | | | | | | | | | | | | | | | | | | |
| Spoonhead sculpin | | | | | | | | | | | | | | | | | | | | | | | | |

Prepared by Don Skaar, Montana Fish, Wildlife and Parks, 3/6/01. This table is a combination of known spawning times for fish in Montana and estimates based on spawning times reported in other areas in North America of similar latitude. Sources used for this table include G.C. Becker, Fishes of Wisconsin; C.J.D. Brown, Fishes of Montana; K.D. Carlander, Handbook of freshwater fishery biology, volumes 1 and 2; R.S. Wydoski, and R.R. Whitney. Inland fishes of Washington; Scott and Crossman. Freshwater fishes of Canada; Montana Fish, Wildlife and Parks fisheries biologists.