



# Training Manual for NPDES Permit Writers

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## **1. INTRODUCTION TO THE NPDES PROGRAM**

### **1.1 PURPOSE AND FORMAT OF THIS MANUAL**

The purpose of this manual is to provide basic training in the writing of a National Pollutant Discharge Elimination System (NPDES) permit. It is designed for new permit writers, but may also serve as a refresher for experienced permit writers. The manual will also be useful for anyone who has an interest in the NPDES permit program and how it operates.

The format used in presenting this material follows the actual process of writing an NPDES permit, from the time an application is received, through the time a permit becomes final (See Exhibit 1-1 for a description of the NPDES permitting process). The significant permit-related issues, such as evidentiary hearings, which may arise after permit issuance, are also discussed. Thus, the chapters are presented in the sequence in which the events would actually take place. Related topics are discussed at the point in the process other these items would normally be addressed by the permit writer.

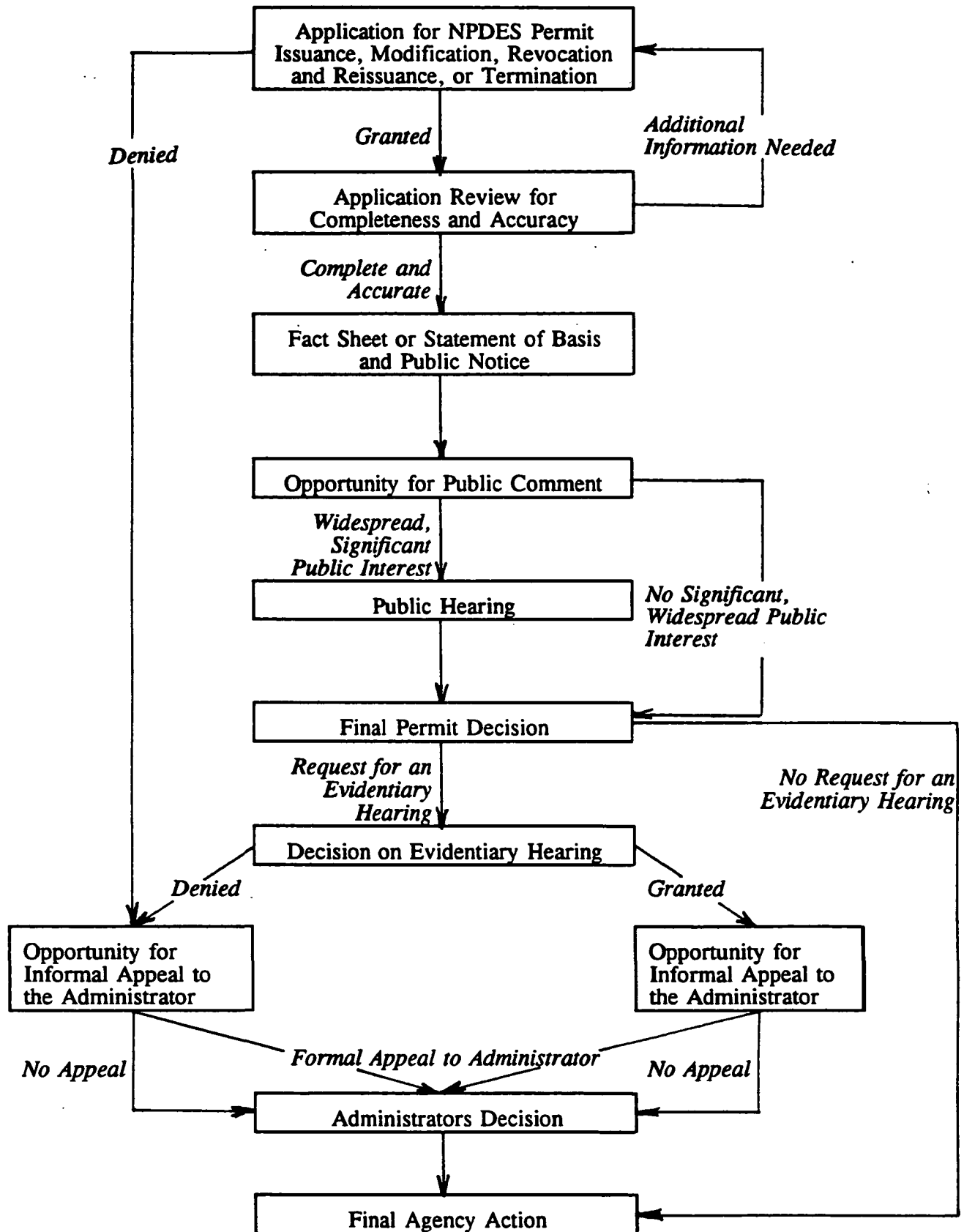
It is recognized that each U.S. Environmental Protection Agency (EPA) Regional office or approved State will have NPDES permit processing procedures specially adapted for a specific geographical area that incorporate local requirements. Therefore, it is the purpose of this manual to explain only the elements of the program common to any State or Regional office that issues NPDES permits. Particular emphasis is given to areas that historically have been difficult steps in the permit process. To the extent possible, practical examples are used to demonstrate the concepts discussed. The overall approach is designed to make the process clearer and the relevant information more accessible to the permit writer.

### **1.2 OVERVIEW OF THE NPDES PROGRAM**

The NPDES permit program is authorized by Section 402 of the Clean Water Act (CWA) and is implemented through the 40 *Code of Federal Regulations* (CFR) Parts 122 through 124. Other parts of the CFR affecting the NPDES program include:

- 40 CFR Part 125 (technology-based standards)
- 40 CFR Part 129 (toxic pollutant standards)
- 40 CFR Part 130 (water quality management plans)
- 40 CFR Part 131 (water quality-based standards)
- 40 CFR Part 133 (sewage secondary treatment regulations)

# EXHIBIT 1-1: NPDES PERMITTING PROCESS





- 40 CFR Part 135 (citizen suits)
- 40 CFR Part 136 (analytical procedures)
- 40 CFR Part 257 (sludge disposal regulations)
- 40 CFR Part 401 (general effluent guidelines provisions)
- 40 CFR Part 403 (general pretreatment regulations)
- 40 CFR Parts 405-471 (effluent limitation guidelines)
- 40 CFR Part 501 (sludge permitting requirements)
- 40 CFR Part 503 (sewage sludge disposal standards).

The regulations contained in the CFR are an annually codified version of the promulgated regulations provided in the *Federal Register*. The *Federal Register* is the vehicle by which EPA and other branches of the Federal Government provide notice of, propose, and promulgate regulations. Although the regulations in the CFR provide a comprehensive source, they do not provide much of the background and implementation information that is provided in the preamble to the regulations contained in the *Federal Register*. It is very helpful for the permit writer to have a basic understanding of these documents. They are important to the permit writer because they explain what permit writers can and cannot do.

The NPDES program requires permits for the discharge of pollutants from any point source into waters of the United States. The following definitions are contained in 40 CFR 122.2:

- **Pollutant**-Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.
- **Waters of the United States**-All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the United States include but are not limited to all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds.
- **Point Source**-Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged.

If a facility discharges pollutants from any point source into U.S. waters, then the operator of that facility must submit an application requesting a permit to the NPDES permitting authority. Once issued, a permit is basically a license to discharge a specified amount of pollutants into waters of the United States under certain conditions. The permit is drafted and issued either by 1 of the 10 EPA Regions or by an NPDES authorized State or Territory. States and Territories may obtain the authority to issue NPDES permits by meeting certain technical, administrative, and legal requirements. But not all States or Territories with authority to implement the basic NPDES program (municipal and industrial) have approval for all program categories (i.e., Federal facilities, pretreatment, general permits, and municipal sewage sludge). Except for sludge, the State or Territory must be authorized to implement the basic NPDES program before approval will be granted to implement the other program categories. The State or Territory may apply concurrently for several programs, including the basic NPDES program. Once the permit is issued to a facility, the permit is enforced through a combination of self monitoring (requirements in the permit) and compliance monitoring. If the facility is out of compliance with the permit requirements, then the facility is subject to enforcement actions, which may include both monetary penalties and imprisonment.

### **1.3 EVOLUTION OF THE NPDES PROGRAM**

The NPDES program has evolved from numerous legislative initiatives dating back to the mid-1960s. In 1965, Congress enacted legislation requiring States to develop water quality standards for all interstate waters by 1967. Despite increasing public concern and increased Federal spending, just over half of the States had fully approved programs establishing water quality standards by 1971. This lack of success in developing adequate water quality standards programs, combined with ineffective enforcement of Federal water pollution legislation and the effectiveness of the environmental movement, prompted the Federal Government to advance the Refuse Act Permit Program (RAPP) in 1970 under the Rivers and Harbors Act of 1899 as a vehicle to control water pollution.

RAPP required any facility that discharged wastes into public waterways to obtain a Federal permit specifying abatement requirements from the U.S. Army Corps of Engineers. William Ruckelshaus, the first Administrator of EPA, endorsed the joint program with the Corps soon after confirmation, and, on December 23, 1970, the permit program was mandated through Presidential Order. EPA and the Corps of Engineers rapidly began to prepare the administrative and technical basis for the permit program. However, unanticipated problems plagued the program almost immediately.

In December 1971, RAPP was struck down by a decision of the Federal District Court in Ohio (Kalur v. Resor), which held that the issuance of a permit for an individual facility could require the preparation of an environmental impact statement under the National Environmental Policy Act (NEPA) of 1969. The concept of a permit program survived, however, and, in November 1972, Congress amended the Federal Water Pollution Control Act to include the NPDES permit program as the centerpiece of a national water pollution control effort.

The enactment of the 1972 Amendments to the Federal Water Pollution Control Act, also referred to as the CWA, marked a distinct change in philosophy of water pollution control in the United States. The 1972 amendments maintained water quality-based controls, but placed a greater emphasis on a technology-based or end-of-pipe control strategy. This shift in emphasis from water quality to technology was demonstrated by a corresponding shift in the relative importance of water quality standards and effluent limitations.

The first round of NPDES permits issued between 1972 and 1976 provided for control of a number of traditional pollutants but focused on 5-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), pH, oil and grease, and some metals by requiring use of Best Practicable Control Technology Currently Available (BPT). The CWA established a July 1, 1977, deadline for all facilities to be in compliance with BPT. Additionally, the compliance deadline for installing Best Available Technology Economically Achievable (BAT) was July 1, 1983. A majority of all major permits issued to industrial facilities in the first round of NPDES permitting contained effluent limitations based on Best Professional Judgment (BPJ) because regulations prescribing nationally uniform effluent limitations were generally unavailable. The second round of permitting in the late 1970s and early 1980s began to emphasize the control of toxics but, due to the lack of information on their treatability, failed to complete the task.

The 1977 amendments to the legislation, known formally as the Clean Water Act of 1977, shifted emphasis from controlling conventional pollutants to controlling toxic discharges. This era of toxic pollutant control is referred to as the third round of permitting. The concept of BAT controls was clarified and expanded to include toxic pollutants. Hence, the compliance deadline for BAT was extended to July 1, 1984. The conventional pollutants (BOD<sub>5</sub>, TSS, pH, fecal coliform, and oil and grease) controlled by BPT in the first round of permitting were subject to a new level of control, termed Best Conventional Pollutant Control Technology (BCT). The compliance deadline for meeting BCT was also July 1, 1984.

On February 4, 1987, Congress amended the CWA with the Water Quality Act (WQA) of 1987. The amendments outline a strategy to accomplish the goal of meeting water quality standards set by the States. The WQA requires all States to identify waters that are not expected to meet water quality standards after technology-based controls on point sources have been imposed. The State must then prepare an individual control strategy to reduce toxics from point and nonpoint sources to meet the water quality standards. Among other measures, these plans are expected to address control of pollutants beyond technology-based levels. The strategy will require both biological and chemical methods to address the toxic and nonconventional pollutants from industrial and municipal sources.

The WQA once again extended the time to meet BAT and BCT effluent limitations. The new compliance deadline was March 31, 1989. The WQA established compliance dates for industrial and municipal storm water discharges. Industrial storm water discharges must meet the equivalent of BCT/BAT effluent quality. Municipal storm water discharges are required to meet standards based on control to the maximum extent practicable. Additionally, the WQA required EPA to identify toxics in sewage sludge and establish numerical limits to control these pollutants. The WQA also established an antibacksliding requirement that would not allow an existing permit to be modified or reissued with less stringent effluent limitations, standards, or conditions than those already imposed. There are a few exceptions for BPJ-based limits but in no case can the limits be less stringent than existing effluent guidelines (unless a variance has been granted) or violate water quality standards. Furthermore, the WQA made civil and criminal judicial penalties more stringent, increasing the maximum penalty for knowing endangerment to a fine of \$250,000 and/or imprisonment for 15 years.

The challenge for the NPDES program in the 1990s is to maintain the momentum established in the 1970s and 1980s in the face of increasingly complex permitting issues and limited permitting resources.

#### **1.4 TYPES OF NPDES PROGRAM AUTHORITY**

NPDES program authority can be divided into five elements:

- Basic municipal and industrial permit program
- Pretreatment program
- Federal facilities program

- General permit program
- Sludge permit program.

These programs require that EPA grant specific authority to States to administer each program. The following subsections discuss these components.

#### ***1.4.1 Basic Municipal and Industrial Permit Program***

As stated previously, anyone who wishes to discharge pollutants into waters of the continental United States must obtain an NPDES permit. Certain elements are common to any NPDES program, regardless of the type of wastewaters being regulated. However, there are also some significant differences. Generally speaking, municipal wastewaters include the sanitary wastes from residential and commercial sources, and industrial wastewater refers to wastes generated as the result of an industrial process.

Municipal wastewaters contain primarily biodegradable organic matter and, thus, treatment processes typically combine simple settling (primary treatment) with biological treatment (secondary treatment). In biological treatment, microorganisms biochemically oxidize the wastewaters. Industrial treatment technologies may be similar to those used in municipal treatment systems or they may be quite different. Permit limitations are designed to control levels of the parameters of concern whether from municipal or industrial sources.

For example, at the municipal wastewater treatment facility, sanitary wastes are treated in a publicly owned treatment work (POTW) and discharged to a receiving stream. In an industrial plant, process wastes are treated in a specially designed treatment facility and the treated process wastewater is discharged to a receiving stream. Because the composition of the wastewater is different in each of these situations, different treatment technologies would be employed. The final treated effluents would be reflective of the type of wastewater being treated and, thus, a different set of NPDES conditions would apply in each case.

In general, the information presented in the following chapters is applicable to both municipal and industrial NPDES permits. If specific considerations apply to only one type of facility, it will be so noted.

EPA currently administers the NPDES program on Native American lands unless a State is specifically authorized by EPA to do so. It is important to recognize, however, that



during the next several years Native American Tribes, if they desire, may be authorized by EPA to issue NPDES permits on Federal Native American reservations. The WQA of 1987 authorized EPA to treat Native American Tribes as States for purposes of the baseline NPDES program (as well as the pretreatment, sludge, Federal facilities, and general permits programs) and other CWA programs. Under the WQA of 1987, a Native American Tribe may apply for authorization to operate these programs like any State after the Tribe qualifies for treatment as a State by demonstrating four criteria: (1) Federal recognition as a Native American Tribe, (2) capability to carry out substantial governmental powers and duties, (3) authority over the surface waters of the Federal Native American reservation, and (4) capability to administer the NPDES program.

#### ***1.4.2 Pretreatment Program***

In actual practice, wastewaters are typically mixtures from different sources. This is particularly true in a municipal setting, in which a portion of the wastewater discharged to a POTW may be sanitary-type wastes from residential or commercial sources, while another portion may comprise industrial process wastes. Because the treatment process employs a biological process for the treatment of sanitary wastes, it is susceptible to upset from toxic industrial wastes. Thus, it is often necessary to require pretreatment of industrial wastes, which are discharged to municipal sewerage systems, to prevent a bypass of pollutants through the treatment works or an upset to the operation of the treatment works. These industrial discharges are called indirect discharges or industrial users because they go through a municipal treatment system before being discharged to the receiving waters. Pretreatment and other specific issues that are applicable only to a municipal NPDES program will be discussed in more detail in Chapter 5.

#### ***1.4.3 Federal Facilities Program***

The authority to administer the NPDES program to Federal facilities is an additional programmatic responsibility for NPDES States. Federal facilities are installations that are owned and operated by the U.S. government. EPA will permit Federal facilities if and only if the State is not authorized to permit these facilities. The permit writer who is required to prepare a permit covering a Federal facility should consult applicable guidance in order to develop limitations that are adequate to control the wastes generated. For example, a Navy facility that has a direct discharge from a metal finishing facility would be subject to promulgated effluent limitation guidelines that apply to metal finishers. Hence, Federal facilities are subject to effluent guidelines, to the extent that the facility is engaged in that activity.

#### **1.4.4 General Permit Program**

General permits are designed to enable the issuance of one permit covering a specified class of dischargers within a defined geographic area. General permits apply the same set of limitations to a group of similarly situated dischargers as would be imposed through individual permits. Unlike the Federal facilities program, if an NPDES-authorized State is not approved to implement the general permit program, EPA may not issue a general permit in that State.

The geographic areas for which general permits are designed to cover should correspond to existing geographic or political boundaries, such as the following:

- Designated planning areas
- Sewer districts
- City, county, or State boundaries
- State highway systems
- Standard metropolitan statistical areas
- Urbanized areas.

The types of sources that the general permit may be written to cover include:

- Storm water point sources
- A category of point sources having elements in common, such as facilities that:
  - Are involved in similar operations
  - Discharge the same types of wastes
  - Require the same effluent limitations or operating conditions
  - Require the same monitoring where tiered conditions may be used for minor differences within class (e.g., size or seasonal activity)
  - Are, according to the EPA/State more appropriately regulated by a general permit.

From an administrative standpoint, general permits are issued, modified, revoked and reissued, or terminated in accordance with the procedures followed for individual NPDES permits (see Chapter 8). Additional requirements for general permits may also be found in 40 CFR 122.28 of the NPDES regulations.

#### **1.4.5 *Sludge Permit Program***

EPA's sludge permitting program also requires special authorization. Sludge permits are to be issued to treatment works, including POTWs and privately owned treatment works that treat domestic sewage, and to other entities that control the quality of sewage sludge or the manner in which it is disposed. The permitting regulations can be found at 40 CFR Part 122 for the Federal program and regulations for State program approval are at 40 CFR Parts 123 or 501 (depending on whether the State wishes to administer the sewage sludge program under its NPDES program or under another program [e.g., a solid waste program]). The technical regulations governing sewage sludge use and disposal are contained in 40 CFR Part 503.

### **1.5 INTRODUCTION TO NPDES TERMINOLOGY AND REGULATIONS**

Prior to continuing with this manual, the permit writer should become familiar with the typical terminology. Appendix A contains a glossary of the commonly used terms in this textbook that are also used in the NPDES permitting program. Once the terminology is familiar, the permit writer should proceed to become acquainted with the regulations that govern the NPDES program. Appendix B provides an outline of the regulations contained in 40 CFR Part 122, and Appendix C contains an index, by subject, of the NPDES regulations. These appendices will help the permit writer become more familiar with applicable regulations and will become a useful resource for future permitting endeavors.

## **2. THE APPLICATION FORM AND ADDITIONAL INFORMATION**

### **2.1 THE APPLICATION PROCESS**

#### **2.1.1 *Facilities Required to Obtain Permits***

Anyone who discharges pollutants or proposes to discharge pollutants to waters of the United States needs to obtain an individual permit. There are some exceptions, however, including discharges that are covered under a general permit (40 *Code of Federal Regulations* [CFR] 122.28) or those types of discharges that are excluded under 40 CFR 122.3 (e.g., certain discharges from marine vessels, nonpoint source runoff, and indirect discharges to publicly owned treatment works [POTWs]).

Most direct dischargers have an existing permit but must reapply for a permit renewal at least 180 days before their current permit expires. Renewals of existing permits far exceed the number of new permit applications. New permit applications fall into two classes: new sources and new dischargers. New sources are facilities constructed after New Source Performance Standards have been promulgated. New dischargers are other new facilities that did not begin discharging until after August 13, 1979. The glossary in Appendix A to this document and 40 CFR 122.29 contain more detailed definitions of new sources and new dischargers.

#### **2.1.2 *Forms Used in Applying for a Permit***

The type of application forms that existing and new dischargers must complete has changed as the National Pollutant Discharge Elimination System (NPDES) program has evolved. The older forms will eventually be replaced by revised application forms. The following forms are currently being used:

- **Form 1** is a general form used in combination with all other NPDES permit applications. It provides general information, such as the name of the facility, location, and contact person.
- **Form A and Short Form A** are used by POTWs. Form A is used for major dischargers and Short Form A is used for minor dischargers. Definitions of major and minor are on the application forms.
- **Form 2B** is used by concentrated animal feeding operations or aquatic animal production facilities.
- **Form 2C** is used by existing industrial dischargers, including privately owned waste treatment facilities and water treatment plants whether publicly or privately owned, that discharge process wastewater.

- **Form 2D** is used for new manufacturing, mining, and commercial discharges (major and minor) that discharge process wastewater.
- **Form 2E** is used for new or existing industrial dischargers that do not discharge process wastewater.
- **Form 2F** is used for new or existing municipal and industrial dischargers that are required to apply for discharges consisting of storm water only.

Approximately 48,000 facilities currently use Form 2C; 15,000 of the 48,000 are expected to be able to use Form 2E. About 2,900 facilities use Form 2B (animal feed lot permits) and new industrial dischargers using Form 2D are expected to remain in the hundreds.

As the number of permits for existing sources far exceeds all other types of discharge permits, the processing of Form 2C will be the main topic of concern, with respect to industrial discharges. Many of the comments are also applicable to Form A and Short Form A for POTWs.

### **2.1.3 Application Deadlines**

The Federal regulations contained in 40 CFR 122.21 require that applications for new discharges be made 180 days before discharges actually begin. Applications for permit renewals must be made at least 180 days before the expiration of the existing permit. Individual States, however, may have slightly different schedules. Furthermore, the State Director or the Regional Administrator may allow individual applications to be submitted at dates later than these but not later than the expiration date of the existing permit.

## **2.2 REVIEW OF THE APPLICATION**

The principle aspects of application review are checking for completeness and for accuracy. Because the draft permit is based upon the information included in the application, the application must be complete and accurate. This point cannot be stressed strongly enough. Experience from permit writers across the country has shown that this can be an especially troublesome part of the process. Owners of facilities that are required to file an application are sometimes unfamiliar with the application form. For an existing facility, it is possible that the forms that must be used for reissuance are different than the forms used at the time the permit was originally issued.

A considerable amount of correspondence may be required before the permit writer obtains an application that can be considered complete and accurate. Some offices use



checklists for reviewing application forms. In addition, it is often useful to send form letters to applicants when certain portions of the application are either missing or inadequate. As the permit writer gains experience in writing permits, he or she will be able to better detect omissions and errors in the permit application form.

### **2.2.1 *The Complete Application***

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

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

A response to the blank items must be obtained by contacting the facility in writing or, in some cases, by telephone. Because of the administrative record (this topic is discussed more fully in Chapter 8) that must be maintained in the processing of an application, and the possibility of hearings, only minor items should be handled by telephone, and even these must be documented in writing. Returning the application to the applicant for completion is the preferred method. Of course, to save some processing time, a new application could be submitted after the applicant has been advised of the need.

If the changes or corrections to any application are extensive, the applicant may be required to submit a new application. Supplementary information, such as more detailed production information or maintenance and operating data of a treatment system, may also be required to process the permit (supplementary information can also be obtained at a later date when the permit writer is actually drafting the permit). An application is considered to be complete when the permit writer is satisfied with all submitted materials.

All applicants are required to submit a map as an attachment to Form 1. Often, this item is overlooked. Other industrial- or municipal-specific information is also often omitted. For example, industrial applicants sometimes fail to submit a process line diagram required by Part IIA of Form 2C. This piece of information is important to ensure that the location and description of the outfalls and the description of processes (Parts I and IIB of Form 2C) given by the applicants correspond to the map and the process line diagram. Municipal applicants

commonly overlook the submittal of whole effluent toxicity (WET) testing, as required by 1990 amendments to the regulations. WET testing is required from municipal applicants with greater than one million gallons per day flow or with an approved pretreatment program. The results of this testing may demonstrate the need for further WET testing, WET limits, or both.

Many of the omissions also typically occur in the sections of the application which requiring data submissions. Applicants may fail to submit data necessary to properly characterize the facility. Examples of the types of data that the permit writer will need to obtain before the application can be considered complete are given below:

- Are required toxic organic pollutants (gas chromatograph/mass spectrometer [GC/MS] fractions) listed?
  - **Example:** An application from a plastics processor fails to list any GC/MS fraction.
  - **Discussion:** A plastics processor is required to test for the volatile GC/MS fraction (Table 2C-2 in the application form instructions and 40 CFR 122.21(g)(7)(ii)(A) of the NPDES regulations).
- Are required heavy metals listed?
  - **Example:** A primary felt producer marks thallium and beryllium as believed absent in the wastewater.
  - **Discussion:** Although thallium and beryllium are not expected to be found in a felt producer's discharge, page 2C-3 of the application form instructions and 40 CFR 122.21(g)(7)(ii)(B) require testing for these metals. Occasionally, unexpected contaminants will be present in a waste stream due to poor housekeeping, unusual production methods, or for other reasons. The comprehensive testing requirements that apply to the various categories of industry are designed to determine whether any unexpected contaminants are present in significant quantities, as well as to determine levels of pollutants that are known to be present. In the above example, the submission is incomplete because additional information is needed and "believed absent" is wrongly indicated.
- Are all expected pollutants listed?
  - **Example:** A producer of wood-resin-based derivatives does not indicate the presence of zinc in his wastewater.
  - **Discussion:** Zinc is used as a catalyst in the production of wood-resin-based derivatives. This type of information can be found in the effluent limitations development documents. Testing for zinc is also required.
  - **Practical Exercise:** Consider the plastics processor, the felt producer, and the producer of wood-resin-based derivatives, mentioned above, and answer the following questions:
    - - 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?
- **Discussion:** 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 testing of all four GC/MS fractions by the felt producer and the producer of wood-resin-based derivatives. Page 2C-3 of the application instructions and 40 CFR 122.21(g)(7)(ii)(B) require testing of all of the heavy metals listed in item V part C1 of the application form by all three manufacturers. For the expected metals, see the effluent limitations development documents for information.

Since many applicants particularly fail to submit all required effluent monitoring data due to interpretations of regulations, Appendix D provides a summary of required effluent data.

### **2.2.2 The Accurate Application**

All information submitted on a permit application should be accurate, in addition to being complete. Although it may be difficult to detect certain inaccuracies, a number of common mistakes and omissions can be readily detected. When mistakes are detected, they must be corrected. The permit writer should follow the same procedures for correcting inaccurate information as are used for obtaining missing information. The following examples reflect the type of review that the permit writer must conduct:

- Do the concentration, mass, and flow values correspond?
  - **Example:** Suppose the maximum daily flow is shown as 1.2 million gallons per day, the maximum daily suspended solids is 23 milligrams per liter (mg/l), and the maximum daily mass discharge is reported as 230 pounds per day (lbs/day).
  - **Discussion:** In this case, the maximum daily flow and concentration supposedly occurred on the same day to give the maximum daily discharge. While the maximum flow and the maximum concentration can occur on the same day, it is an unlikely event. Accordingly, when the data on the Form 2C application indicate that this has happened, the permit writer should investigate whether this is the case or it is an error. The same holds true for the maximum 30-day values, although it is a somewhat more likely occurrence.
- Do the reported values correctly correspond to the existing permit and previous application, monitoring data, waiver requests, and effluent guidelines development documents?
  - **Example:** The previous permit had a limitation of 38 lbs/day for oil and grease. The application reports an average of 3.3 lbs/day.
  - **Discussion:** There is apparently a problem in calculation here. It could be simply a shift in the decimal point or it could involve some other type of error. It also could represent a significant change in production techniques or treatment efficiencies.

- Do concentration values correspond with analytical detection limits?
  - **Example:** The acid GC/MS fraction (phenols) compounds are all reported as less than 1 mg/l.
  - **Discussion:** The detection limits for the compounds in this fraction are all near 0.01 mg/l. Probably the 4AAP method for phenols was used, rather than the required testing procedure using GC/MS.

## **2.3 ADDITIONAL INFORMATION**

In addition to the formal application form, the permit writer should consider other sources of information for development of a draft permit. A review of background information and a facility inspection are valuable sources of information.

### **2.3.1 Background Information Review**

The permit writer should consider any additional background information on the facility that may be relevant. Much of this information may already be available in the permit file or office.

File information includes the current permit, the rationale for the current permit (if one was prepared), Discharge Monitoring Reports (DMRs), compliance inspection reports, any correspondence concerning compliance problems, any information on changes in plant conditions, and communications with other agencies. Much of this information, particularly DMR data, may be already stored in various automated data tracking systems (see Chapter 9). The permit writer should use these sources of information whenever they are available. Other information present in the office should include effluent guidelines, related development documents, reference textbooks on specific industry categories, the U.S. Environmental Protection Agency's (EPA's) *Treatability Manual*, State Water Quality Standards, and receiving water quality data such as that available from the Storage and Retrieval data base (STORET). The permit writer should also consider reviewing the other environmental permit information, if appropriate, such as Resource Conservation and Recovery Act (RCRA) permit files.

This information should be reviewed for completeness. As needed, supplemental data may be requested from various State Agencies, EPA's Engineering and Analysis Division, and the applicant.

### **2.3.2 Facility Inspections**

For the permit writer to gain an adequate understanding of more complex facilities, a facility visit is highly recommended. This is especially warranted if significant pollution control or treatment improvements will be required, there have been frequent problems in complying with the present permit, there are known problems with spills or leaks or with contaminated surface runoff, or there is onsite treatment storage or disposal of hazardous wastes. As noted previously, the information from other environmental programs (e.g., Comprehensive Environmental Response, Compensation, and Liabilities Act; RCRA) may be important in this regard.

The inspection should include a detailed review of production processes in order to evaluate what toxic or hazardous substances may be present in raw materials and associated contaminants, as well as in products and byproducts. The water uses, the resulting wastewater streams, and any in-process pollution controls should be reviewed. This information is needed to assist in selecting toxic pollutants to be limited and in evaluating possible in-process control improvements.

In addition, the inspection should include a review of wastewater treatment facilities, their performance and operation, and maintenance practices. This is useful in evaluating the adequacy of existing treatment performance in assessing the feasibility of improvements and in assessing performance data. Effluent monitoring points, sampling methods, and analytical techniques should be reviewed to define 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 onsite disposal areas, and all process areas should be observed to determine the need for controls on surface runoff and for specific best management practices.

The time required to conduct an adequate inspection will vary 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 onsite management of sludges or hazardous wastes, an adequate inspection can be completed in one day. Complex, larger plants with several treatment systems, numerous outfalls, and extensive ancillary activities may require several days to inspect.



Time spent on plant inspections often results in time savings during permit preparation. However, time and/or travel resources are generally not adequate to allow inspection of all facilities. In such cases, the permit writer may be able to obtain much of the desired information from the next (or previous) compliance monitoring inspection. This requires advance planning to review the permit application and background information so that the compliance inspector can be alerted to specific information needs.

Aerial photographs are an excellent aid for conducting a plant inspection and may provide much of the needed information on the potential for contamination of surface runoff and on ancillary activities in the absence of an inspection. Aerial photographs may be obtained from a variety of sources, including the Environmental Services Division in some EPA Regions, the National Enforcement Investigation Center, EMSL—Las Vegas, Nevada, the Environmental Photo Interpretation Lab—Vint Hill, Virginia, and private contractors.

### **3. DEVELOPMENT OF THE DRAFT PERMIT**

#### **3.1 GENERAL CONSIDERATIONS**

##### **3.1.1 *Contents of a Permit***

Once the permit writer is satisfied that a complete and accurate application has been received and necessary background information has been obtained, he or she may proceed to the next step: drafting the actual National Pollutant Discharge Elimination System (NPDES) permit conditions. This step is the heart of the process and may require a considerable expenditure of time and effort on the part of the permit writer. The draft permit, at a minimum, will consist of the following sections:

- Cover page
- Effluent limitations
- Monitoring requirements
- Standard conditions
- Special conditions.

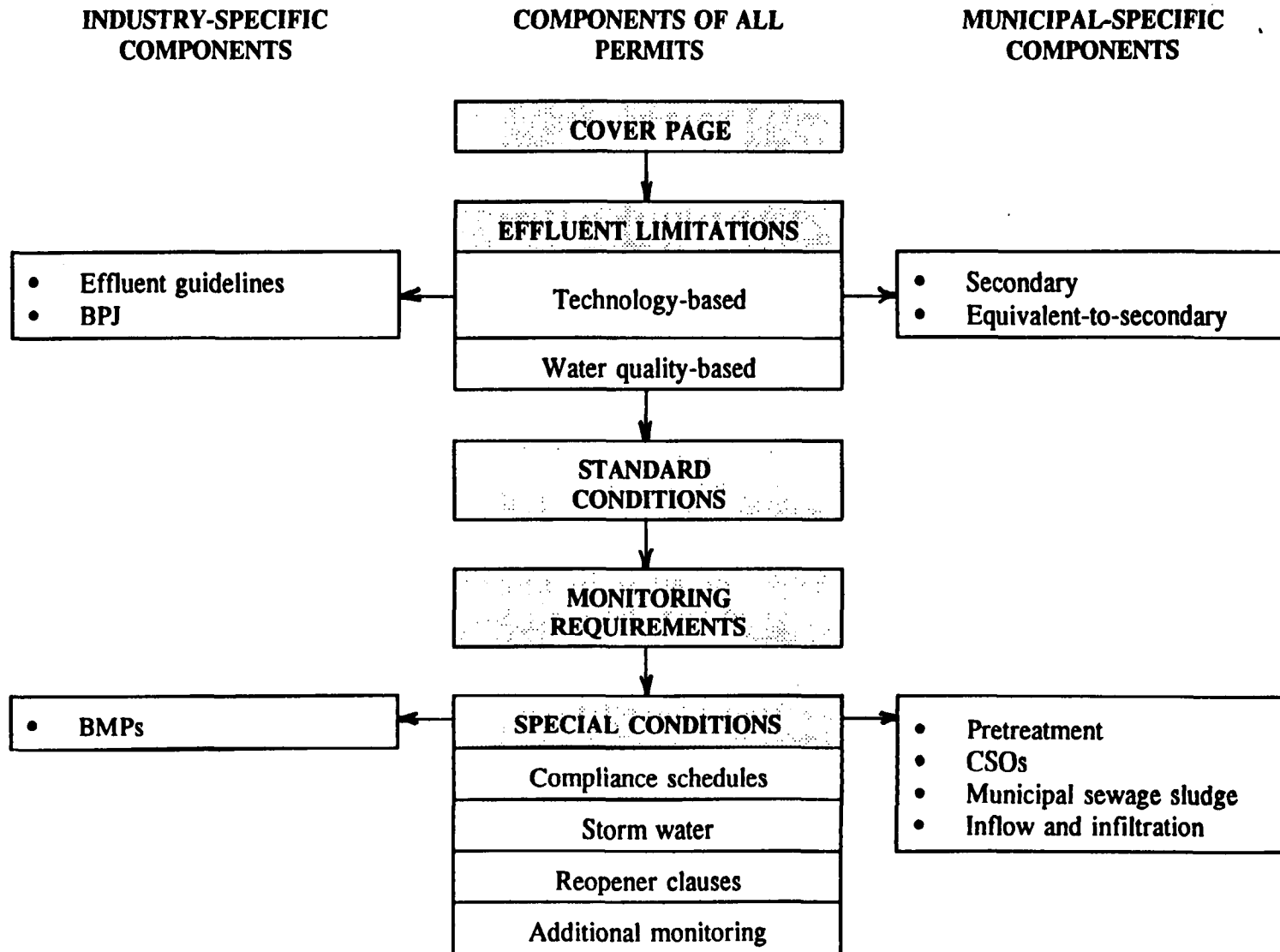
Although these sections compose all permits, the contents of some of these sections will vary depending on whether the permit is to be issued to a municipal or industrial facility. Exhibit 3-1 shows the industrial- and municipal-specific contents that should be considered. Chapter 4 discusses the industrial-specific content; Chapter 5 discusses the municipal-specific content.

##### **3.1.2 *Importance of Documentation***

During the course of developing the draft permit, the permit writer should remember the importance of carefully documenting each step in the process for several reasons for this. It will assist the permit writer in developing the permit in a thorough and logical fashion. In addition, it will become part of the official record with respect to the facility and will serve to explain the rationale for the permit limits and to counter any challenges to the derivation of the permit terms and conditions. Furthermore, new staff members who become involved in the permit process must be able to clearly determine the history of various facilities.

As a general rule, it is better to thoroughly document every step of the permit drafting process than to rely on one's memory or on an abbreviated administrative record (this subject is discussed in more detail in Chapter 8).

### EXHIBIT 3-1: PERMIT CONTENTS



### **3.2 COVER PAGE**

The first page of every NPDES permit is the cover page. The cover page typically contains facility identification information and a statement authorizing the discharge(s). It is generally printed on official letterhead or stationery to give it a measure of distinction. A cover page is different from the transmittal page/letter used to convey the permit.

Permitting authorities typically have a standard boilerplate format and language for use in drafting the cover page. In most cases, the cover page contains relevant general information including:

- Name and location/address of the permittee
- A statement granting authorization to discharge in compliance with the terms and conditions of the permit
- A listing of the specific locations from which and specific receiving waters to which a discharge is authorized
- An effective and expiration date
- The signature of the permitting authority and the date of issuance.

Each of these components is integral to ensure that the NPDES permit is legally enforceable. The cover page is the most sensible location for this information because it ensures that relevant identifying and authorization information is readily accessible. It is also important that the information contained on the cover page is accurate. Drafting the cover page improperly may have significant ramifications regarding permit enforceability. Some common errors in drafting the NPDES permit cover page include:

- An incorrect name or location description (address) of the permittee
- Failure to properly identify the outfalls and the receiving waters
- Failure to limit the duration of the permit to 5 years
- An improperly authorized signature on the permit.

### **3.3 EFFLUENT LIMITATIONS**

Effluent limitations are the heart of the NPDES permit. They act as the primary mechanism to control the discharges of pollutants to waters of the United States. In general, the majority of the permit writer's time is spent determining and developing appropriate effluent limitations based on technology and water quality factors.

Technology-based limits pertain to both industrial and municipal facility categories. Technology-based permit limits for industrial facilities are derived from effluent limitations guidelines (ELG) or Best Professional Judgment (BPJ), whereas technology-based permit limits for municipal facilities, referred to as publicly owned treatment works (POTWs), are derived from secondary treatment standards. In all cases, technology-based limits represent the best treatment a facility can install within the economic means of the industry/municipal facilities as a whole (in the case of ELGs/secondary treatment) or of a specific industrial facility being permitted (in the case of BPJ). Technology-based limitations vary dependent on the nature of the discharge and on the type of facility. An overview of industrial- and municipal-specific technology limitations are provided in this Section. However, Chapters 4 and 5 provide detailed permitting considerations for industries and municipalities respectively.

The Clean Water Act (CWA) and the U.S. Environmental Protection Agency (EPA) regulations require water quality-based limitations in permits when more stringent limits than technology-based effluent guidelines are necessary in order to protect the "designated use" of the receiving water. The permit writer must calculate both technology-based permit limits and water quality-based permit limits for each parameter and impose the most stringent limit in the permit. Water quality-based limits are generally more difficult to develop than effluent guidelines because they involve a site-specific evaluation of the discharge and its effect on a receiving stream. Water quality-based limits are applicable to all facility categories. Chapter 6 thoroughly discusses water quality-based permitting.

### ***3.3.1 Statistical Considerations for Limit Development***

The quality of the effluent from a treatment facility will normally vary over time. If 5-day biochemical oxygen demand (BOD<sub>5</sub>) data for a typical treatment plant are plotted against time, the day-to-day variations of effluent concentrations can be seen. Some of this behavior can be described by constructing a frequency-concentration plot. From this plot, one can see that for most of the time, BOD<sub>5</sub> 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).

Permit limits are generally set at the upper bounds of acceptable performance. Requirements are usually expressed using two expressions of permit limits—an average limit and a maximum limit. The use of average and maximum limits can vary depending on the

effluent guidelines and water quality criteria that are consulted. Instantaneous maximums, daily averages and daily maximums, weekly averages, and monthly averages are all commonly used limitation expressions. Generally, the definitions are consistent with those set forth in Appendix A.

If permit limits are set too lenient relative to the long-term average, a discharger not complying with expected performance will not exceed the limits. If permit limits are set too stringently, a discharger that is complying with expected performance may frequently exceed the limits. It is important to note that statistical variability is already built in with respect to the effluent limitation guidelines, and the permit writer may not perform a separate evaluation in those cases where a permit limitation is derived from a guideline. When developing a BPJ limit, regulatory agencies have settled on a statistical confidence rate of 1 to 5. These confidence rates correspond to the 99th to 95th percentiles of a cumulative probability distribution. The 99th percentile limit is less stringent than the 95th percentile limit. Thus, in any single monitoring observation, a discharger running a properly operated and maintained treatment facility has a 95 to 99 percent chance of complying with its permit limits .

### **3.3.2 Overview of Industrial-Specific Limitations**

Effluent limitations for industrial dischargers are developed by three methods:

- ELGs
- BPJ
- Water quality considerations.

Deriving effluent limitations based on water quality will be discussed in Chapter 6. The use of ELGs and BPJ when developing limitations are discussed in detail in Chapter 4. However, it is useful to provide a brief overview in this chapter.

In general, derivation of limits based on ELGs is usually the most straight forward, since it involves the application of a guideline that has already been technically derived (and litigated). The location of applicable effluent guidelines requires a familiarity with several sources of information, particularly the *Federal Register*. The *Federal Register* and the codified version (*Code of Federal Regulations* [(CFR)]) were discussed in Chapter 1. In addition to the *Federal Register*, there are a number of documents that are useful to the permit writer in the process of locating applicable guidelines and other background information, including the development documents for the various industrial categories which

are produced by EPA's Engineering and Analysis Division. Development documents contain the rationale for the development of the effluent guidelines and include a considerable amount of background information. In addition, the Engineering and Analysis Division has compiled a document that summarizes and cross-references all of the currently promulgated guidelines.

BPJ-based limits are also technology-based limits but are derived on a case-by-case basis, taking into account site-specific considerations. BPJ is used in cases where effluent limitations guidelines are not available for or do not regulate a particular pollutant of concern.

Often, a permit will have limitations for parameters developed by different means and occasionally the limitations on a single parameter will be derived through a combination of methods. For example, an effluent may have total suspended solids limited by effluent guidelines, oil and grease limited by BPJ, ammonia by aquatic toxicity (water quality considerations), and BOD<sub>5</sub> by effluent guidelines for part of the year and by water quality considerations for the remainder of the year.

### **3.3.3 *Overview of Municipal-Specific Limitations***

Effluent limitations for municipal dischargers are developed by three methods:

- Secondary limitations
- Equivalent to secondary considerations
- Water quality considerations.

Deriving effluent limitations based on water quality will be discussed later in this chapter. Developing permit limitations based on secondary or equivalent to secondary considerations are discussed in detail in Chapter 5. However, it is useful to provide a brief overview in this chapter. Exhibit 3-2 summarizes secondary limitations. Equivalent to secondary may be applied where sewage treatment plants use trickling filters or waste stabilization ponds as the primary method of biological treatment and the secondary limitations noted above cannot be met despite the treatment plant meeting appropriate design standards. Equivalent to secondary limitations are slightly more difficult to apply since they involve an analysis of appropriate design and operations of a plant, as well as the statistical and economical bases of limitations.

**EXHIBIT 3-2: SECONDARY LIMITATIONS**

<b>Parameter</b>	<b>30-Day Average</b>	<b>7-Day Average</b>
<b>BOD<sub>5</sub></b>	30 milligrams per liter (mg/l)	45 mg/l
<b>Total Suspended Solids (TSS)</b>	30 mg/l	45 mg/l
<b>Percent Removal</b>	85% BOD <sub>5</sub> and TSS	N/A
<b>pH</b>	Minimum 6.0 standard units (s.u.), Maximum 9.0 s.u.	

As with an industrial permit, a municipal permit will often have limitations for different parameters developed by different means. Thus, the most stringent limitations derived for some parameters will be based on water quality and others on technology.

**3.4 MONITORING CONDITIONS**

After addressing the selection of permit limits, the permit writer's next task is to establish monitoring requirements for these limits. Monitoring is truly the cornerstone of the NPDES program.

It is important to understand that monitoring in the context of an NPDES permit is primarily carried out by the permittee. The ideal situation would be one in which the regulatory agency and/or an independent laboratory collected and analyzed samples from the permittee's waste stream. Because this is not logistically or financially possible, however, the burden falls to the permittee. Potential problems that can result from a self-monitoring system include improper sample collection, poor analytical technique, falsification of records, and other abuses of the system.

Several tools are available to the regulatory agency to prevent or minimize these problems. Facility inspections are routinely performed by regulatory agency personnel and should consist of a thorough inspection of the treatment facility. This visual observation of the site will allow the inspector to determine whether the facility is capable of producing an effluent that will meet its permit limits. The facility inspection should also include an inspection of the laboratory facilities, including a review of the laboratory and sampling techniques used and appropriate supporting records. Additionally, the regulatory agency conducts compliance monitoring consisting of periodic sampling of a permittee's discharge. If the compliance monitoring results differ significantly from those reported by the permittee, the reasons for the discrepancy should be discovered and corrected. Chapter 9 discussed the subject of compliance monitoring in more detail.



### **3.4.1 Considerations When Selecting Monitoring Requirements**

#### **3.4.1.1 Monitoring Points**

An integral part of the monitoring conditions for a particular facility are the monitoring points. The point at which a sample is collected can have a dramatic effect on the monitoring results for that facility. For example, a facility may have several waste streams from different plant processes. The waste stream from a particular process may contain extremely high amounts of a particular pollutant, which may reflect poor housekeeping, inadequate treatment facilities, or other problems. When diluted with other waste streams from other parts of the plant, resulting limitations may be below detectable levels. Thus, it may be necessary to require internal monitoring points in order to detect these problem areas. Authority to address internal waste streams is provided in 40 CFR 122.45(h). Ultimately, the permittee is responsible for providing a safe and accessible sampling point that is representative of the discharge; the permit writer is responsible for determining the most appropriate monitoring location and explicitly specifying this in the permit.

#### **3.4.1.2 Monitoring Frequency**

Factors that need to be considered when determining monitoring frequency include:

- Frequency of discharge
- Design capacity of treatment facility
- Type of treatment method used
- Significance of the pollutants with regard to
  - Post compliance record/history
  - Cost of monitoring relative to discharger's capabilities.

State and EPA Regional offices usually recommend monitoring frequencies based on the design capacity of the treatment facility. Exhibit 3-3 shows typical monitoring frequencies.

If the cost of monitoring is significant considering the capability of the discharger, the frequency of some or all of the parameters can be decreased (the term significant, in this context, can be related to the *Work Book for Determining Economic Achievability for National Pollutant Discharge Elimination System Permits*). This is especially true if some other parameter will act as an indicator or surrogate (e.g., BOD<sub>5</sub> acts as an indicator for the priority pollutants in the Wood and Gum Chemicals category).

**EXHIBIT 3-3: TYPICAL MONITORING FREQUENCIES**

<b>Plant Capacity (million gallons per day)</b>	<b>Flow</b>	<b>Other Parameters</b>
0-0.099	Measure and record weekly	Quarterly
0.1-0.99	Measure and record daily	Monthly
1.0-4.99	Measure continuously Record daily flow	Weekly
More than 5.0	Measure continuously Record daily flow	Daily

In addition to monitoring pollutants that are limited in the permit, parameters may be monitored to collect information. Monitoring may be done when insufficient information exists to set a limit, but where past data indicates concerns. For example, a biomonitoring requirement may be set on a semiannual basis, even though there is no effluent limitation for toxicity units.

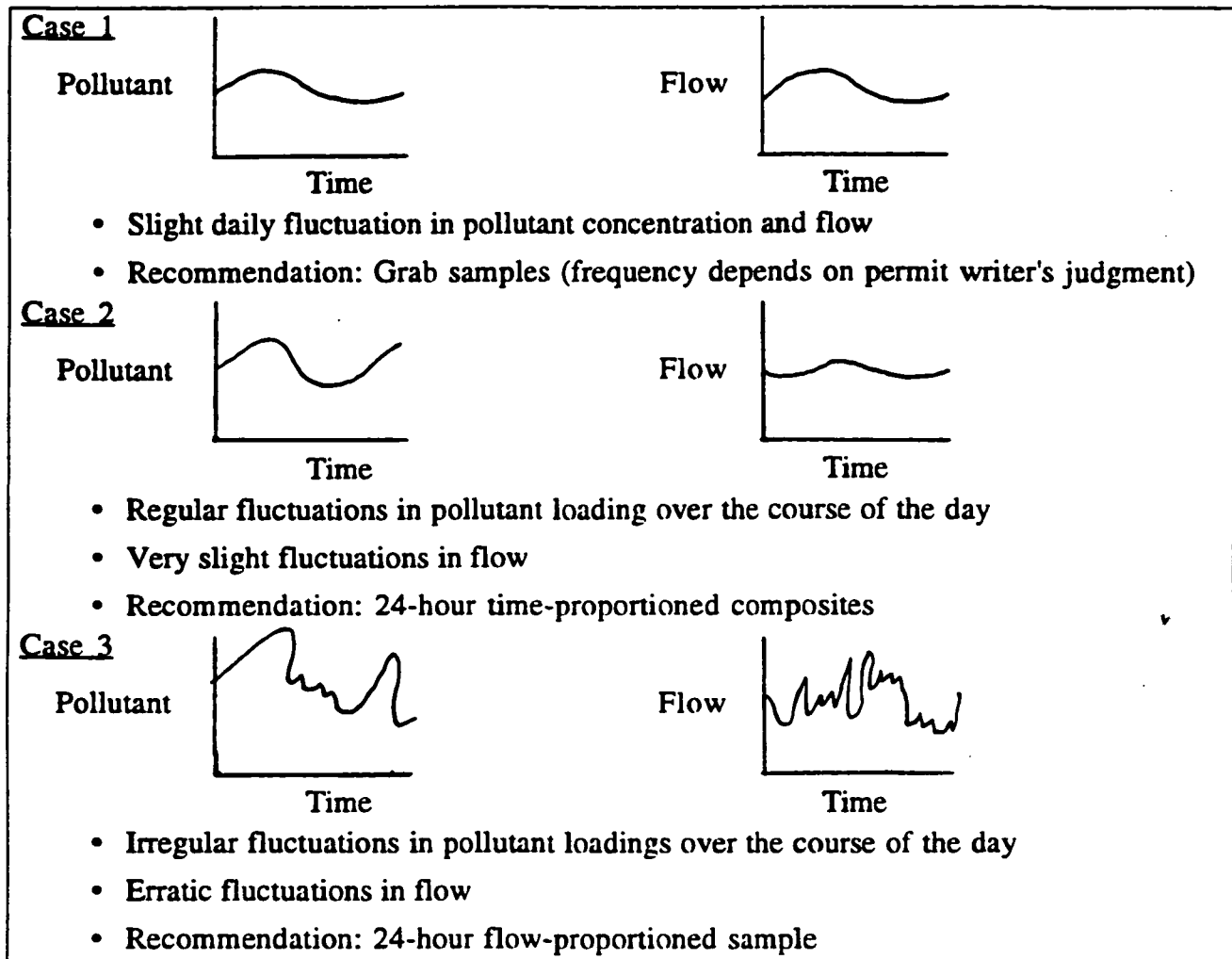
Useful tools for the permit writer in establishing monitoring requirements include *Abstracts of Industrial NPDES Permits*, Permit Compliance System retrieval information from facility inspections, and plant performance data, such as that contained in discharge monitoring reports (DMRs).

**3.4.1.3 Types of Sampling**

In addition to establishing monitoring frequencies, the permit writer will need to determine the type of sample required. There are basically two types of samples: grabs and composite. Where the quality and flow of the waste stream being sampled is not likely to change over time, a grab sample is appropriate. When the material being sampled varies significantly over time either as a result of flow or quality changes, a composite sample is desirable. There are two types of composite samples: (1) time-proportional, which apportions sample aliquot volumes according to time (e.g., 250 milliliters [mls] every 2 hours, or 125 mls after 1 hour and 375 mls after 3 hours) and (2) flow-proportional, which apportions sample aliquot volumes according to flow (e.g., 250 mls every 5,000 gallons of flow, or 50 mls after 1,000 gallons of flow and 150 mls after 3,000 gallons of flow).

Three situations and the appropriate type of sampling in each case are presented in Exhibit 3-4.

**EXHIBIT 3-4: CASE STUDIES ILLUSTRATING APPROPRIATE  
SAMPLING TYPES**



As shown in Exhibit 3-4, samples may be composited by time or flow and a representative sample will be assured. However, where both flow and pollutant concentration fluctuate dramatically, a flow-proportioned composite sample should be taken because a greater quantity of pollutant will be discharged during these periods. As an alternative, time-proportioned samples may be taken with flow records used for weighing the significance of various samples.

In addition to flow and loading variations dictating the type of samples collected, the chemical and physical properties of a pollutant also prescribe sample types. For some pollutants, the concentration of a pollutant may degrade or increase over time, thus resulting in a composite sample not being reflective of the facility discharge. For example, the

temperature of a discharge will approach the ambient air temperature over time. Another scenario would be where the process of compositing a sample may result in losses caused by pollutant residual adhering to container surfaces (e.g., oil and grease). Due to their properties, parameters including oil and grease, sulfite, fecal coliform, fecal streptococcus, volatile organic acids, dissolved oxygen, pH, temperature, chlorine, phenol, and cyanide may be monitored more representatively by grab sample. Permit writers should be aware of the properties of pollutants being regulated in order to determine when special sampling should be conducted.

#### **3.4.1.4 Analytical Methods**

The analytical methods required in conjunction with monitoring requirements are usually specified in the standard conditions of the permit. Analytical methods for industrial and municipal wastewater pollutants must be conducted in accordance with the methods specified pursuant to 40 CFR Part 136, which references one or more of the following:

- Test methods in Appendix A to 40 CFR Part 136
- *Standard Methods for the Analysis of Water and Wastewater (Edition Referenced)*
- *Methods for the Chemical Analysis of Water and Wastes*
- *Test Methods: Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater.*

The analytical methods contained in 40 CFR Part 136 are test methods designed only for chemical-specific pollutants. For some parameters, it may be necessary to specify the analytical methods required. For example, biomonitoring test procedures are not found in 40 CFR Part 136 so the permit writer will need to specify the methods. EPA has published recommended toxicity test protocols in three manuals: *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, *Short-Term Methods for Estimating the Chronic Toxicity of Effluents, and Receiving Waters to Marine and Estuarine Organisms*. The Agency is revising methods for chronic toxicity testing and amending the regulations at 40 CFR Part 136 to add the whole effluent toxicity procedures to the already promulgated analytical test methods.

### **3.5 STANDARD CONDITIONS**

Standard conditions, sometimes called boilerplate conditions, will consist of pre-established conditions that are the same for all permits. The standard conditions set out in 40 CFR 122.41 and 122.42 play an important supporting role with respect to the actual limits

because these conditions delineate the legal, administrative, and procedural requirements of the permit. These conditions may be inserted verbatim from the regulations or incorporated into the permit by specific reference to the regulations. Standard conditions cover various topics, including definitions, testing procedures, records retention, notification requirements, and permittee responsibilities.

### **3.5.1 Types of Standard Conditions**

Standard conditions should incorporate applicable Federal and State statutes either by reference or by recitation. The use of standard conditions helps ensure uniformity and consistency of all permits issued by NPDES States or EPA Regional offices. The permit writer needs to be aware of the contents of the standard conditions because it may often be necessary to explain portions of these conditions to a permittee. The permit writer should also keep abreast of any changes in EPA's standard conditions set out in 40 CFR 122.41 as statutes or regulations are revised. Appendix A contains a list of definitions that are typically included as standard conditions. A brief discussion of each of EPA's standard conditions follows:

- ***Duty to Comply [40 CFR 122.41(a)]***—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.
- ***Duty to Reapply [40 CFR 122.41(b)]***—If a permittee, after the expiration of its permit, desires to continue its activities, it must reapply for and obtain a new permit.
- ***Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]***—The permittee may not use as a defense the reasoning that compliance could only be achieved by halting or reducing the permitted activity.
- ***Duty to Mitigate [40 CFR 122.41(d)]***—The permittee is required to take all reasonable steps to prevent any discharge, use, or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.
- ***Proper Operation and Maintenance [40 CFR 122.41(e)]***—The permittee must properly operate and maintain all equipment and treatment systems used by the permittee for compliance with the terms of the permit. The permittee must provide appropriate laboratory controls and quality assurance procedures. Backup systems are required when needed to ensure compliance. However, each main line unit treatment process must be operated as a minimum.
- ***Permit Actions [40 CFR 122.41(f)]***—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.

- **Property Rights [40 CFR 122.41(g)]**—Permittees have no property right in their permit that may be revoked or terminated for cause without compensation to the permittee.
- **Duty to Provide Information [40 CFR 122.41(h)]**—The permittee must transmit any information needed to determine compliance with the permit or to modify the permit.
- **Inspection and Entry [40 CFR 122.41(i)]**—The permittee must, upon presentation of valid credentials by the Director or his representative, allow entry into the premises where the regulated activity and/or records are present. The Director must have access to and be able to make copies of any required records, inspect facility operations and equipment at reasonable times, and monitor discharges.
- **Monitoring and Records [40 CFR 122.41(j)]**—Samples must be representative of the monitored activity. Records must be retained 3 years (5 years for sludge activities) subject to extension by the Director. Monitoring records must identify the sampling dates and personnel, the sample location and time, and the analytical techniques used and corresponding results. Wastewater measurements must be conducted in accordance with 40 CFR Parts 136 or 503 or other specified procedures. Falsification of results is a violation.
- **Signatory Requirements [40 CFR 122.41(k)]**—Applications, reports, or information submitted to the Director must be signed and certified. Knowingly making false statement, representations, or certifications is subject to penalties.
- **Planned Changes [40 CFR 122.41(l)(1)]**—Notice must be given to the Director as soon as possible of any planned physical alterations and/or additions to the facility. This notice is required if the facility changes to meet the criteria for a new source or the nature and concentration of pollutants are affected.
- **Anticipated Noncompliance [40 CFR 122.41(l)(2)]**—The permittee must give advance notice of any conditions that may result in noncompliance.
- **Permit Transfers [40 CFR 122.41(l)(3)]**—The permit is not transferable except after written notice to the Director. The Director may require modification or revocation and reissuance, as necessary.
- **Monitoring Reports [40 CFR 122.41(l)(4)]**—Reports must be submitted on a DMR or on a Director-specified form for sludge use/disposal practices. In addition, more frequent monitoring must be reported. Calculations requiring averaging must use an arithmetic mean, except for fecal coliform. Monitoring results must be reported at the frequency specified in the permit.
- **Compliance Schedules [40 CFR 122.41(l)(5)]**—Reports required by a compliance schedule in the permit must be submitted within 14 days of the due date.
- **Twenty-Four Hour Reporting [40 CFR 122.41(l)(6)]**—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 containing the information outlined in 40 CFR 122.41(l)(6)(ii).
- **Bypass [40 CFR 122.41(m)]**—Intentional diversions of untreated waste streams from any portion of a treatment facility are prohibited unless (1) the bypass does not

cause exceedance of effluent limits, and (2) the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage, and there was no feasible alternatives, and the proper notification was submitted.

- **Upset [40 CFR 122.41(n)]**—An upset can be used as an affirmative defense in actions brought to the permittee for noncompliance. The permittee (who has the burden of proof) must have operational logs or other evidence that shows (1) when the upset occurred and its causes, (2) that the facility was being operated properly, (3) proper notification was made, and (4) remedial measures were taken.

### 3.6 SPECIAL CONDITIONS

Special conditions, as the name implies, are those conditions developed for the specific permit under consideration. They are not included in the effluent limitations section because they do not contain specific limits. Rather, they require that the permittee undertake particular activities designed to reduce the quantity of pollutants being discharged or to reduce the potential for discharges of pollutants. There are many different reasons to incorporate special conditions, including the following:

- Additional monitoring activities to alert the permit writer of the need to impose more stringent limitations
- A clause to increase or decrease monitoring, depending on the monitoring results or certain changes in processes or products, etc.
- Requirements to conduct special studies such, as ambient stream surveys, toxicity reduction evaluations, bioaccumulation studies, sediment studies, dilution studies, pollutant reduction evaluations, or other such information gathering studies.

This section provides a discussion of compliance schedules and an overview of industrial-specific (e.g., Best Management practices [BMPs]) and municipal-specific (e.g., pretreatment, combined sewer overflows [CSOs]) special conditions. Additionally, the special topics discussed in Chapter 7 (municipal sewage sludge and storm water) may also be included as special conditions in some permits.

Ultimately, special conditions are designed to provide an additional measure of control for the reduction of discharges to waters of the United States. As such, the permit writers should not feel constrained to the special conditions discussed above. In many cases, the special conditions section can be used to promote Agency initiatives and to foster compliance with policies.

### ***3.6.1 Overview of Industrial-Specific Special Conditions***

The primary special condition found in industrial permits is a BMP. BMPs are designed to provide, in lieu of numerical limits, a flexible approach in controlling releases of toxic and hazardous pollutants to receiving waters.

There are two types of BMPs that the permit writer may impose. First, if an area of concern has been identified, the permit writer may require that the facility control the problem through the development of a site-specific practice. This may include diking of materials storage areas to prevent contaminated storm water runoff or installing splash plates to prevent process solutions from spilling on the ground and entering the process water sewer. The second avenue permit writer's may pursue is requiring the development of a BMP plan and specifying suggested components, such as the formation of a BMP committee, the issuance of a BMP policy memo, the identification and assessment of releases, and the development of a plan addressing good housekeeping, preventive maintenance, inspections, security, employee training, and recordkeeping and reporting.

### ***3.6.2 Overview of Municipal-Specific Special Conditions***

The two most common special conditions found in municipal permits address the control of CSOs and the implementation of pretreatment programs. CSOs are a permitting consideration at facilities without separate storm sewers. CSOs result when storm events cause the collection system or POTW treatment capacity to be exceeded, resulting in the commingling of and to some degree a dilution of untreated sanitary sewage and commercial/ industrial wastewater with urban storm water runoff. This mixture then overflows the combined sewer to a receiving stream. CSOs pose a very complex permitting situation to permit writers required to develop controls, despite EPA's policy that combined sewer overflows are subject to technology- and water quality-based limitations.

Approximately 1,500 POTWs have been required to develop and implement a pretreatment program. Generally, POTW have been identified as needing a pretreatment program where their design flow is greater than 5 MGD, where a categorical industrial user is within their jurisdiction, or where past industrial discharges have caused or been suspected to cause problems at the POTW.

The pretreatment program was developed to meet four objectives: (1) to prevent pass through, (2) to prevent interference, (3) to prevent municipal sewage sludge contamination,



and (4) to protect worker health and safety. To meet these goals, the pretreatment programs set forth a number of responsibilities, which are summarized in Exhibit 3-5.

**EXHIBIT 3-5: RESPONSIBILITIES UNDER THE PRETREATMENT PROGRAM**

Entity	Responsibilities
<b>EPA Headquarters</b>	Oversee program implementation at all levels Develop and modify regulations for the pretreatment program Develop policies to clarify and further define the program Develop technical guidance for program implementation Initiate enforcement action as appropriate
<b>EPA Regions</b>	Fulfill approval authority responsibilities for States without pretreatment program authorization Oversee State program implementation Initiate enforcement actions as appropriate
<b>Approval Authorities (NPDES States with pretreatment program authorization)</b>	Notify POTWs of their responsibilities Review and approve POTW pretreatment programs Oversee POTW program implementation Provide technical guidance to POTWs Regulate industries in nonpretreatment cities Initiate enforcement action against noncompliant POTWs or industries
<b>Control Authorities (POTWs with an approved pretreatment program)</b>	Develop and maintain an approved pretreatment program Evaluate compliance of regulated industrial users Initiate enforcement action against industries as appropriate Submit reports to the approval authority Develop local limits (or demonstrate that they are not necessary) Develop and implement enforcement response plans
<b>Industrial Users</b>	Comply with applicable pretreatment standards, including prohibited discharge standards, categorical standards, State requirements, and local limits Comply with Federal and POTW-specific reporting requirements

### **3.6.3 Compliance Schedules**

Compliance schedules are set forth in NPDES permits when additional conditions are necessary to ensure compliance. Examples of situation where schedules are often used include:

- Pretreatment program development
- Sludge use and disposal program development and/or implementation
- New/revised effluent guidelines application
- New/revised water quality standards application
- BMP plan development and/or implementation
- Inflow and infiltration program development and/or implementation.

Compliance schedules may involve construction of facilities, in which case they are called construction schedules. Generally, schedules are negotiated with the discharger and ensure compliance with the final permit limitations within a realistic timeframe. Occasionally, a schedule includes the conduct and completion of engineering studies, with the remainder of the schedule requiring the implementation of the suggested actions found pursuant to the study.

Because compliance schedules may not authorize compliance beyond applicable statutory deadlines, compliance schedule negotiation responsibilities are shifting from the permit writer to the compliance officer. There are exceptions for water quality-based permit limits, however. When compliance schedules do fall under the purview of permitting, the permit writer should ensure that at least the two following components are provided (1) dates itemized by day, month, and year are set forth for each major milestone, and (2) reports specifying compliance or noncompliance are required within 14 days of each milestone.

#### 4. INDUSTRIAL PERMIT CONSIDERATIONS

##### 4.1 INDUSTRY-SPECIFIC EFFLUENT LIMITATIONS

###### 4.1.1 *Effluent Limitations Guidelines*

The Clean Water Act (CWA) required all industries discharging wastes into navigable waters to achieve the Best Practicable Control Technology Currently Available (BPT) by July 1, 1977. This control technology represents the average of the best existing wastewater treatment performance within each industry category or subcategory. By March 31, 1989, the CWA required the application of effluent limitations based on the best control and treatment measures that have been developed or that are capable of being developed within the industrial category or subcategory. These effluent limitations are as follows:

- ***Toxic and Nonconventional Pollutants***—Application of the Best Available Technology Economically Achievable (BAT)
- ***Conventional Pollutants***—Application of the Best Conventional Pollutant Control Technology (BCT).

There are three groups of pollutants: conventional, toxic, and nonconventional. By definition, there are five conventional pollutants: 5-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), fecal coliform, pH, and oil and grease. Toxic or "priority" pollutants are those defined in Section 307(a)(1) of the CWA and include heavy metals and manmade organic compounds. The 126 priority pollutants are listed in Appendix F. Nonconventional pollutants are those which do not fall under either of the above categories and include such parameters as ammonia, nitrogen, chemical oxygen demand, and whole effluent toxicity (WET).

New Source Performance Standards (NSPSs) are established for new industrial direct dischargers. The intent of this special set of guidelines is to set limitations that represent state-of-the-art treatment technology for new sources, because these dischargers have the opportunity to install the latest in treatment technology at the time of start-up. Established facilities often have to retrofit existing treatment units to meet BAT guidelines. This can be a costly and time-consuming process and, therefore more lenient requirements are usually applied for existing facilities. NSPSs are described as the best available demonstrated control technology, processes, operating methods, or other alternatives including, where practicable, no discharge of pollutants. NSPSs are effective at the commencement of a new facility's operation; the facility must demonstrate compliance within 90 days.

A summary of statutory deadlines by type of pollutant for the different treatment technologies is provided in Exhibit 4-1.

**EXHIBIT 4-1: STATUTORY DEADLINES FOR BPT, BAT, AND BCT**

<b>Pollutant</b>	<b>Level of Treatment</b>	<b>Statutory Deadlines</b>
Conventional	BPT	July 1, 1977
Conventional	BCT	July 1, 1984
Nonconventional	BPT	July 1, 1977
Nonconventional	BAT	March 31, 1989
Toxic	BPT	July 1, 1977
Toxic	BAT	March 31, 1989

The U.S. Environmental Protection Agency (EPA) has established effluent guidelines and standards for more than 50 different industrial categories (e.g., Steam Electric Power Plants, Iron and Steel Manufacturing Facilities). Guidelines are established for different industrial categories since the best control technology for one industry is not necessarily the best for another. These guidelines were developed based on the degree of pollutant reduction attainable by an industrial category through the application of control technologies, irrespective of the facility location. The CWA requires EPA to assess certain factors when establishing effluent guidelines, including the following:

- The age of the equipment and facilities involved
- Manufacturing processes used
- Engineering aspects of the application of recommended control technologies, including process changes and in-plant controls
- Non-water quality impacts, including energy requirements
- Other factors, as deemed appropriate.

Using this approach, similar facilities are regulated in the same manner. In theory, for example, a pulp and paper mill on the west coast of the United States would be required to meet the same limitations for sulfate as an identical plant located on the east coast (unless there were special site-specific concerns that had to be addressed).

The deadlines for compliance with effluent guidelines has passed, as previously shown in Exhibit 4-1. Permit writers do not have the authority to extend statutory deadlines. Thus, effluent guidelines must be applied in National Pollutant Discharge Elimination System (NPDES) permits without the benefit of a compliance schedule.

#### **4.1.1.1 General Considerations With Respect to the Use of Effluent Limitation Guidelines**

The use of effluent limitations guidelines for the development of permit limits appears at first to be straightforward: determine production and multiply by the appropriate factor contained in the guidelines. For example, a bleach kraft tissue plant produces 234,000 pounds per day (lbs/day), and the daily maximum guideline for BOD<sub>5</sub> is 13.65 lbs/1,000 lbs of product. The effluent limitation should then be 3,194 lbs/day ( $234,000 \times 13.65/1,000 = 3,194$ ). However, the process is often more complicated than this simple example indicates. Some of the difficulties associated with the use of guidelines include:

- Determination of the proper category and subcategory of the facility
- Proper use of the guidelines applicable to the category or subcategory under consideration
- Classification of plants that fall under more than one subcategory and/or have multiple products with multiple measures of production
- Determination of the measure of production
- Use of alternate limits
- Application of mass versus concentration limits.

#### **4.1.1.2 Categorization**

In order to properly use and apply effluent guidelines, the permit writer must first determine which industrial category(s) applies to the facility being permitted. In determining which categories a facility comes under, the Standard Industrial Classification (SIC) code is helpful. Item VII of Application Form I requires that the applicant provide the SIC code for the activity covered by the permit application. Usually, a SIC code will determine the appropriate category but not necessarily the subcategory. For example, a turpentine producer, SIC code 2861, falls under the Gum and Wood Chemicals Manufacturing category. In this particular case, SIC code 2861 and the Gum and Wood Chemicals Manufacturing category correspond. A listing of SIC codes corresponding with effluent guideline categories as in Appendix F should be useful in determining industrial categories. Once the category is established, it is just a matter of determining which subcategory the facility falls under. However, a permit writer should be

cautious of relying exclusively on SIC codes for determining the appropriate category. SIC codes are developed by the Department of Commerce and, therefore, may not always assist the permit writer in the categorization process. It is important to note that more than one SIC code may apply to a facility.

Usually, plants do not fall into a single category and then a single subcategory. This may require some research and probing on the part of the permit writer. For example, an integrated washing machine producer (SIC code 3633) would be expected to fall into the Household Laundry Equipment category (as specified under the SIC code system). Because of the wide-ranging activities needed for integrated production, this manufacturer may also fall under Porcelain Enameling, Metal Finishing, and Plastic Molding and Forming categories.

When determining which subcategories are applicable to a plant, it is best to determine the categories first and then by careful analysis of the plant, determine the subcategories. The determination of applicable categories can be accomplished by quickly classifying the categories as not applicable or possibly applicable. For example, if a brewery is under consideration, Iron and Steel Manufacturing would obviously not be applicable but Organic Chemicals might be, depending on the extent of recovery and processing of byproducts. A careful analysis of the production of the plant and comparison to the subcategories under Organic Chemicals would establish which, if any, of the subcategories are applicable.

#### **4.1.1.3 Production-Based Limitations**

Many effluent limitation guidelines are expressed in terms of allowable pollutant discharge per unit of production. To determine permit limits, these standards are multiplied by the facility's production rate. Thus, it is necessary for the permit writer to determine the facility's actual production, based on information supplied by the permittee.

The ideal situation for the application of effluent limitations guidelines is where production is constant from day-to-day and month-to-month. Production for the purposes of calculating the limitations would then be the average production rate. In practice, production rates are not as constant as the ideal situation. They vary because of market factors, maintenance, product changes, down times, breakdowns, and facility modifications. The production rate of a facility will vary with time, and, thus, determination of production may be difficult.

To apply effluent limitation guidelines to a facility with varying production rates, the permit writer should determine a single estimate of the long-term average production rate that is

expected to exist during the term of the permit being prepared. It is recommended that the permit writer establish this average from 5 years of facility production data. This single production value is then multiplied by both the daily maximum and monthly average guideline limitations to obtain permit limits.

The objective in determining a production estimate for a facility is to develop a single estimate of the long-term average production rate (in terms of mass of product per day), which can reasonably be expected to prevail during the next term of the permit. The following example illustrates the proper application of guidelines:

- **Example:** Company A has produced 331,500 tons, 301,500 tons, 361,500 tons, 301,500 tons, and 361,500 tons per year for the previous 5 years operating 255 days per year. What would be a reasonable measure of production for permitting purposes? Assuming that pollutant X has an effluent limitation guideline of 0.1 lbs/1,000 lbs for the monthly average and 0.15 lbs/1,000 lbs for the daily maximum, what would be the resulting effluent limitations?
- **Discussion:** The use of the long-term average production (331,500 tons per year) would be an appropriate and reasonable measure of production, if this figure was more representative of the actual production expected to occur over the next term of the permit and this number did not represent a temporary increase in production. Also, in evaluating these gross production figures, the number of production days must be considered. If the number of production days per year is not comparable, the numbers must be converted to production per day before they may be compared. To convert from the annual production rate to average daily rate, the annual production rate is divided by the number of production days per year. To determine the number of production days, the total number of normally scheduled nonproduction days are subtracted from the total days in a year.

If Company A normally has 255 production days per year, the annual production rate of 331,500 tons per year would yield an average daily rate of 1,300 tons per day.

Monthly average limit:

$$\frac{1,300 \text{ tons}}{\text{day}} \times \frac{2,000 \text{ lbs}}{\text{ton}} \times \frac{0.10 \text{ lbs}}{1,000 \text{ lbs}} = \underline{260 \text{ lbs/day}}$$

Daily maximum limit:

$$\frac{1,300 \text{ tons}}{\text{day}} \times \frac{2,000 \text{ lbs}}{\text{ton}} \times \frac{0.15 \text{ lbs}}{1,000 \text{ lbs}} = \underline{390 \text{ lbs/day}}$$

In the example above, the production during the highest year of the last 5 years was used as the estimate of production. This estimate is appropriate when production is not expected to change significantly during the permit term. However, if historical trends, market forces, or

company plans indicate that a different level of production will prevail during the permit term, a different basis for estimating production should be used.

#### 4.1.1.4 Tiered Permit Limits

If production rates are expected to change significantly during the life of the permit, the permit can include alternate or tiered limits. These tiered limits would become effective when production exceeds a threshold value, such as during seasonal production variations. As a general rule of thumb, 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 alternate limits. The major characteristics of tiered limits are best described by illustration and example.

- **Example:** Plant B has produced 334,800 tons, 260,400 tons, 220,000 tons, 240,000 tons, and 206,500 tons per year for the previous 5 years. The high year is significantly higher than the rest and the permittee has made a plausible argument that production is expected to return to that level. The guideline for pollutant X is 0.08 lbs/1,000 lbs for the monthly average and 0.14 lbs/1,000 lbs for the daily maximum. What are the tiered effluent limitations?
- **Discussion:** The first tier or primary limits would be based on a production rate of 260,400 tons per year or 1,050 tons per day (248 production days per year). These limits would apply when the level of production is no more than 120 percent times the 1,050 tons per day average production rate for the month.

Monthly average limit:

$$\frac{1,050 \text{ tons}}{\text{day}} \times \frac{2,000 \text{ lbs}}{\text{ton}} \times \frac{0.08 \text{ lbs}}{1,000 \text{ lbs}} = \underline{168 \text{ lbs/day}}$$

Daily maximum limit:

$$\frac{1,050 \text{ tons}}{\text{day}} \times \frac{2,000 \text{ lbs}}{\text{ton}} \times \frac{0.14 \text{ lbs}}{1,000 \text{ lbs}} = \underline{294 \text{ lbs/day}}$$

The second tier or alternate limits would be based on production of 334,800 tons/yr or 1,350 tons/day. These limits would apply when the level of production is greater than 120 percent times the 1,050 tons/day average production rate for the month. The results of the calculations for tiered limits follow:

$$\text{Monthly average limit} = \underline{216 \text{ lbs/day}}$$

$$\text{Daily maximum limit} = \underline{378 \text{ lbs/day}}$$

Tiered permits with alternate limits should be used only after careful consideration and only when a substantial increase or decrease in production is likely to occur. In the example above, the primary limits would be in effect when production was at normal levels. During periods of significantly higher production, the alternate limits would be in effect. When production



reverted to normal levels, the primary limits would have to be met. In addition, alternate limits may also be appropriate in the case of special processes or product lines. The thresholds, measures of production, and special reporting requirements must be detailed in the permit. Some of the special reporting requirements may include:

- The permittee notifying the permitting authority at least 2 business days prior to the month they expected to be operating at a higher level of production and the duration this level of production is expected to continue
- The permittee reporting, along with the discharge monitoring report, the level of production and the limitation and standards applicable to that level.

#### **4.1.1.5 Multiple Products or Multiple Categories**

Another complication is the situation of multiple products or multiple categories and subcategories. Determination of production and the calculation of the effluent limits will depend on the specific conditions. A typical case would be a facility with a newly constructed metal plating production line that combines with an older metal plating production line prior to treatment and discharge. In this situation, the flow-weighted combination of the NSPS and BAT/BCT standards would be used to derive a limitation. Another example may be an integrated lamp maker with copper forming, aluminum forming, metal finishing, and porcelain enameling processes all being combined prior to treatment and discharge. In this situation, the appropriate effluent guidelines for these categories must be applied to each waste stream and combined by flow-weighted averaging when developing limitations. Guidelines may also specify inconsistent limit expressions (i.e., one category provides a parameter with a daily maximum limit, while another has an instantaneous maximum limit) that will have to be adjusted.

#### **4.1.1.6 Mass Versus Concentration Limits**

The regulations containing 40 *Code of Federal Regulations* (CFR) 122.45(f) require that all permit limits be expressed in terms of allowable mass (in units of pounds or kilograms) of pollutant per day. However, the permit writer should also consider the use of concentration limits to supplement the mass limits. Including concentration limits encourages proper operation of the treatment facility at all times. In the absence of concentration limits, a permittee could theoretically reduce treatment efficiency during low flow periods and still meet the facility's mass-based effluent limits. For example, Company A could have an average daily wastewater flow of 0.9 million gallons per day (MGD). On a given day, the wastewater flow might drop to 0.6 MGD. In this example, pollutant X could be 150 percent more than the normal average.

However, the company would still be in compliance with its permit, unless concentration limits were also included. The following example and calculation illustrate this situation:

- **Example:** For Company A, the mass limits for pollutant X have been set as 260 lbs/day and 390 lbs/day monthly average and daily maximum respectively. What are the monthly average concentration limitations in milligrams per liter (mg/l) using both an average flow of 0.9 MGD and the low flow of 0.6 MGD?
- **Discussion:** Note: 8.34 is a conversion factor with the units [(lbs/day)/(MGD)(mg/l)]. Monthly average limit (based on average flow):

$$\frac{260 \text{ lbs/day}}{(8.34)(0.9 \text{ MGD})} = \underline{35 \text{ mg/l}}$$

Monthly average limit (based on low flow):

$$\frac{260 \text{ lbs/day}}{(8.34)(0.6 \text{ MGD})} = \underline{52 \text{ mg/l}}$$

This is almost 150 percent more than the concentration during average flow!

In determining applicable effluent concentration limitations, the monthly average and daily maximum mass limits divided by the average flow will provide appropriate concentrations.

Monthly average limit:

$$\frac{260 \text{ lbs/day}}{(8.34)(0.9 \text{ MGD})} = \underline{35 \text{ mg/l}}$$

Daily maximum limit:

$$\frac{390 \text{ lbs/day}}{(8.34)(0.9 \text{ MGD})} = \underline{52.5 \text{ mg/l}}$$

It should be noted that the long-term average flow is used to calculate both the monthly average and daily maximum concentrations. The use of the long-term average flow is appropriate for the calculation of a daily maximum concentration because it will reflect the range of concentrations that could be expected in a well operated plant. The use of the maximum daily flow is not appropriate to determine the daily maximum concentration from the daily maximum mass limitation because it will reduce the daily maximum concentration below the value which could be expected in a well operated plant. The maximum concentration calculated using the maximum daily flow could be less than the monthly average concentration. For example, Company A has a maximum daily flow of 1.6 MGD. Using this flow, the maximum concentration is calculated to be 29 mg/l, which is less than the average concentration limit of 35 mg/l. Concentration limits derived by these calculations should be evaluated using historical monitoring data and engineering judgment to be sure they are reasonable.

In certain situations, the use of concentration limits may be counter productive since they may discourage the use of innovative techniques, such as water conservation. For example, if a facility had a history of providing efficient treatment of its wastewater and also wished to practice water conservation, inclusion of concentration limits would probably not be appropriate. To summarize, the applicability of concentration limits should be a case-by-case determination based upon the professional judgment of the permit writer.

#### **4.1.1.7 Net Credits**

In some cases, solely as a result of the level of pollutants in the intake water, facilities are faced with situations in which technology-based limits are difficult or impossible to meet with BAT/BCT technology. Permit writers are authorized to grant net credits for the quantity of pollutants in the intake water where the applicable effluent guidelines specify that the guidelines are to be applied on a net basis or where the pollution control technology would, if properly installed and operated, meet applicable effluent guidelines limitations and standards in the absence of the pollutants in the intake waters.

The following requirements have been established in 40 CFR 122.45(g) for establishing net limitations:

- Credit for generic pollutants, such as BOD<sub>5</sub> or TSS, is only authorized where the constituents resulting in the BOD<sub>5</sub> 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
- Net credits do not apply to the discharge of raw water clarifier sludge generated during the treatment of intake water.

#### **4.1.1.8 Variances**

In addition to specifying national goals for water pollution control, the CWA provides a mechanism for modification of requirements of the CWA in exceptional cases. These modifications are called variances. Very specific data requirements must be met by an applicant before a variance may be granted. As the term implies, a variance is the unusual situation, and, thus, 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, because the permit writer will most likely be the person to conduct the initial reviews of

such requests before submitting them for review to the State Director (if applicable), the EPA Regional office, and EPA Headquarters. The permit writer should consult 40 CFR 124.62 for the procedures for decisions on the various types of variances.

With one exception, a variance request must be submitted before the close of the public comment period of the permit. The following paragraphs discuss variances and the factors that should be considered in a technical review of the variance request.

### ***Economic Variances***

Section 301(c) of the CWA provides for a variance for nonconventional pollutants from BAT effluent guidelines due to economic factors. The variance may also apply to non-guideline limits in accordance with 40 CFR 122.21(l)(2)(iii). The request for the variance from effluent limitations developed from BAT guidelines is normally filed by the discharger during the public notice period for the draft permit. Other filing time periods may apply, as specified in 40 CFR 122.21(l)(2). The application must show that the modified requirements:

- Represent the maximum use of technology within the economic capability of the owner or operator
- Will result in further progress toward the no discharge goal.

The methodologies for determining economic capability for utilities is different than that used for other industries. Utilities should perform two financial calculations. Generally, EPA will only grant a variance only if both tests indicate that the pollution control equipment is not economically achievable and the applicant can demonstrate reasonable further progress. Other industry categories must calculate three financial tests to determine if they are eligible on economic grounds for a 301(c) variance. Guidance for conducting these financial tests is available from EPA's Office of Wastewater Enforcement and Compliance. Generally, EPA will only grant a variance if all three tests indicate that the required pollution control is not economically achievable and the applicant makes the requisite demonstration about reasonable further progress.

With respect to the second requirement for a 301(c) modification (reasonable further progress toward the no-discharge goal), the applicant must, at a minimum, demonstrate compliance with all applicable BPT limitations and pertinent water quality standards. In addition, the proposed alternative must provide for a reasonable degree of improvement in the applicant's discharge.

### ***Water Quality Variances***

Section 301(g) of the CWA provides for a variance for certain nonconventional pollutants from BAT effluent guidelines due to localized environmental factors. These pollutants include ammonia, chlorine, color, iron, and total phenols. The discharger must file a variance application that meets the following requirements:

- The 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. Also, 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, acute or chronic toxicity, or 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 involves a great deal of water quality assessment, including aquatic toxicity, mixing zone and dilution model analysis, and possible site-specific criterion development. In addition, many complex human health effects must be assessed, including carcinogenicity, teratogenicity, mutagenicity, bioaccumulation, and synergistic propensities. All permit writers should use the EPA draft 301(g) technical guidance manual to assess a completed variance request. Typical industries that have applied for 301(g) variances include Iron and Steel Manufacturing, Steam Electric Power Generating, Inorganic Chemicals Manufacturing, Nonferrous Metals Manufacturing, Aluminum Forming, and Pesticides Manufacturing facilities.

### ***Fundamentally Different Factors Variances***

Section 301(n) of the CWA provides for variances based upon fundamentally different factors (FDF). FDF variances for direct dischargers are available from effluent guidelines regulations for BPT, BCT and BAT for toxic, conventional, and nonconventional pollutants if the individual facility is found to be fundamentally different from the factors considered in establishing the effluent guidelines. There is no FDF variance allowed from NSPS. The FDF variance must be requested by the discharger within 180 days of the guideline promulgation. An FDF variance cannot be approved if violations of water quality standards will result.

Factors needed to justify a variance of this type include factors relating to a discharger's facilities, equipment, and processes that differ from those considered in the subcategory classification in the effluent guidelines. The review or proposal of an FDF variance is completed on a case-by-case basis. The burden of proof lies with the entity requesting the variance.

#### **4.1.2 *Best Professional Judgment Permitting***

Best Professional Judgment (BPJ) permitting is used in cases where an effluent limitation guideline has not been promulgated for the industry or pollutant of concern. BPJ is defined as the highest quality technical opinion developed by a permit writer after consideration of all reasonably available and pertinent data or information that forms the basis for the terms and conditions of an NPDES permit.

The authority for BPJ is contained in Section 402(a)(1) of the CWA, which authorizes the EPA 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 the establishment of effluent limitations guidelines. During the first round of NPDES permits in the early-to-mid-1970s, a majority of permits were based on the authority of Section 402(a)(1) of the CWA. These first round so-called best engineering judgment permits were drafted because effluent guidelines were not available for many industries. As effluent guidelines began to be promulgated, permit writers had to rely less on their best engineering judgment and could apply the effluent limitations in permits. As the implementation of the age of toxic pollutant control continues, the use of BPJ conditions in permits has again become more common. However, the statutory deadline for compliance with BPJ-based pollutant limits was March 31, 1989. Therefore, compliance schedules cannot be placed in permits to allow for extensions in meeting BPJ pollutant limits.

BPJ has proven to be a valuable tool for NPDES permit writers over the years. Because it is so broad in scope, BPJ allows the permit writer considerable flexibility in establishing permit terms and conditions. Inherent in this flexibility, however, is the burden on the permit writer to show that his/her BPJ is based on sound engineering analysis. If this evaluation of reasonableness does not exist, the BPJ condition is vulnerable to a challenge by the permittee. Therefore, the need for and derivation of the permit condition and the basis for its establishment should be clearly defined and documented. References used to determine the BPJ condition should be identified. In short, the rationale for a BPJ permit must be carefully drafted to withstand the scrutiny of not only the permittee but also the public and, ultimately, a hearing officer.

#### **4.1.2.1 Establishment of BPJ Pollutant Limits Permits**

The NPDES regulations in 40 CFR 125.3 state that permits developed on a case-by-case basis under Section 402(a)(1) of the CWA must consider (1) the appropriate technology for the category class of point sources of which the applicant is a member, based on all available information, and (2) any unique factors relating to the applicant. In setting BPJ limitations, the permit writer must consider several specific factors as they appear in 40 CFR 125.3(d). These factors, which are enumerated below, are required to be considered in the development of effluent limitations guidelines and, therefore, are often referred to as the Section 304(b) factors:

- For BPT requirements
  - The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application
  - The age of equipment and facilities involved\*
  - The process employed\*
  - The engineering aspects of the application of various types of control techniques\*
  - Process changes\*
  - Non-water quality environmental impact including energy requirements\*
- For BCT requirements
  - All items in the BPT requirements indicated by an asterisk (\*) above
  - The reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived
  - The comparison of the cost and level of reduction of such pollutants from the discharge of publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources
- For BAT requirements
  - All items in the BPT requirements indicated by an asterisk (\*) above
  - The cost of achieving such effluent reduction.

A permit writer must consider each of these factors in establishing BPJ-based conditions in permits. Since BPJ contains an element of judgment or educated opinion, a permit writer with the proper tools should be able to establish BPJ conditions in permits that are both technically sound and reasonable.

A technically sound and reasonable permit is not likely to be successfully challenged by the permittee or a third party. In this context, technically sound permit conditions means that the conditions are achievable with existing technology and reasonable means that they are achievable at a cost that the facility can afford. Historically, some of the other factors, such as age, process

employed and non-water quality impacts have assumed lesser importance than the technical and economic feasibility evaluations.

#### **4.1.2.2 BPJ Permitting Tools**

References (e.g., data sources and tools) for BPJ permit writing are numerous and voluminous. As one gains experience drafting BPJ permits, it is common practice to rely on some references more than others. Exhibit 4-2 lists references and provides some examples for selected BPJ data sources that have proven useful over the years .

#### **EXHIBIT 4-2: BPJ PERMITTING TOOLS**

- *Abstracts of Industrial NPDES Permits*
- *Treatability Manual*
- *NPDES Best Management Practices Guidance Document*
- *Technical Support Document for the Development of Water Quality-based Permit Toxic Control*
- *Workbook for Determining Economic Achievability for NPDES Permits*
- National Environmental Investigation Center reports on specific facilities
- Toxicity reduction evaluations for selected industries
- Industry experts within EPA Headquarters, Regions, and States
- Effluent guidelines development information
  - CWA Section 308 questionnaires
  - Screening and verification data
  - Development documents
  - Contractor's reports
  - Proposed regulations
  - Project Officers
- Permit Compliance System data
- Permit/compliance file information
  - Previous NPDES application forms
  - Discharge Monitoring Reports
  - Inspection reports
- Other media permit files (e.g., Resource Conservation and Recovery Act permit applications and Spill Prevention Countermeasure and Control (SPCC) plans)
- Literature (e.g., technical journals and books)



## **4.2 INDUSTRY-SPECIFIC SPECIAL CONDITIONS**

### **4.2.1 *Best Management Practices***

Traditionally, NPDES permits have contained chemical-specific, numerical effluent limits. Effluent guidelines are not always available to prescribe these limits nor to guarantee water quality sufficient for the protection of indigenous aquatic life. To improve water quality, the CWA provides for water pollution controls supplemental to effluent limitation guidelines.

Best Management Practices (BMPs) are measures to prevent or mitigate water pollution from sources ancillary to the industrial manufacturing or treatment process. BMPs are broad and may include processes, procedures, human actions, or construction. In essence, BMPs are any measure or action identified by a plant manager, department foreman, environmental engineer, consultant, or employee as a method to prevent toxic pollutants or hazardous substances from damaging the aquatic environment. They may be inexpensive, such as a liquid level alarm in a material transfer operation, or they may be costly, such as impervious secondary containment around a tank farm.

Experience has shown that three-quarters of all spills of hazardous chemicals can be attributed, in one way or another, to human error. Improper procedures, lack of training, and poor engineering are among the major causes of spills. BMPs are aimed at preventing spills and similar environmental incidents by stressing the importance of management and employee awareness of potential spill situations.

BMPs are one method of supplemental control. Pursuant to 40 CFR 122.44(k) and Sections 304 and 402 of the CWA, BMPs may be incorporated as permit conditions. In the context of the NPDES program, BMPs are actions or procedures to prevent or minimize the potential for the release of toxic pollutants or hazardous substances in significant amounts to surface waters. BMPs, although normally qualitative, are expected to be most effective when used in conjunction with numerical effluent limits in NPDES permits.

#### **4.2.1.1 Best Management Practices in NPDES Permits**

BMPs are included in permits in two basic ways: as BMP plans and/or as site-, process-, or pollutant-specific BMPs. BMP plans can be submitted for review but are usually kept onsite and made available to the permitting authority on request. The normal compliance schedule is to require preparation of the plan within 6 months and implementation within 12 months of permit issuance.

Generally, the determination and incorporation into NPDES permits of site-specific or pollutant-specific BMPs are left to the discretion of the permit writer, because these are highly dependent on a careful review of the circumstances at a particular facility. However, EPA has identified several components that act as a basis for developing and implementing effective BMP plans. The minimum suggested components of a BMP plan are presented below:

- **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.

The following subsection describes in detail the specific requirements that should be included in a BMP plan.

#### **4.2.1.2 Specific Components of BMP Plans**

##### ***BMP Committee***

The BMP committee is the group of individuals within the plant organization responsible for developing the BMP plan and assisting the plant management in its implementation, maintenance, and updating. Thus, the committee's functions are similar to those of a plant fire prevention or safety committee. Plant management, not the committee, has overall responsibility and accountability for the quality of the BMP plan.

The scope of activities and responsibilities of the BMP committee should include all aspects of the facility's BMP plan, such as identification of toxic and hazardous materials addressed in the plan; identification of potential spill sources; establishment of incident reporting procedures; development of BMP inspections and records procedures and review of environmental incidents to determine and implement necessary changes to the BMP plan;

coordination of incident notification, response, and cleanup procedures; establishment of BMP training programs for plant personnel; and aid for interdepartmental coordination in carrying out the BMP plan.

### ***Risk Identification and Assessment***

The areas of the plant subject to BMP requirements should be identified by the BMP committee, plant engineering group, environmental engineer, or others in the plant. Each such area should be examined for the potential risks of discharges to receiving waters of toxic pollutants or hazardous substances from ancillary sources. Any existing physical means (e.g., dikes or diversion ditches) of controlling such discharges also should be identified.

A hazardous substances and toxic chemicals inventory (materials inventory) should be developed as part of the risk identification and assessment. The level of detail of the materials inventory should be proportionate to the quantity of toxic pollutants and hazardous substances onsite and their potential for reaching the receiving waters.

### ***Reporting of BMP Incidents***

A BMP incident reporting system is used to keep records of incidents, such as spills, leaks, runoff, and other improper discharges, for the purpose of minimizing recurrence, expediting mitigation or cleanup activities, and complying with legal requirements. Reporting procedures defined by the BMP committee should include (1) notification of a discharge to appropriate plant personnel to begin immediate action, (2) formal written reports for review and evaluation by management of the BMP incident and revisions to the BMP plan, and (3) notification, as required by law, of government and environmental agencies.

### ***Materials Compatibility***

Materials compatibility includes consideration of the compatibility of stored and mixed chemicals. Incompatible materials can cause equipment failure resulting from corrosion, fire, or explosion. Equipment failure can be prevented by ensuring that the hazardous substances or toxic pollutants are compatible with the container contents and the surrounding environment. The BMP plan should provide procedures to address these aspects in the design and operation of the equipment used for the storage or transfer of toxic and hazardous materials.

### ***Good Housekeeping***

Good housekeeping is the maintenance of a clean, orderly work environment that contributes to the prevention of releases, which in turn prevents pollution and loss of raw

materials from occurring. Periodic training of employees in housekeeping techniques for plant areas where the potential exists for BMP incidents reduces the possibility of mishandling chemicals or equipment.

Examples of good housekeeping include neat and orderly storage of bags, drums, and piles of chemicals, prompt cleanup of spilled liquids to prevent significant runoff to surface waters, sweeping, vacuuming or other cleanup of accumulations of dry chemicals as necessary to prevent them from reaching receiving waters, and provision for storage of containers or drums to keep them from protruding into open walkways or vehicular traffic.

### ***Preventive Maintenance***

An effective preventive maintenance (PM) program is important to prevent environmental incidents. A PM program involves inspecting and testing plant equipment and systems (e.g., pumps and alarms) to identify conditions that could cause breakdowns or failures resulting in significant discharges of chemicals to surface waters. The program should prevent breakdowns and failures by adjustment, repair, or replacement of items.

A PM program should include a suitable records system for scheduling tests and inspections, recording test results, and facilitating corrective action. Most plants have PM programs that provide a degree of environmental protection. A BMP plan should not require the development of a redundant PM program. Instead, the plan should reinforce the objective to have qualified plant personnel (e.g., BMP committee, maintenance foreman, or environmental engineer) evaluate the existing plant PM program and recommend to management any changes, needed to address BMP requirements.

A good PM program includes identification of equipment or systems to which the PM program should apply, periodic inspections or tests of identified equipment and systems, appropriate adjustment, repair, or replacement of items, and maintenance of complete PM records on the applicable equipment and systems.

### ***Inspections and Records***

An inspection and records system detects and documents actual or potential BMP incidents and is integral to a good preventive maintenance program. The BMP plan should include written inspection procedures and optimum intervals between inspections. Records to show the completion date and results of each inspection should be signed by the appropriate supervisor and maintained for 3 years. A tracking or followup procedure should be initiated to ensure that

adequate response and corrective action have been taken if potential or actual problems have been identified. The recordkeeping portion of this system can be combined with the existing spill reporting system in the plant.

The inspection and records system should include equipment and plant areas having the potential for significant discharges. To determine the inspection frequency and inspection procedures, experienced personnel should evaluate the causes of previous incidents and the likelihood of future incidents and assess the probable risks for incident occurrence or recurrence. Consideration should be given to the nature of chemicals handled, materials of construction, and site-specific factors, including age, inspection techniques, and cost effectiveness of BMPs employed.

### ***Security***

A security system prevents accidental or intentional entry to a plant that might result in vandalism, theft, sabotage, or other improper or illegal use of plant facilities, which may cause pollution. Most plants have security systems to prevent unauthorized entry.

The BMP plan should describe any portions of the existing security system and any improvements necessary to ensure that toxic chemicals are not discharged to receiving waters in significant quantities as a result of unauthorized entry. Documentation of the security system may require separate filing from the BMP plan to prevent unauthorized individuals from gaining access to sensitive or confidential information.

### ***Employee Training***

Employee training programs should instill in personnel, at all levels of responsibility, a complete understanding of the BMP plan. Training should address the processes and materials on the plant site, the safety hazards, the practices for preventing discharges, and the procedures for responding properly and rapidly to toxic and hazardous materials incidents.

Meetings should be conducted periodically to ensure adequate understanding of the objectives of the BMP plan and the individual responsibilities of each employee. Typically, these topics could be a part of routine employee meetings for safety or fire protection. Such meetings should highlight previous spill events, equipment malfunctions or failures, and new or modified BMPs.

Training sessions should review the BMP plan and associated procedures. Just as fire drills are used to improve an employee's reaction to a fire emergency, spill or environmental incident drills may serve to improve the employee's reactions to BMP-related incidents. Plants are encouraged to conduct spill drills on a quarterly or semi-annual basis. Spill or incident drills serve to evaluate the employee's knowledge of BMP-related procedures and are a fundamental part of employee training.

#### **4.2.1.3 Specific BMPs**

Site-, process-, and pollutant-specific BMPs are designed to address conditions particular to a site, process, or pollutant. The need for specific BMPs at a facility often will be discovered in conjunction with other permit-related activities, such as compliance inspections. Poor housekeeping or a history of spills, for example, indicate a need for specific BMPs to supplement the quantitative effluent limits on specific pollutants in the permit.

#### **4.2.1.4 Best Management Practices and Pollution Prevention**

Over the last 20 years, the NPDES program has focused on end-of-pipe treatment to meet permit limits and the goals of the CWA. As a result, the goals of the CWA (fishable and swimmable waters by 1983) have been met in some locations, but much progress still needs to be made. Additionally, the CWA goal to end the discharge of pollutants into U.S. waters by 1985 has not been met. In the coming decade, it is clear that prevention rather than treatment is key to solving the remaining pollution problems.

Under Section 6602 (b) of the Pollution Prevention Act of 1990, Congress established a national policy for a hierarchy of environmental management:

- Pollution should be prevented or reduced at the source, whenever feasible
- Pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner, whenever feasible
- Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

The Pollution Prevention Act emphasizes that pollution prevention means source reduction and defines source reduction as any practice that:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal
- Reduces the threats to public health and the environment associated with the release of hazardous substances, pollutants, or contaminants
- Increases the efficiency of using raw materials, energy, water, or other resources, or protects natural resources by conservation.

Some methods that achieve source reduction include equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

The environmental management hierarchy—prevention, recycling, treatment, and disposal—should be viewed as establishing a set of preferences, rather than an absolute judgment that prevention is always the most desirable option. The hierarchy is applied to many different circumstances that require good judgment. Prevention includes what is commonly called in-process recycling, but not out-of-process recycling. Recycling conducted in an environmentally sound manner shares many of the advantages of prevention (e.g., energy and resource conservation and reduction of the need for end-of-pipe treatment or waste containment).

Within the NPDES program, 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 media as a result of leaks, spills, and improper waste disposal. However, based on the authority granted under the regulations, BMPs may include the universe of pollution prevention, which encompasses production modifications, operational changes, materials substitution, materials and water conservation, and other such measures.

The regulatory authority for BMPs needs to be used to the maximum extent possible to incorporate pollution prevention into the permit. The most likely scenario requires the development of a BMP/Pollution Prevention (P<sup>2</sup>) plan that incorporates P<sup>2</sup> activities into the traditional BMP plan parts. P<sup>2</sup> activities may include requirements for the permittee to develop a plan to audit their feed stock, process, and discharge to determine how they may reduce the amount of pollutants being discharged to the receiving stream.

## 5. MUNICIPAL PERMIT CONSIDERATIONS

Nationally, there are more than 15,000 municipal point sources or publicly owned treatment works (POTWs). In the early years of the National Pollutant Discharge Elimination System (NPDES) program, municipal NPDES permits were probably viewed as easy to prepare compared to industrial permits. The municipal permits at that time were fairly standard and usually contained limits for a small number of conventional pollutants. However, several regulatory changes and important realizations about municipal wastewater have increased the complexity of municipal permitting and require special consideration including:

- Secondary and equivalent to secondary treatment definition
- Pretreatment
- Municipal sewage sludge
- Combined sewer overflows (CSOs).

Because of the special circumstances surrounding permitting for municipal sewage sludge, this topic is discussed in Chapter 7; the other three topics will be discussed in the subsequent sections of this chapter. A complete explanation of all of the aspects of these programs is outside the scope of this document. Rather, the intent is to explain how these programs relate to the process of writing municipal NPDES permits. The reader is referred to the various documents listed in the bibliography for more detailed discussions of these programs.

### 5.1 MUNICIPAL-SPECIFIC EFFLUENT LIMITATIONS

As with industrial discharge limits, municipal discharge limits are derived from technology-based limitations and water quality considerations. For purposes of discussion, one may think of municipal wastewater treatment facilities as being analogous to a single industrial category. The type of technology-based limit that is applicable to this category is called secondary treatment. Secondary treatment limits are defined by regulation in 40 *Code of Federal Regulations* (CFR) Part 133. The use of conventional secondary treatment limits is analogous to guidelines for primary industries and typically does not involve Best Professional Judgment (BPJ) decisions by the permit writer.

Changes to the secondary regulation initiated by the 1981 Amendments to the Clean Water Act (CWA) introduced a BPJ-like concept to certain classes of municipal permits that formerly incorporated conventional secondary treatment. This equivalent to secondary treatment classification involves the consideration of various site-specific factors that may lead to the



development of effluent limitations, which are less stringent than conventional secondary treatment limits, but which reflect treatment technologies which are considered to be equivalent-to-secondary. The various site-specific factors that must be considered in this process include the type of treatment technology employed and the operating history of the treatment facility or of similar facilities. This topic is discussed in detail under the section on secondary treatment.

The same general water quality considerations that apply to industrial discharges also apply to municipal discharges. However, when assessing water quality impacts with respect to municipal discharges, the driving factors are usually in-stream dissolved oxygen concentration, concern for specific toxic pollutants, and whole effluent toxicity. Dissolved oxygen concerns stem from the fact that the primary pollutant in municipal wastewater is oxygen-demanding matter, of both carbonaceous and nitrogenous origin. In some cases, nutrients (i.e., nitrogen and phosphorous compounds) may also be of concern, as well as metals and organics that are contributed by industrial users and that pass through the treatment system. Where a wasteload allocation model or an areawide water quality plan indicates the need for more stringent limits than technology-based limits (conventional secondary or equivalent to secondary), the permit's effluent limitations must reflect these more stringent limits. In these cases, higher levels of treatment must be applied to achieve the effluent levels desired to protect the receiving stream quality. Such treatment may involve some additional treatment steps to augment a secondary treatment system. These steps might include additional aeration or filters or chemical addition. The resulting treatment scheme is then called advanced secondary, greater than secondary, or tertiary depending upon the type of system. Finally, the permit writer should be aware of the need to consider water quality-based limitations on toxic pollutants, particularly in those situations where the contribution from industrial wastes to a municipal facility may be significant.

An increased understanding of toxic pollutants in POTW effluents has resulted in an increasing need for water quality-based limitations in municipal permits. While the National Pretreatment Program is in place to control toxic pollutants introduced into POTWs, it is essential that the permit writer assess the need for chemical-specific toxic limits in the municipal permit data, since toxic pollutant data are not required and thus may not always be present in the municipal permit application. Most POTWs with approved pretreatment programs are likely to have collected POTW effluent data on toxics. This information can usually be obtained with the help of the State or U.S. Environmental Protection Agency (EPA) Regional Pretreatment Coordinator.

### **5.1.1 *Secondary and Equivalent-to-Secondary Treatment Definition***

An important aspect of municipal wastewater is that it is amenable to biological treatment. The biological treatment component of a municipal treatment plant is termed secondary treatment and is usually preceded by simple settling (primary treatment). Just as effluent limitation guidelines applicable to an industrial category establish effluent limitations based upon the appropriate treatment technology applicable to the industrial category, municipal guidelines have been established based upon the efficiency of secondary treatment systems. This has historically been defined in terms of (1) the desired effluent concentrations of 5-day biochemical oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS) i.e., 30 milligrams per liter (mg/l) (30-day average) BOD<sub>5</sub> and TSS and 45 mg/l (7-day average), (2) the percent removal for BOD<sub>5</sub>, specified as 85 percent; and (3) the effluent pH value which must be maintained between 6.0 and 9.0 standard units (s.u.). Most POTWs are required to meet these minimum requirements.

The definition of secondary treatment was modified on September 20, 1984, and June 3, 1985, and published in the revised secondary treatment regulations contained in 40 CFR Part 133. These regulations allow alternative limits for facilities using trickling filters and waste stabilization ponds that qualify for equivalent to secondary treatment. Several important concepts form the basis for this revision of the regulations:

- Certain classes of biological treatment facilities that are capable of achieving significant reductions in BOD<sub>5</sub> and TSS, but cannot consistently achieve secondary treatment, should be defined as separate and distinct from secondary treatment facilities.
- These facilities (equivalent to secondary) are cheaper and easier to operate and, therefore, are utilized by smaller communities. The provisions established by EPA should provide for continued use of these technologies where possible.
- The technology-based effluent limitation approach used to establish secondary treatment should be retained for equivalent to secondary treatment limits.
- Water quality must not be adversely affected by the application of equivalent to secondary treatment.
- Costly treatment plant upgrading or replacement should be avoided where equivalent facilities are operating sufficiently (e.g., achieving their original design performance levels).
- Regulations should address variations in facility performance due to geographic, climatic, or seasonal conditions.

In recognition of the above factors, the revisions to include a definition for equivalent to secondary treatment entail a change in the traditional definition of secondary treatment for some POTWs. The capability and performance of an individual plant is assessed, and limits are

selected from a range of possible values. Although this process has been used for industrial facilities, the concept has generally not been applied to municipal permits (with the exception of interim permit limits).

To be eligible for equivalent-to-secondary limitations, 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<sub>5</sub> and TSS removal is provided by the trickling filter or waste stabilization pond system)
- The effluent quality consistently achieved, despite proper operations and maintenance, is in excess of 30 mg/l BOD<sub>5</sub> and TSS
- The treatment works as a whole provides significant biological treatment such that a minimum 65 percent reduction of BOD<sub>5</sub> is consistently attained (30-day average).

A treatment works that is operating beyond its design hydraulic or organic loading limit is not considered an eligible facility. If overloading or structural failure is causing poor performance, the solution to the problem is construction, not effluent limitations adjustment. There are several important implications of the equivalent-to-secondary treatment regulation as it applies to specific municipal permitting issues. These issues are discussed below.

#### **5.1.1.1 New Facility Limitations**

As specified in 40 CFR 133.105(f), the permitting authority must set more stringent limits for new facilities if an analysis of new plant performance shows that more stringent limits than the maximum equivalent-to-secondary limits (45/45) can be met. Recently, a wide range of designs (e.g., solids contact channels, covers) has been used on trickling filters to improve their performance. This situation creates a performance dichotomy between old trickling filters and current state-of-the-art plants. The regulations recognize this disparity and encourage States to establish separate limits for new trickling filters based on current design practices in the State. Where possible, an analysis of similar plants is the preferred method for establishing permit limits where in-State data on new trickling filters are not available. Where no performance data are available for determining new plant capability, literature values may be used.

#### **5.1.1.2 Calculation of Permit Limits for Equivalent-to-Secondary Facilities**

In most cases the permit limits for equivalent-to-secondary facilities will be selected from the 30 to 45 mg/l BOD<sub>5</sub> and TSS monthly average and 45 to 60 mg/l BOD<sub>5</sub> and TSS weekly average range established by the regulation. Obviously, not all permits will be set at the 45 mg/l

monthly average and 65 mg/l weekly average top of the range. The selection should be based on current performance data for the last two years of operation, at a minimum.

Where the plant performance data contain erroneous values because of plant upsets, or other situations not associated with poor operation or maintenance, an adjustment to the permit limit calculation may be made. The data for the month in question may be adjusted by dropping the erroneous daily value and recalculating the monthly average based on the remaining daily values. Another alternative is to analyze monthly average values for a period greater than two years and drop the monthly averages that are erroneous because of explained upset situations. Discharge Monitoring Report (DMR) data should be used for calculations whenever possible. The DMRs must support the permit limits decision for an equivalent to secondary facility. It should be noted that the burden of proof for performance data and demonstration of proper operation and maintenance is the responsibility of the municipality.

Often a trickling filter or lagoon will be combined with another biological process (i.e., activated sludge process) in one treatment plant. In this case, if the trickling filter or lagoon qualifies for equivalent-to-secondary limits, the permit limits for the treatment plant can be derived by averaging the equivalent-to-secondary and conventional secondary treatment limits. To accomplish this, a flow-weighted average of the two effluent concentration limits should be calculated and applied as the outfall limitation for the permit. An alternative to this approach is the use of internal waste stream limitations as authorized by 40 CFR 122.45(h) for each biological process effluent line. The permit writer should encourage the continued use of existing trickling filters and lagoons, where appropriate, through the application of appropriate equivalent-to-secondary limits. However, the permit writer must be sure that these facilities are capable of meeting the proposed effluent limits without causing water quality impacts before the permit limits can be adjusted. If one cannot determine this, equivalent-to-secondary limits cannot be used in the permit.

#### **5.1.1.3 Alternative State Requirements (ASRs)**

The Alternative State Requirement (ASR) provision contained in 40 CFR 133.105(d) of the regulation allows States the flexibility to set permit limits above the maximum levels of 45 mg/l monthly average and 65 mg/l weekly average BOD<sub>5</sub> and TSS from lagoons meeting certain requirements. Where lagoon suspended solids requirements are already above 45 mg/l in accordance with 40 CFR 133.103(c), an ASR by the State is not necessary, unless higher limits are desired. To establish an ASR, the State must do two things:

- Identify a group of equivalent facilities that warrant different limits in exceedance of the equivalent-to-secondary values contained in 40 CFR Part 133
- Justify the higher permit limitations for these facilities.

The group of facilities can be selected because of climatic or geographic location, the type of technology used, or any other supportable criteria. The analysis of plant data for the group must be statistically sound and should follow the methods presented in EPA's *Technical Support Document for Water Quality-based Toxics Control*. The ASR must be approved by the EPA Region before permits can be written using the ASR values. The public notice of a proposed ASR is the responsibility of the State. EPA has published approved ASRs in the September 20, 1984, *Federal Register*. Exhibit 5-1 is a summary of the ASRs for each State.

#### EXHIBIT 5-1: STATE-SPECIFIC ASRS

Location	Alternate TSS Limit (30-day average) (mg/l)
Alabama	90
Alaska	70
Arizona	90
Arkansas	90
California	95
Colorado	
Aerated ponds	75
All others	105
Connecticut	None
Delaware	None
District of Columbia	None
Florida	None
Georgia	90
Guam	None
Hawaii	None
Idaho	None
Illinois	37
Indiana	70
Iowa	
Controlled discharge, 3 cell	Case-by-case but not greater than 80
All others	80
Kansas	80
Kentucky	None
Louisiana	90
Maine	45

**EXHIBIT 5-1: STATE-SPECIFIC ASRS (CONTINUED)**

<b>Location</b>	<b>Alternate TSS Limit (30-day average) (mg/l)</b>
<b>Maryland</b>	90
<b>Massachusetts</b>	None
<b>Michigan: Controlled seasonal discharge</b>	
Summer	70
Winter	40
<b>Minnesota</b>	None
<b>Mississippi</b>	90
<b>Missouri</b>	80
<b>Montana</b>	100
<b>Nebraska</b>	80
<b>North Carolina</b>	90
<b>North Dakota</b>	
North and East of Missouri River	60
South and West of Missouri River	100
<b>Nevada</b>	90
<b>New Hampshire</b>	45
<b>New Jersey</b>	None
<b>New Mexico</b>	90
<b>New York</b>	70
<b>Ohio</b>	65
<b>Oklahoma</b>	90
<b>Oregon</b>	
East of Cascade Mountains	85
West of Cascade Mountains	50
<b>Pennsylvania</b>	None
<b>Puerto Rico</b>	None
<b>Rhode Island</b>	45
<b>South Carolina</b>	90
<b>South Dakota</b>	120
<b>Tennessee</b>	100
<b>Texas</b>	90
<b>Utah</b>	None
<b>Vermont</b>	55
<b>Virginia</b>	
East of Blue Ridge Mountains	60
West of Blue Ridge Mountains	78
East slope counties: Loudoun, Faquier, Rappahannock, Madison, Green, Albemarle, Nelson, Amherst, Bedford, Franklin, Patrick.	Case-by-base application of 60/78 limits.

**EXHIBIT 5-1: STATE-SPECIFIC ASRS (CONTINUED)**

<b>Location</b>	<b>Alternate TSS Limit (30-day average) (mg/l)</b>
Virginia Islands	None
Washington	75
West Virginia	80
Wisconsin	80
Wyoming	100
Trust Territories and N. Marianes	None

**5.1.1.4 Carbonaceous BOD Limits**

EPA recognizes that the carbonaceous BOD (CBOD) test can provide accurate information on treatment plant performance in many cases. However, the use of CBOD in permits should be focused on facilities with known or suspected nitrification problems such as underloaded facilities and new facilities with long detention times. These conditions favor nitrifying bacteria and can lead to erroneous BOD<sub>5</sub> test results.

The equivalent-to-secondary treatment regulations in 40 CFR Part 133.105(e) allow optional use of a CBOD limit and test procedure in municipal permits as a substitute for the standard BOD<sub>5</sub>. This substitution is at the discretion of the permitting authority. To establish a CBOD limit for an equivalent-to-secondary treatment facility, the permitting authority must have data to show that nitrifying bacteria in the treatment plant are causing the BOD<sub>5</sub> test results to be significantly impacted. Extensive BOD<sub>5</sub>/CBOD comparisons should not be necessary because the actual CBOD limit will be established by (1) determining the BOD<sub>5</sub> limit that can be met through proper operation and maintenance, and (2) if the BOD<sub>5</sub> limit is between 30 and 45 mg/l, setting the CBOD limit 5 units lower (e.g., between 25 and 40 mg/l).

The EPA approved test procedures in 40 CFR Part 136 now contain a CBOD (nitrogen inhibited) test procedure. The CBOD test can be specified for any municipal permit. However, the BOD<sub>5</sub>/CBOD relationship (5 mg/l difference) may not apply outside the 30 to 45 mg/l BOD<sub>5</sub> range. If CBOD limits will be used for equivalent-to-secondary permits above 45 mg/l (BOD<sub>5</sub>), a BOD<sub>5</sub>/CBOD relationship should be established during the ASR process. Where parallel BOD<sub>5</sub>/CBOD test data are available, they must be submitted to the EPA Regional office with the proposed ASRs for approval. For permit limits below 30 mg/l BOD<sub>5</sub> the corresponding CBOD limit should be developed during an advanced treatment review or from the wasteload allocation.

The use of CBOD in the permit is not a substitute for nitrogen or ammonia limits if in-stream nitrification or ammonia toxicity is creating a problem.

## **5.2 MUNICIPAL-SPECIFIC SPECIAL CONDITIONS**

Several special conditions are exclusive to municipalities. These are pretreatment, CSOs, and municipal sewage sludge. This section discusses pretreatment and CSOs. Municipal sewage sludge is discussed in the special topics contained in Chapter 7.

### **5.2.1 Pretreatment**

#### **5.2.1.1 Statutory History**

The discharge of industrial pollutants into municipal sewer systems can result in water pollution and related problems at the local wastewater treatment plant. Congress decided that the most feasible solution to this problem was to regulate discharges from industrial users and, where necessary, require pretreatment by these users to remove pollutants from their wastewaters prior to discharge into municipal sewers. Section 307(b) of the CWA focuses pretreatment requirements on the control of toxic pollutants by establishing pretreatment standards for industrial and commercial dischargers in specific industrial categories determined to be the most significant sources of toxic pollutants referenced in Section 307(a) of the CWA. In Section 402(b)(8) of the CWA, Congress assigned the primary responsibility for enforcing national pretreatment standards to the local POTWs and that this responsibility would be a condition of the POTW's NPDES permit.

To implement this mandate, EPA first issued pretreatment regulations under 40 CFR Part 128 on November 8, 1973. Subsequently, the General Pretreatment Regulations for Existing and New Sources of Pollution were promulgated on June 26, 1978 as part of 40 CFR Part 403, the current location of the pretreatment regulations. Revised regulations have been established as recently as July 1990. The regulations establish procedures, responsibilities, and requirements for EPA, States, local governments, and industry.

#### **5.2.1.2 Objectives of the Pretreatment Program**

Four major problems can be prevented through implementation of a local pretreatment program:

- ***Interference With POTW Operations***—Since municipal wastewater treatment systems are designed primarily to treat domestic wastes, the introduction of nondomestic wastes may affect these systems. For example, the bacteria in activated sludge treatment systems can be inhibited by toxic pollutants. The result is interference with the



treatment process, which means that domestic and industrial wastes may be improperly treated before being discharged into the receiving stream.

- ***Pass-Through of Pollutants***—Even if pollutants do not interfere with the treatment systems, they may pass through POTWs without being adequately treated because the systems are not designed to remove them.
- ***Municipal Sludge Contamination***—The removal of certain pollutants (particularly metals) by the POTW's treatment system can result in contamination of its sludge. Such contamination can limit the POTW's sludge management alternatives and increase the cost of appropriate sludge disposal methods.
- ***Exposure of Workers to Chemical Hazards***—When combined with domestic wastes, industrial wastes can produce poisonous gases that may be hazardous to POTW personnel.

The pretreatment regulations require that if a POTW (or combination of POTWs operated by the same authority) has a design flow greater than 5 million gallons per day (MGD) and receives wastes subject to Pretreatment Standards, it must establish a pretreatment program as a condition of its NPDES permit. POTWs with design flows less than 5 MGD may also be required to establish a pretreatment program if nondomestic wastes cause upsets, sludge contamination, or violations of the POTW's NPDES permit conditions.

Five States (Connecticut, Vermont, Alabama, Nebraska, and Mississippi) have elected to implement the pretreatment requirements at the State level, in lieu of requiring approval for local pretreatment programs. This alternative is authorized pursuant to 40 CFR 403.10(e). About 1,500 of the Nation's 15,000-plus POTWs have approved pretreatment programs. The remaining municipal treatment plants are not believed to be receiving industrial wastes of concern at this time and will probably not be required to develop pretreatment programs unless local circumstances regarding their industrial users change.

#### **5.2.1.3 Pretreatment Standards**

The pretreatment regulations provide for three types of pretreatment standards to control pollutant discharges into POTWs. First, prohibited discharge standards promulgated by EPA apply to all nondomestic sources of pollutants discharged to POTWs. Second, categorical pretreatment standards apply to users in specific industrial categories determined to be the most significant sources of toxic pollutants. Third, POTWs are required to establish local limits where necessary to protect the environment or the municipal sewage system.

Prohibited discharge standards include a general prohibition against any pollutant that causes pass-through or interference and specific prohibitions that are intended to protect the

POTW treatment plant and its operations. The specific prohibitions forbid the introduction of the following pollutants:

- Pollutants that create a fire or explosion hazard (flash point less than 104°F/60°C) in the sewers or treatment works
- Pollutants that are corrosive (or with a pH lower than 5.0 s.u.)
- Solid or viscous pollutants in amounts that cause obstructions
- Any pollutant released at a flow rate and/or concentration that causes interference, including oxygen demanding pollutants (e.g., BOD<sub>5</sub>)
- Pollutants that increase the temperature of wastewater entering the treatment plant to above 104°F(40°C)
- Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil in amounts that cause interference or pass-through
- Pollutants that result in the presence of toxic gases, vapors, or fumes
- Any trucked or hauled pollutants, except at discharge points designated by the POTW.

Categorical pretreatment standards are uniform, national technology-based standards established for specific industrial categories. They are published by EPA as a separate regulation. The standards contain limitations for pollutants commonly discharged within each specific industrial category. All firms regulated by a particular category are required to comply with these standards, no matter where they are located in the United States.

Local limits are established by POTWs in consideration of site-specific factors such as NPDES permit limits, receiving stream water quality sludge use and disposal practices, and the operational characteristics of the POTW treatment plant. Sound technically based local limits are the key to achieving the environmental objectives of the pretreatment program. All POTWs with approved pretreatment programs are required to develop and implements local limits and to evaluate, every 5 years, whether their limits need to be revised. POTWs without approved pretreatment programs that are experiencing pass-through and interference may be required to develop local limits.

There are a number of different methods to calculate appropriate and technically defensible local limits. EPA's December 1987 and May 1991 *Guidance on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program* provide various methods of calculating local limits. The predominant approach used by POTWs and advocated in the guidance is a chemical-specific approach known as the Maximum Allowable

**Headworks Loading (MAHL) method.** This method involves back-calculating from environmental and plant protection criterion to MAHLs. This is accomplished, pollutant by pollutant, for each environmental criteria or plant requirement. The lowest or most limiting value for each pollutant serves as the basis for allocation to industry and for ultimately setting local limits. The following steps detail the MAHL local limits development process:

- **Step 1—Collect data for local limits development.**
  - Determine pollutants of concern.
  - Characterize existing loadings from industrial users, hauled waste contributions, and remaining domestic/commercial contribution through the monitoring program.
  - Determine applicable environmental criteria, including NPDES permit limits, receiving stream water quality criteria and standards, sludge use and disposal practices, and inhibition of treatment plant processes.
- **Step 2—Develop the MAHLs.**
- **Step 3—Determine maximum allowable industrial loadings and allocate them to industrial users.**
- **Step 4—Incorporate local limits into individual control mechanisms and the sewer use ordinance.**
- **Step 5—Revise local limits where conditions dictate such, but at least once every five years.**

Besides the MAHL methods, other methods of local limits development have been used by POTWs. These include the collection system approach, industrial user management practice plans, and case-by-case discharge limits. These approaches are briefly described as the following:

- **Collection System Approach—**To apply this method, the POTW identifies pollutants that may cause fire and explosion hazards or other worker health and safety concerns. Pollutants found to be present are evaluated for their propensity to volatilize and are modeled to evaluate their expected concentration in air. Comparisons are made with worker health exposure criteria and lower explosive limits. Where values are of concern, the POTW may set limits or require development of management practices to control undesirable discharges. The collection system approach may also consider the prohibition of pollutants with specific flashpoints to prevent discharge of ignitable wastes.
- **Industrial User Management Practice Plans—**This approach consists of POTWs requiring industrial users to develop management practices as enforceable pretreatment requirements for the handling of chemicals and wastes. Example practice plans include chemical management practices, best management practices, and spill prevention plans. Management practice plans are usually narrative local limits.

- ***Case-by-Case Discharge Limits***—In this approach, a POTW may set numeric local limits based on BPJ and on available technologies that are known to be economically feasible. This approach is most often used when insufficient data are available to employ other methods.

#### **5.2.1.4 Relationship of the Pretreatment Program to the NPDES Program**

States with approved programs have the responsibility of overseeing and coordinating the development of local pretreatment programs and approving or disapproving local pretreatment program submissions. If a State does not administer a pretreatment or NPDES program, then EPA is the Approval Authority for local pretreatment programs. However, many States participate in pretreatment activities even if their State program is not approved.

The development and implementation of a pretreatment program are integral and enforceable components of the POTW's NPDES permit. Initially, POTWs are notified by EPA or their State water pollution control agencies that they are required to develop local pretreatment programs. A compliance schedule (generally 1 year) is included in the NPDES permit and typically outlines milestones and dates for program completion. As part of pretreatment program development, POTWs are required to develop and document the necessary authorities, information, and procedures to implement local programs.

Once the local pretreatment program is approved, 40 CFR 122.63 provides that the permit be modified, as a minor modification, to incorporate the conditions and requirements of the approved pretreatment program. Note that approved programs are not enforceable until the POTW's NPDES permit requires them to be implemented. Typically, in the past, the modified NPDES permit included simple language that required the POTW to implement its approved program and the requirements of the General Pretreatment Regulations. Over time, it has become apparent that more specific and detailed language in the POTW's NPDES permit has certain advantages, such as a clearer standard of performance and improved enforceability against the POTW. EPA has distributed model language requiring POTW program implementation. Exhibit 5-2 provides an abbreviated summary of requirements of the model permit language, which in turn provides good insight into the responsibilities of POTWs for implementing local pretreatment programs.

EPA and the States oversee and evaluate POTW program implementation and compliance through the review of POTW reports and onsite evaluation (e.g., pretreatment audits and compliance inspections).

.. **EXHIBIT 5-2: EXAMPLE POTW PRETREATMENT PROGRAM  
IMPLEMENTATION REQUIREMENTS**

- Adopt and maintain legal authority to conduct pretreatment program activities as per 40 CFR 403.8(f)(1)
- Establish multijurisdictional agreements (for industrial users located in other jurisdictions)
- Identify and locate industrial users
- Develop and enforce local limits
- Issue individual control mechanisms (e.g., permits) to all significant industrial users (SIUs)
- Perform inspections and sampling at each SIU at least annually
- Review industrial user reports
- Take enforcement action and publish public notice of users in significant noncompliance
- Perform data management and recordkeeping
- Ensure public participation
- Secure and maintain resources
- Report at least annually to the State/EPA
- Monitor POTW treatment plant influent, effluent, and sludge
- Evaluate the environmental effectiveness of the POTW pretreatment program.

***Role of the Permit Writer***

An NPDES State or an EPA Region will often designate an individual (e.g., pretreatment coordinator) to serve as the pretreatment expert. The pretreatment coordinator is a key resource on pretreatment issues, particularly at the time of NPDES permit reissuance. However, in most cases, it will be the responsibility of the permit writer to identify relevant pretreatment concerns and ensure they are appropriately addressed in the permit. Therefore, the permit writer must be familiar with requirements of the pretreatment program since, as discussed above, he or she will become an integral part of the NPDES permit. Further, the POTW's pretreatment program can serve as an important source of information for other municipal permit considerations.

The major roles and contributions of the municipal permit writer are briefly discussed below:

- ***Identify the Need for a Pretreatment Program***—When reviewing the municipal permit application, it may become apparent that a POTW should have a pretreatment program

because of concerns about industrial users or historical operational or compliance problems. The pretreatment coordinator should be consulted in these cases.

- ***Modify Pretreatment Implementation Language/Initiate Corrective Action***—Reissuance of the NPDES permit is the opportunity to adjust the requirements for an approved program. The results of a recent audit or pretreatment compliance inspection may have identified deficiencies that can be addressed through reissuance of the NPDES permit. Also, the permit writer may notice that the pretreatment boilerplate in the expiring NPDES permit is not detailed and specific. The permit writer is encouraged to coordinate reissuance of all permits for pretreatment POTWs with the pretreatment coordinator.
- ***Identify the Need for Water Quality-Based Controls***—Until recently, municipal application requirements did not require POTWs to submit any data related to the toxicity of POTW's effluent. In a July 1990 rule, EPA began to require all pretreatment POTWs and POTWs with flows more than 1 MGD to submit the results of a valid whole effluent toxicity (WET) test with their application for a permit. These data can help establish the need for and basis of further WET controls. There is currently no requirement for chemical-specific toxics effluent monitoring to be submitted with the permit application. However, most pretreatment POTWs have performed toxics monitoring of their influent, effluent, and sludge. The permit writer should obtain such data, with the aid of the pretreatment coordinator. These data can be used to determine the need for water quality-based limits.

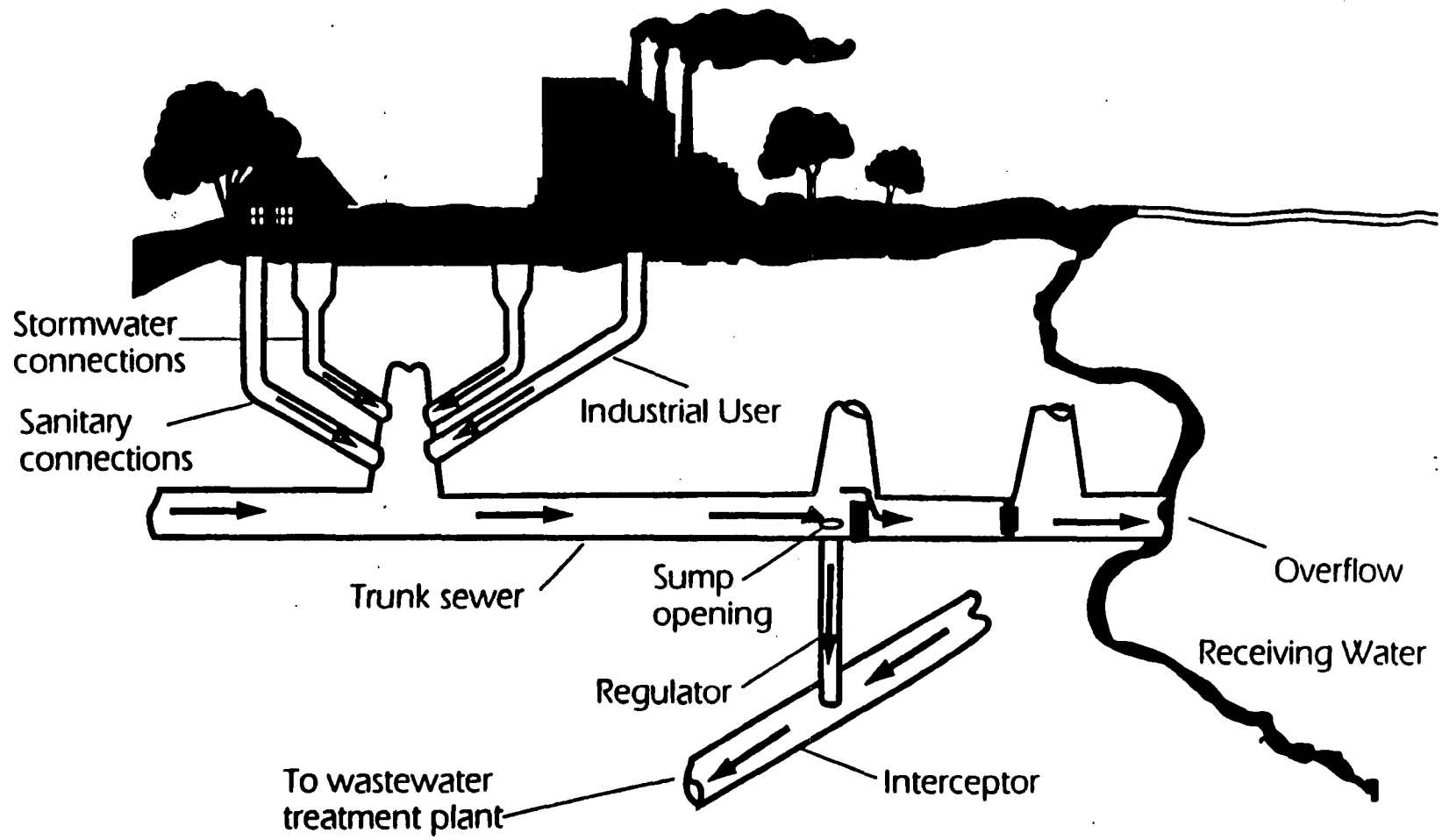
### **5.2.2 Combined Sewer Overflows**

Combined sewer systems are designed to achieve two purposes: control sanitary and industrial wastewater and control storm water runoff. During dry weather, combined sewers, carry sanitary wastes and industrial discharges to a treatment plant. In periods of heavy rainfall, however, the combined storm water runoff and untreated sanitary sewage, including industrial components, can overflow the structures that normally divert the wastewater to a POTW and instead divert this untreated wastewater directly to a water body. These overflows are called CSOs. A typical diagram of a CSO is provided in Exhibit 5-3.

CSOs are point source discharges subject to the technology-based requirements of the CWA and to applicable State water quality standards. Under the CWA, CSOs must comply with the Best Available Technology Economically Achievable (BAT) for nonconventional and toxic pollutants and Best Conventional Pollution Control Technology (BCT) for the conventional pollutants. Furthermore, they must achieve compliance with applicable State water quality standards. However, since these discharges are not POTW effluent discharges, they are not subject to secondary treatment regulations.

There are no promulgated BAT/BCT effluent guidelines and limitations for CSOs. As a result, permit writers must use their judgement in developing technology-based permit

EXHIBIT 5-3: TYPICAL COMBINED SEWER SYSTEM CONFIGURATION



requirements. Broad authority under the CWA is provided in authorizing the development of NPDES permit conditions on a case-by-case basis. BPJ is the permit writer's opinion as to what constitutes technically-based permit conditions considering all reasonable available and relevant data after a multidisciplinary approach examination and evaluation. Permit writers must clearly define and document the need for CSO permit requirements and the basis for their establishment. In short, the rationale for CSO special conditions must be clearly drafted to withstand the scrutiny of not only the permittee but also the public and, possibly, a hearing officer.

For CSO discharges, the permit writer should weigh those considerations appropriate for CSOs in general, as well as information specific to a particular CSO. In developing permit requirements to meet technology-based requirements and applicable State water quality standards, the permit writer may decide that particular issues are appropriate considerations in developing conditions for CSOs. EPA believes that the following general considerations will be particularly relevant:

- CSO Discharge
  - Flow, frequency, and duration of the CSO discharge
  - Available effluent characterization data on the CSO discharge
  - Available information and data on the impacts of the CSO discharge(s) (e.g., 305(h) reports, ambient survey data, fish kills, 304(l) lists of impaired waters)
  - Compliance history of the CSO owner, including performance and reliability of any existing CSO controls
  - Current NPDES permit and NPDES permit application
  - Facility planning information from the permittee which addresses CSOs.
- Technologies
  - Performance data (either from the manufacturer or from other applications) for various CSO technologies that may be employed, including equipment efficiency and reliability
  - Cost information associated with both the installation and operations and maintenance of CSO technologies
  - Reference materials on various types of CSO technologies (e.g., WEF Manual of Practice, ASCE publications).

EPA's National Combined Sewer Overflow Control Strategy, issued in August 1989, stated that, as a minimum BAT/BCT, NPDES permits should require six technology-based control measures:

- Proper operation and maintenance for sewer system and CSO points
- Maximization of storage in collection system



- **Minimization of CSO impacts through pretreatment program modifications**
- **Maximization of flow to POTW for treatment**
- **Prohibition of dry weather overflows**
- **Control of solids and floatables.**

EPA's Office of Water's Management Advisory Group has recently recommended that EPA require three additional control measures in NPDES permits as minimum control measures:

- **Inspections and monitoring**
- **Pollution prevention**
- **Public notification.**

Permit writers should include these nine minimum technology-based CSO control measures in any NPDES permit issued to control CSO discharges. When the permit writer determines that these nine control measures do meet the technology-based requirements of the CWA and applicable State water quality standards, the permit writer has satisfied the statutory requirements. When the determination is that these nine minimum control measures are not sufficient to achieve the level of control required to alleviate the impacts of the CSO discharges, then the permit writer must select additional control measures. Using BPJ, the permit writer must include additional measures that will achieve the incremental level of control necessary to reduce the CSO impacts to the required degree. EPA's strategy also identified the following 17 additional CSO control measures that the permit writer should consider to bring wet weather CSO discharges into compliance with BAT/BCT requirements and applicable State water quality standards:

- **Improved operation and maintenance**
- **Best Management Practices (BMPs)**
- **System-wide storm water management programs**
- **Supplemental pretreatment program modifications**
- **Sewer ordinances**
- **Local limits program modifications**
- **Identification and elimination of illicit discharges**
- **Monitoring requirements**
- **Pollutant-specific limitations**
- **Flow minimization and hydraulic improvements**

- Direct treatment of overflow
- Sewer rehabilitation
- In-line/off-line storage
- Reduction of tidewater intrusion
- Construction of CSO controls within sewer system or at CSO discharge points
- Sewer separation
- New/modified wastewater treatment facilities.

The permit writer must base the selection of these measures on good judgement in order to determine which control measures are necessary to meet statutory requirements. The permit writer must also use all available resources in developing NPDES permits that control CSO discharges and satisfy all the requirements in the NPDES regulations, including technology-based requirements and any applicable State water quality standards. If the permits do not meet these minimal levels of control, they are vulnerable to successful challenges by the permittee or by other interested parties.

EPA is currently preparing CSO-specific permitting guidance to reflect a to-be-developed CSO Permitting Strategy.

## **6. WATER QUALITY-BASED PERMITTING**

A water quality-based limit is designed to protect the water quality of a receiving water by ensuring that State water quality standards are met. To understand how to develop water quality-based limits, the permit writer must be familiar with the concepts of water quality standards. This chapter discusses water quality standards, approaches to water quality-based toxics control, determination of the need for a water quality-based effluent limit (WQBEL), and procedures for setting WQBELs. For more detailed information on water quality-based permitting, refer to the U.S. Environmental Protection Agency (EPA) manual, entitled *Technical Support Document for Water Quality-based Toxics Control* (TSD).

### **6.1 WATER QUALITY STANDARDS**

Water quality standards define the water quality goals of a waterbody and, under the Clean Water Act (CWA), every State must develop water quality standards applicable to the various bodies of water within the State. Once developed, EPA must approve or disapprove of these standards. The water quality standards should (1) include provisions for restoring and maintaining chemical, physical, and biological integrity of State waters, (2) provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife and recreation (fishable/swimmable) in and on the water, and (3) consider the use and value of State waters for public water supplies, propagation of fish and wildlife, recreation, and industrial purposes and navigation. Water quality standards comprise three parts:

- Uses or classifications of waters
- Water quality criteria
- Antidegradation policy.

The permit writer should be aware that the basis for the development of criteria and standards is constantly evolving. States review their water quality standards and revise them if necessary, at least once every three years. Whenever writing a permit, the permit writer must use the most current State water quality standards.

In addition, States may, at their discretion, adopt policies affecting the application and implementation of the standard, such as mixing zones, variances, low flow exemptions, or schedules of compliance for water quality-based permit limits. However, EPA retains authority to review and approve or disapprove of such policies.

### **6.1.1 Use or Classifications of Waters**

The CWA describes various uses of waters that are considered desirable and should be protected. These uses include public water supply, recreation, and propagation of fish and wildlife. The States are free to designate more specific uses (e.g., cold water and warm water aquatic life) or to designate uses not mentioned in the CWA, with the exception that waste transport and assimilation are not acceptable designated uses (see 40 *Code of Federal Regulations* [CFR] 131.10(a)). Designated uses should support the fishable/swimmable goal of Section 101(a)(2) of the CWA. Water quality standards, including use classifications, are to be reviewed by the States and, where appropriate, modified at least every three years.

### **6.1.2 Water Quality Criteria**

The regulations in 40 CFR 131.11 encourage States to adopt both numeric and narrative water quality criteria. Aquatic life criteria should protect against both short-term (acute) and long-term (chronic) effects. Numeric criteria are particularly important where the cause of toxicity is known or for protection against pollutants with potential human health impacts or bioaccumulation potential. Numeric criteria are expressed in terms of concentration. Narrative criteria can be the basis for limiting the toxicity of waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity but there are no numeric criteria in the State standards or where toxicity cannot be traced to a particular pollutant. For example, a narrative criterion is a statement that requires discharges to be "free from toxics in toxic amounts."

Water quality criteria developed by EPA and States for various pollutants of concern are scientifically based ambient limits expressed in terms of concentration. The primary resource available to determine the water quality criteria for a specific body of water is the State water quality standards. Typically, States have water quality criteria to protect human health and aquatic life uses. The criteria values represent the numbers that States determine must not be exceeded in order to protect the designated uses of State waterbodies. Since water quality criteria may depend on the waterbody, the criteria may vary among States and even among receiving waters within a State.

EPA periodically updates and publishes water quality criteria which States can use as guidelines to help develop their criteria or to supplement their criteria. EPA criteria are recommended levels not to be exceeded in a body of water. These levels are designed to protect the aquatic life and human health criteria for the designated beneficial use/classification. For example, the maximum chronic criteria for zinc are 86 micrograms per liter ( $\mu\text{g/l}$ ) for marine

waters and 110 µg/l for fresh water aquatic life. EPA's past lists of water quality criteria are referred to as the *Green, Blue, Red, Toxics, and Gold Books*, published in 1968, 1973, 1976, 1980, and 1986 respectively. Toxic criteria were published in the 1980 water quality criteria documents for the 65 compounds and families of compounds listed in Section 307(a) of the CWA as priority pollutants.

Numeric criteria are required where they are necessary to protect designated uses. Numeric criteria to protect aquatic life should be developed to address both short-term (acute) and long-term (chronic) effects. Adoption of numeric criteria is particularly important for toxicants known to be impairing surface waters and for toxicants with potential human health impacts (e.g., those with high bioaccumulation potential). Human health should be protected from exposure resulting from consumption of water and fish or other aquatic life (e.g., mussels, crayfish). Numeric water quality criteria also are useful in addressing nonpoint source pollution problems.

To supplement numeric criteria for toxicants, all States have also adopted narrative criteria for toxicants. Narrative criteria are statements that describe the desired water quality goal, such as "All State waters must, at all times and flows, be free from substances that are toxic to humans or aquatic life."

The science that forms the basis of water quality criteria development is constantly evolving. For example, two new areas where criteria are being developed include biological and sediment criteria.

Biological criteria are numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting unimpaired waters of a designated aquatic life use. The biological communities in these waters represent the best attainable condition for the organisms. According to EPA policy, States should develop and implement biological criteria in their water quality standards.

Although ambient water quality criteria are playing an important role in ensuring a healthy aquatic environment, they alone have not been able to ensure appropriate levels of environmental protection. Sediment contamination, which can involve deposition of toxicants over long periods of time, is also responsible for affecting water quality. EPA is currently developing sediment criteria and sediment guidance.

### **6.1.3    *Antidegradation Policy***

EPA's regulation for water quality standards requires each State to adopt, as part of its water quality standards, an antidegradation policy consistent with 40 CFR 131.12 and to identify the methods it will use for implementing the policy. EPA's antidegradation regulations require States to maintain the quality of high quality waters and outstanding natural resources even where the designated uses of such waters would permit lower water quality.

### **6.1.4    *Other Policies***

It is not always necessary to meet all water criteria at the outfall to protect the integrity of the waterbody as a whole. Sometimes it is appropriate to allow for ambient concentrations above the criteria in small areas near outfalls. These areas are called mixing zones.

The CWA allows mixing zones at the discretion of the State. EPA recommends that States have a definitive statement in their standards on whether or not mixing zones are allowed. When they are, the State should include in their standards a description of the procedures for defining a mixing zone. The TSD gives recommendations on mixing zone allowances.

To ensure that mixing zones do not impair the integrity of the waterbody, the mixing zone must not cause lethality to passing organisms and, considering likely pathways of exposure, must not cause significant health risks. One way to achieve these objectives is to limit the size of the area affected by the mixing zones.

## **6.2    APPROACHES TO WATER QUALITY-BASED TOXICS CONTROL**

The objective of water quality-based toxics control is to protect water quality standards for aquatic life and human health and wasteload allocations through the implementation of permit limitations. This is accomplished using three different approaches: the chemical-specific approach, the whole effluent toxicity (WET) approach, and the biological criteria or bioassessment approach. These approaches have unique, as well as overlapping, attributes.

To be fully protective of water quality, EPA recommends that regulatory agencies strive to integrate the chemical-specific, WET, and biological criteria approaches because each has its respective capabilities and limitations. The TSD highlights the strengths and weaknesses of each approach.

### **6.2.1 Chemical-Specific Approach**

The chemical-specific approach, developed in the 1960s, involves the use of chemical specific criteria that are adopted into a State's water quality standards. This approach features numeric criteria that protect aquatic life from acute and chronic effects. These criteria are used as the basis to analyze an effluent and decide which chemicals need controls and to derive permit limits to control those chemicals. This approach allows for the control of individual chemicals before a water quality impact has occurred.

### **6.2.2 Whole Effluent Toxicity Approach**

WET, the second approach to water quality-based toxics control, is the aggregate toxic effect of a complex mixture of pollutants. The WET approach is important because specific, numeric criteria for all pollutants have not been developed and there is no set determination of the toxicity caused by the interaction of different pollutants. Ultimately, this approach allows the permit writer to protect the narrative "no toxics in toxic amounts" standard, which is applicable to all U.S. waters.

This approach involves the use of toxicity tests to measure the toxicity of wastewater. A toxicity test measures the degree of response of exposed aquatic test organisms to a specific chemical, an effluent, or receiving water samples. There are two types of toxicity tests: acute and chronic. An acute toxicity test is usually conducted over a period of 48 hours and the endpoint measured is mortality. The endpoint for an acute test is often expressed as the lowest concentration of a toxicant that is lethal to 50 percent of the exposed test organisms (LC50).

A chronic toxicity test is usually conducted over a period of 7 days and the endpoint measured is latent mortality and sublethal effects, such as changes in reproduction and growth. The endpoint is often expressed as the no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC). The NOEC is the highest concentration of a toxicant or effluent at which no adverse effects are observed on the aquatic test organisms. The LOEC is the lowest concentration of toxicant that causes observable adverse effects in exposed test organisms.

To express criteria, facilitate modeling, and express permit limits, EPA recommends that toxicity be expressed in toxic units (TUs). A TU is merely the inverse of the sample fraction. Toxicity expressed as percent sample is divided into 100 to obtain toxic units. For example, if a chronic test result is a NOEC of 25 percent effluent, that result can be expressed as  $100/25$  or 4

chronic toxic units (4 TUc); if an acute test result is a LC50 of 50 percent, that result can also be expressed as 100/50 or 2 acute toxic units (2 TUa).

It is important to distinguish TUa (acute toxic units) from TUc (chronic toxic units). The difference between TUa and TUc can be likened to the difference between miles and kilometers. In order to compare a TUa and a TUc, an acute-to-chronic ratio (ACR) needs to be used. The ACR is a conversion factor that changes TUa into equivalent TUc. The  $ACR = LC50/NOEC$ . If data are insufficient to calculate an ACR, EPA's TSD recommends a default value of  $ACR = 10$ .

### **6.2.3 *Biological Criteria or Biological Assessment Approach***

This approach is used to assess the overall biological integrity of an aquatic community in order to protect water quality standards and to define designated uses of waterbodies. A bioassessment is an evaluation of the biological condition of a waterbody using biological surveys and other direct measurements of resident biota in surface waters. A biosurvey consists of collecting, processing, and analyzing representative portions of a resident aquatic community to determine the community structure and function.

The biocriteria approach first involves the use of numeric or narrative values to describe the biological integrity of aquatic communities in a reference waterbody, and then biosurveys are used to collect information on the overall health of aquatic communities in a waterbody of interest. The results of the biosurveys are compared to the reference waterbody to determine if the criteria are met. EPA issued guidance on this approach in the *Biological Criteria: National Program Guidance for Surface Waters*.

## **6.3 DETERMINATION OF THE NEED FOR A WQBEL**

Once the applicable designated uses and water quality criteria for a waterbody are determined and, if after technology based limits are applied, the receiving water concentrations still exceed the water quality standards, the discharges into such waters are subject to further reduction. EPA regulations at 40 CFR 122.44(d) require that all effluents be characterized by the permit authority to determine the need for WQBELs to control the discharge.

The purpose of effluent characterization is to determine whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion of numeric or narrative water quality criteria. EPA's regulation at 40 CFR 122.44(d)(1) establishes grounds for determining if there is an excursion of the numeric or narrative water quality criteria. At a minimum, the



permitting authority must make this determination at each permit reissuance and must develop permit limits that will control the discharge.

When conducting an effluent characterization, the permit writer is essentially projecting the concentration of the pollutant(s) contained in the effluent once the effluent enters the receiving water. The permit writer then compares this projected receiving water concentration to the applicable State water quality criteria. If the projected concentration exceeds the applicable water quality criteria, the permit writer has established that WQBELs are needed.

In making a determination of the need for a permit limit for WET or an individual toxicant, the permit authority is required to consider, at a minimum, existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (for whole effluent), and where appropriate, the dilution of the effluent in the receiving water (40 CFR 122.44(d)(ii)).

#### ***6.3.1 Determination of the Need for WQBELs With Effluent Monitoring Data***

When characterizing an effluent for the need for a WET, and/or an individual toxicant limit, the regulatory authority should use any available effluent monitoring data as the basis for a decision. The regulatory authority may already have effluent toxicity data available from previous monitoring or it may decide to require the permittee to generate effluent monitoring data prior to permit issuance or as a condition of the issued permit. EPA recommends monitoring data be generated on effluent toxicity prior to permit limit development for the following reasons: (1) the presence or absence of effluent toxicity can be more clearly established or refuted, and (2) where toxicity is shown, effluent variability can be more clearly defined.

#### ***6.3.2 Determination of the Need for WQBELs Without Effluent Monitoring Data***

If the permit authority so chooses, or if the circumstances dictate, the authority may decide to develop and impose a permit limit for WET or individual toxicants without facility-specific effluent monitoring data. WQBELs can be set for a single parameter or WET based on the available dilution and the water quality criterion or State standard in the absence of facility-specific effluent monitoring data. In justification of a limit, EPA recommends that the more information the authority can acquire to support the limit, the better a position the authority will be in to defend the limit if necessary. In such a case, the regulatory authority may well benefit from the collection of effluent monitoring data prior to establishing the limit.

If the regulatory authority, after evaluating all available information on the effluent, in the absence of effluent monitoring data, 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 criterion for WET or for individual toxicants, the authority should require WET or chemical-specific testing to gather further evidence. In such a case, the regulatory authority can require the monitoring prior to permit issuance, if sufficient time exists, or it may require the testing as a condition of the issued (reissued) permit.

Under such circumstances, the permit authority may include a permit reopener allowing for the imposition of an effluent limit if the effluent testing establishes that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a water quality criterion.

### **6.3.3     *Uncertainty in Effluent Characterization by Generating Effluent Monitoring Data Using Statistics***

All toxic effects testing and exposure assessment parameters, for both effluent toxicity and individual chemicals, have some degree of uncertainty. The fewer the pieces of effluent data available, the greater the uncertainty of the data. For example, if a regulatory authority has only one piece of effluent data (i.e., an LC50 of 50%) for a facility, uncertainty results because of limited monitoring data. Effluent variability in such a case, given the range of effluent toxicity variability seen in other effluents, may range between 20 percent to 100 percent (see Appendix A in the TSD). It is impossible to determine from one piece of monitoring data where in this range the effluent variability really falls. More monitoring data would be needed to determine the actual variability of this effluent and reduce this source of uncertainty.

To better characterize the effects of effluent variability and to reduce uncertainty in the process of deciding whether to require an effluent limit, EPA has developed a statistical approach, which is discussed in Chapter 3 of the TSD. This approach combines knowledge of effluent variability with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. This projected maximum concentration, after considering dilution, can then be compared to an appropriate water quality criterion to determine the potential for exceeding that criterion and the need for an effluent limit.

## **6.4     PROCEDURES FOR SETTING WATER QUALITY-BASED LIMITS**

### **6.4.1     *Waste Load Allocation and Exposure Assessment***

The difficulty of setting WQBELs is further complicated where water quality in a water body is affected by more than one discharger and the burden of effluent reduction must be

allocated among the various dischargers. The first step in this process is to establish waste load allocations to determine the total maximum daily load (TMDL) of discharges to a waterbody.

A TMDL is the sum of the individual pollutant allocations from point sources, nonpoint sources, and natural background sources, complemented by a margin of safety. The TMDL process uses water quality analyses to predict water quality conditions and pollutant concentrations. Point source wasteload allocations (WLAs) and nonpoint source load allocations (LA) are established so that predicted receiving water concentrations do not exceed water quality criteria. TMDLs and WLAs or LAs should be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards, with seasonal variations and a margin of safety that account for any lack of knowledge concerning the relationship between point and nonpoint source loadings and water quality.

Before calculating a water quality-based effluent limit, the permit writer must determine the WLA for the point source involved. A WLA is the fraction of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.

An exposure assessment is the method used to determine the appropriate WLA. The water quality model is the primary tool used by regulatory agencies in conducting an exposure assessment to determine a WLA. Models establish a quantitative relationship between a particular waste load and its impact on water quality. Modeling is usually conducted by a specialized work group within the regulatory agency; however, it is important that the permit writer understand this process. The permit writer will use the end result of the model (i.e., the WLA) to derive a water quality-based permit limitation.

Two major types of water quality models are used to conduct an exposure assessment: steady-state and dynamic. The selection of the model depends on the characteristics of the receiving water, the availability of effluent data, and the level of sophistication desired. The minimum data required for model input include receiving water flow, effluent flow, effluent concentrations, and background concentrations.

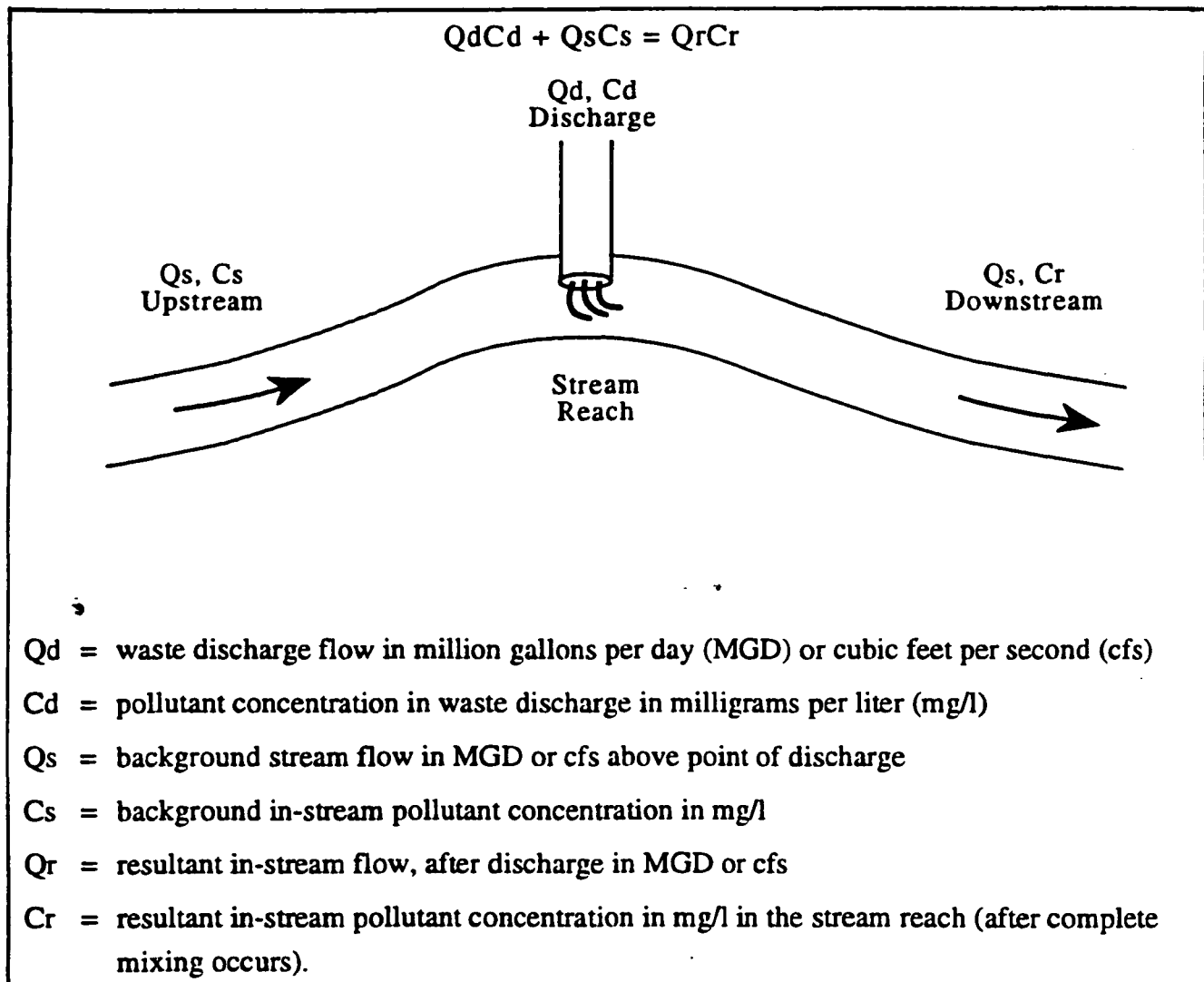
#### **6.4.1.1 Steady-State Models**

If only a few toxicant or effluent toxicity measurements are available or if a daily receiving water flow record is not available, steady-state assessments should be used. Single-value or two-value steady-state WLA models calculate WLAs at critical conditions, which are usually combinations of worst-case assumptions of flow, effluent, and environmental effects. For

example, a steady-state model for ammonia considers the maximum effluent discharge to occur on the day of the lowest river flow, highest upstream concentration, highest pH, and highest temperature. Permit limits derived from a steady-state model will be protective of water quality standards at the critical conditions and for all environmental conditions less than critical.

Steady-state modeling involves the application of a mass-balance equation, which allows the analyst to equate the mass of pollutants upstream of a given point (generally at a pollutant discharge, tributary stream, or lateral inflow) to the mass of pollutants downstream after complete mixing. Using the simplified diagram in Exhibit 6-1, the general formula for the mass-balance model is as follows:

#### EXHIBIT 6-1: MASS BALANCE WATER QUALITY CALCULATIONS



The equation can be rearranged as follows to determine the downstream effect of a particular discharge concentration:

$$C_r = \frac{(Q_d \times C_d) + (Q_s \times C_s)}{Q_r}$$

The equation can be further rearranged to determine the permit limit necessary to achieve a given in-stream concentration, such as a water quality standard:

$$C_d = \frac{C_r (Q_d + Q_s) - (C_s \times Q_s)}{Q_d}$$

For example, assume a stream has a flow of 1.2 cfs and a background zinc concentration of 0.80 mg/l. The State standards for zinc are 1.0 mg/l or less. The allowable zinc discharge with a flow of 0.2 MGD is:

$$0.2 \text{ MGD} = 0.31 \text{ cfs}$$

$$C_d = \frac{(1.0)(0.31 + 1.2) - (0.80)(1.2)}{0.31} = \frac{1.51 - 0.96}{0.31} = \frac{0.55}{0.31}$$

$$C_d = \underline{1.75 \text{ mg / l}}$$

A one-value or two-value steady-state approach can be used. EPA is encouraging the States to adopt two-numbered aquatic life water quality criteria to protect against acute and chronic effects and is using them in WLA studies. Steady-state WLA models should be used to calculate the allowable effluent load that will meet the criteria maximum concentration at the 1Q10 (1-day low flow over a 10-year period) acute design flow and the criteria continuous concentration at the 7Q10 (7-day low flow over a 10-year period) chronic design flow. Steady state WLA analyses should be used in most cases.

#### 6.4.1.2 Dynamic Models

If adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, one of the dynamic (i.e., probabilistic) modeling techniques should be used to develop more cost-effective treatments. In general, dynamic models account for the daily variations of and relationships between flow, effluent, and environmental conditions and, therefore, directly determine the actual probability that a water quality standard exceedance will

occur. The three dynamic modeling techniques recommended by EPA are continuous simulation, Monte Carlo simulation, and lognormal probability modeling. These methods calculate a probability distribution for receiving water concentrations rather than a single, worst-case concentration based on critical conditions.

Chapter 4 of the TSD describes steady-state and dynamic models in detail and includes specific model recommendations for toxicity and individual toxicants for each type of receiving water—rivers, lakes, and estuaries. In addition, EPA has issued detailed guidelines on the use of fate and transport models of individual toxicants in the TMDL guidance available through the Office of Wetlands, Oceans, and Watersheds. These manuals describe in detail the transport and transformation processes involved in water quality modeling.

#### **6.4.2    *Development of WQBELs From WLAs***

WLAs are the outputs of water quality models, and the requirements of a WLA must be translated into a permit limit. The objective of the permit writer is to derive permit limits that are fully enforceable, adequately account for effluent variability, consider available receiving water dilution, protect against acute and chronic impacts, account for compliance monitoring sampling frequency, and protect the WLA and ultimately water quality standards. To accomplish these objectives, EPA recommends that permitting authorities use the statistical permit limit derivation procedure discussed in Chapter 5 of the TSD with outputs from either steady-state or dynamic models. EPA believes this procedure will result in the most defensible and protective water quality-based permit limits for both specific chemicals and WET.

The NPDES regulations at 40 CFR 122.45(d) require that all permit limits be expressed, unless impracticable, as both average monthly and maximum daily values for all discharges other than publicly owned treatment works (POTWs) and as average weekly and average monthly limits for POTWs. The maximum daily limit (MDL) is the highest allowable discharge measured during a calendar day or 24-hour period representing a calendar day. The average monthly permit limit (AML) is the highest allowable value for the average of daily discharges obtained over a calendar month. The average weekly permit limit is the highest allowable value for the average of daily discharges obtained over a calendar week.

The objective is to establish permit limits that result in the effluent meeting the WLA under normal operating conditions virtually all the time. It is not possible to guarantee, using permit limits, that a WLA will never be exceeded. It is possible, however, using the recommended permit limit derivation procedures, to account for extreme values and to establish low

probabilities of exceedance of the WLA in conformance with the duration and frequency requirements of the water quality standards. This is not to suggest that permit writers should assume a probability of exceedance of the WLA but, rather, that they should develop limits that will make an exceedance a very small likelihood.

Since effluents are variable and permit limits are developed based on a low probability of exceedance, the permit limits should consider effluent variability and ensure that the requisite loading from the WLA is not exceeded under normal conditions. In effect then, the limits must force treatment plant performance, which, after considering acceptable effluent variability, will only have a low statistical probability of exceeding the WLA and will achieve the desired loadings.

A permit limit depends on the type of WLA. A number of WLAs have two results: acute and chronic requirements. These types of allocations will be developed more often as States begin to adopt water quality standards that provide both acute and chronic protection for aquatic life. These WLA outputs need to be translated into MDLs and AMLs. The acute and chronic WLA can be achieved for either specific chemicals or WET by using the following methodology to derive permit limits:

- A treatment performance level (a long term average or LTA and a coefficient of variation or CV) is established that will allow the effluent to meet the WLA requirement calculated.
- For WET only, the acute WLA is converted into an equivalent chronic WLA by multiplying the acute WLA by an ACR.
- Permit limits are then derived directly from whichever performance level is more protective.

This procedure provides a toxicologically sound approach. To help the permit writer, EPA has developed tables (see Table 5-1 and 5-2 in Chapter 5 of the TSD) to quickly determine the values necessary to translate a WLA into a permit limit. In addition, some permit authorities have developed their own computer programs to readily compute the necessary information from the appropriate inputs.

## 7. SPECIAL TOPICS

Special permitting topics, storm water permitting and municipal sewage sludge permitting, also warrant discussion in this document. These special topics are discussed separately because of their possibility of being permitted under a number of different permitting mechanisms.

Under the storm water program, storm water may be permitted as part of an existing individual permit. Under other conditions, a permit solely regulating storm water may be needed. This includes cases where facilities do not discharge process water or discharge process water to publicly owned treatment works (POTWs) or where facilities opt to be covered under a group-specific or baseline general permit rather than an individual permit.

POTWs that generate sewage sludge may have sewage sludge conditions incorporated into existing National Pollutant Discharge Elimination System (NPDES) permits, which already authorize the discharge of treatment plant effluent to receiving water(s). However, because the sludge program requires that States receive authorization, the U.S. Environmental Protection Agency (EPA) may be obligated to issue a sludge use and disposal permit separately from the existing NPDES permit authorizing wastewater discharges. Additionally, in arid areas where effluent may not be discharged, separate sludge use and disposal permits may be needed.

This chapter discusses the intricacies involved with the storm water and municipal sewage sludge permitting programs.

### 7.1 STORM WATER CONSIDERATIONS

Pollutants in storm water discharges come from many sources and are largely uncontrolled. *The National Water Quality Inventory, 1990 Report to Congress* provides a general assessment of water quality based on biennial reports submitted by the States under Section 305(b) of the Clean Water Act (CWA). The report indicated that roughly 30 percent of identified cases of water quality impairment reported by the States are attributable to point source discharges of storm water.

The results of the Nationwide Urban Runoff Program (NURP) demonstrated that commercial and residential areas can contribute a substantial quantity and diversity of pollutants to storm water runoff. Some of the most commonly observed pollutants included biochemical oxygen demand, total suspended solids, copper, cadmium, zinc, lead, nutrients, and a variety of pesticides and herbicides. The NURP study excluded the contribution of pollutants to storm



water runoff from industrial activities. However, these activities are known contributors of pollutants to storm water runoff from such sources as exposed raw materials, material handling operations, improper dumping and spills, illicit connections to the storm sewer system, and waste disposal practices. It is anticipated that the effective prohibition of illicit connections to storm sewer systems, as required by 40 *Code of Federal Regulations* (CFR) 122.26, presents one of the largest opportunities for dramatic improvement in the quality of storm water discharges.

In the November 16, 1990, *Federal Register*, EPA identified certain municipalities and industrial activities that were required to obtain an NPDES storm water permit. The remainder of this section addresses the permit storm water application requirements and ongoing permitting efforts.

### **7.1.1 Storm Water Permit Applications**

#### **7.1.1.1 Facilities Required to Apply**

In the 1987 Amendments to the CWA, Congress established that EPA or States must require permit applications by October 1, 1992, from dischargers of storm water point sources from the following:

- A discharge of storm water associated with industrial activity
- A discharge from a municipal separate storm sewer system serving a population of 250,000 or more
- A discharge from a municipal separate storm sewer system serving a population greater than 100,000 but less than 250,000
- A discharge for which the Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

Activities that do not meet the above criteria are not required to submit storm water permit applications by October 1, 1992. After October 1, 1992, however, these activities may be subject to coverage under Phase II of the storm water program.

The term storm water discharge associated with industrial activity is defined as the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. The November 16, 1990, *Federal Register* identified the following 11 industrial categories that were required to seek a storm water permit:

- Facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N
- Certain heavy manufacturing facilities (lumber, paper, chemicals, petroleum refining, leather tanning, stone, clay, glass, concrete, ship construction)
- Active and inactive mining operations and oil and gas operations with contaminated storm water
- Hazardous waste treatment, storage, or disposal facilities, including Resource Conservation and Recovery Act (RCRA) Subtitle C facilities
- Landfills, open dumps, and RCRA Subtitle D facilities
- Recycling facilities, including metal scrapyards, battery reclaimers, salvage yards, and automotive junkyards
- Steam electric power generating facilities, including coal handling sites
- Transportation facilities that have vehicle maintenance shops, equipment cleaning operations, or airport de-icing operations
- Major POTW sludge handling facilities, including onsite application of sewage sludge.
- Construction activities that disturb five acres or more
- Certain light industrial manufacturing facilities (category XI also includes an exemption for facilities with no exposure of pollutants to runoff).

The November 16, 1990, *Federal Register* also identified 172 cities and 47 counties that are required, based on the results of the 1980 Census to apply for a storm water permit. EPA established the following definitions for large and medium municipal separate storm sewer systems:

- A large municipal separate storm sewer system is a separate storm sewer system serving an incorporated city or unincorporated, urbanized county with a population greater than 250,000
- A medium municipal separate storm sewer system is a separate storm sewer system serving an incorporated city or unincorporated, urbanized county with a population greater than 100,000 but less than 250,000.

The 1987 Amendments to the CWA provided that the Administrator or States may designate specific storm water discharges that contribute to the violation of water quality standards or are significant contributors of pollutants. This could include small municipal separate storm sewer systems interconnected with a large or medium separate storm sewer system or certain industrial activities not covered under the definition of discharges of storm water associated with industrial activity. Ultimately, this allows for significant flexibility in requiring the submission of storm water permit applications by facilities of concern.

### **7.1.1.2 Permit Application Requirements** ***Industrial Activities***

The regulations set forth in 40 CFR Part 126 establish the following three permit application options for industrial activities:

- Individual applications
- Group applications
- Notice of Intent (NOI) to be covered under a general permit.

Facilities with storm water discharges associated with industrial activity may submit an individual permit application. If a facility elects this option, it is required to complete a Form 1 and Form 2F. The Form 2F requirements include a topographic map, estimates of impervious surfaces, descriptions of material management practices and control measures, a certification that separate storm water outfalls have been evaluated for non-storm water discharges, descriptions of past leaks and spills, and analytical data for several specified parameters. The submission of an individual application must be accompanied by sampling data for a representative storm event from all sewer outfalls. When an applicant has two or more outfalls with substantially identical effluents or discharges, the permitting authority may allow the applicant to test only one outfall and to report that the quantitative data also apply to substantially identical outfalls.

Construction operations with discharges of storm water associated with industrial activity and that opt to apply for an individual permit are not required to submit a Form 2F. Alternatively, construction activities are required to provide a description of the construction activity, the total area of the site and the area to be excavated or disturbed under the permit application, proposed measures to control pollutants in storm water discharges during and after construction operations, an estimate of the runoff coefficient, the estimated increase in impervious area after construction, and the name of the receiving water. Unlike other industrial activities, construction activities are not required to submit sampling data with their individual applications.

Certain facilities that discharge storm water associated with industrial activity have the option of participating in group permit applications. In order for these facilities to participate in a group application, each must demonstrate that they are substantially similar. EPA approves group applicants largely based on factors established in 40 CFR 122.28 governing the development of general permits (see Section 1.4.4 of this manual).

Group applicants are required to select a subset of its members that will collect and submit quantitative data from a representative storm event. The number of samplers is based on the total number of members participating in the group application process and the number of samplers breakdown as follows:

- Four to 20 members: Minimum of 50 percent of participating facilities
- Twenty-one to 99 members: Minimum of 10 participating facilities
- One hundred to 1,000 members: Minimum of 10 percent of participating facilities
- More than 1,000 members: No more than 100 participating facilities.

In the April 2, 1992, *Federal Register* (57 FR 11394), EPA provided regulations establishing a final permit application option—submitting an NOI to be covered under a general permit. These regulations mandated that NOI requirements be specified in the general permit and that specific information, including the legal name and address of the owner or operator, the facility name and address, type of facility or discharges, and the receiving stream(s), be submitted and signed in accordance with 40 CFR 122.22.

Certain industrial activities cannot be covered under a general permit, including the following:

- Storm water discharges that are subject to storm water effluent guidelines
- Any industrial facilities with current or existing NPDES permits for storm water discharges (these facilities may seek coverage under a general permit when their existing NPDES permit expires)
- In general, storm water discharges that are mixed with non-storm water discharges, such as process wastewater
- Storm water discharges that may be contributing to violation of a water quality standard.

Although all three permit application options have been provided in the Federal regulations, State regulations may be more stringent and, thus, not provide for all three permit application options. Permit writers should be aware of State-specific requirements pertaining to group permit applications and NOI guidelines to ensure compliance with their regulatory framework.

### ***Municipal Separate Storm Sewer Systems***

The November 16, 1990, *Federal Register* established a two-part application process for storm water discharges from large and medium municipal separate storm sewer systems. The following information summarizes the key requirements of Parts 1 and 2:

- Part 1 of the application must include:
  - General information (e.g., name, address)
  - Existing legal authorities and any additional authority required
  - Source identification information
  - Discharge characterization, including results of dry weather flow screening
  - Identification of representative 5 to 10 outfalls for storm water sampling
  - Description of existing storm water management programs
  - Descriptions of existing financial budget and resources available to complete Part 2 of the application.
- Part 2 of the application must include:
  - Demonstration of adequate legal authority
  - Identification of any major storm sewer outfalls
  - Discharge characterization data from sampling three representative storm events
  - Proposed storm water management program
  - Assessment of controls, including expected reductions in pollutant loadings
  - Fiscal analysis, and capital and operation and maintenance expenditures for each year of the permit.

#### **7.1.1.3 Permit Application Deadlines**

Exhibit 7-1 summarizes permit application deadlines for both municipal separate storm sewer systems and industrial activities.

#### **7.1.2 Permitting Activities**

On September 9, 1992, EPA published two baseline general permits. These permits covered discharges of storm water associated with industrial activity from construction activities and discharges of storm water associated with industrial activity from other industrial activities. EPA's baseline general permits were intended to provide coverage to States that currently do not possess NPDES authority, as well as provide States having general permit authority with example language. These baseline permits comply with EPA's long-term storm water management program, which establishes four tiers of permitting in order of priority: baseline permitting, watershed permitting, industry-specific permitting, and facility-specific (individual) permitting.

**EXHIBIT 7-1: PERMIT APPLICATION DEADLINES**

Category	Type of Application	Deadline	
Storm Water Associated With Industrial Activity	• Individual	October 1, 1992	
	• Group	<u>Part 1</u>	<u>Part 2</u>
	– All industrial activities except those owned or operated by a municipality with a population less than 250,000	September 30, 1991	October 1, 1992
	– Industrial activities owned or operated by a municipality with a population greater than 100,000 but less than 250,000	May 18, 1992	May 17, 1993
	• General Permit	October 1, 1992	
Municipal Separate Storm Sewer Systems	• Large Municipalities • Medium Municipalities	<u>Part 1</u>	<u>Part 2</u>
		November 18, 1991 May 18, 1992	November 16, 1992 May 17, 1993

These baseline general permits rely on the development and implementation of site-specific storm water pollution prevention plans as the primary means of controlling pollution. EPA believes that site-specific storm water pollution prevention plans allow for the selection of control measures best suited for controlling pollution at a particular industrial facility.

EPA is currently drafting industry-specific general permits that reflect conditions applicable to facilities submitting group permit applications. As they become available, these draft permits will be provided to State and EPA Regional permitting authorities for use in drafting industry-specific general permits.

## 7.2 MUNICIPAL SEWAGE SLUDGE

Section 405 of the CWA requires that EPA regulate disposal of sewage sludge to protect public health and the environment from any reasonably anticipated adverse effects of these practices. In the CWA, Congress directs EPA to develop technical standards for municipal sludge use and disposal options and to incorporate these standards into NPDES permits issued to POTWs. These standards are set out in 40 CFR Part 503. Congress also enacted strict deadlines for compliance with these standards; within 1 year of promulgation of the standards, compliance is required unless construction of new pollution control facilities is necessary, in which case compliance is required within 2 years.

The regulations establish requirements for the use and disposal of municipal sludge when land applied, placed in surface disposal sites, or incinerated. The standards for each end use and disposal method consist of numeric pollutant limits, management practices, and other requirements that protect human health and the environment. For example, a good management practice would be prohibiting the land application of sludge within a certain distance from a stream. Proposed standards are set for as many as 28 different organic and inorganic pollutants, such as polychlorinated biphenyls (PCBs) and cadmium. Unlike technology standards based on the ability of treatment technologies to reduce the level of pollutants, EPA's sewage sludge standards are based on health and environmental risks.

#### **7.2.1 Sewage Sludge Conditions in NPDES Permits**

To provide a mechanism for including the technical standards in permits, EPA promulgated regulations designed to incorporate sewage sludge use and disposal requirements into permits as required under Section 405(d) of the CWA. On May 2, 1989 (published at 54 FR 18716), EPA issued final revisions to the regulations contained in 40 CFR Parts 122 and 124 that identify permit requirements under Section 402 of the CWA. These regulations require inclusion of sludge conditions in NPDES permits issued to municipal sewage treatment works. The regulations also authorize issuance of permits to facilities that do not discharge wastewater under the NPDES program.

EPA also promulgated regulations for State sludge management programs in 40 CFR Parts 501 and 123 (see 54 FR 18716). These regulations specify procedures for States to receive authorization to implement sludge management programs in lieu of the Federal program. Like the NPDES base program, to receive program approval, a State must demonstrate adequate legal authority and administrative procedures to issue permits and determine compliance with and enforce Federal and State sewage sludge regulations and requirements.

Three boilerplate conditions must be written in the permit: (1) language requiring the POTW to comply with all existing requirements for sludge use and disposal, including the technical standards when they are promulgated, (2) a reopener clause, which authorizes reopening a permit to include technical standards if the technical standards are more stringent or more comprehensive than the conditions in the permit, (3) a notification provision requiring the permittee to give notice to the permitting authority when a significant change in the sludge use or disposal practice occurs (or is planned).

Some standard permit conditions that apply to effluent discharges will also apply to sludge use and disposal (e.g., duty of proper operation and maintenance; entry and inspection duties.)

EPA suggests the following monitoring conditions for sludge permits:

- Class 1
  - Annual Priority Pollutant Scan
- Non-Class 1/Industry
  - Priority Scan at Application
  - Annual 503 Scan
- Non-Class 1 Industry
  - Annual monitoring of six metals: cadmium, copper, chromium, lead, nickel, and zinc

In addition to the CWA, several other Federal laws provide authority for regulating various aspects of sewage sludge disposal. These include the Clean Air Act; Subtitles C and D of RCRA; the Marine Protection, Research, and Sanctuaries Act; and the Toxic Substances Control Act (TSCA). POTWs are already under obligation to comply with existing Federal regulations. Nevertheless, placing the regulations in a POTW's NPDES permit reinforces the importance of compliance for purposes of the CWA and helps to ensure that sludge disposal practices will not threaten public health and the environment. It also provides a more direct link to pretreatment controls, which are an important means of improving sludge quality (i.e., the sludge requirements may force some POTWS to develop more stringent local limits). Exhibit 7-2 lists current Federal regulations that directly apply to sludge use and disposal. Permit writers should consult with personnel responsible for implementing these programs to see if NPDES permit conditions aimed at improving sludge quality and disposal practices would help ensure compliance with the existing requirements.

#### **7.2.1.1 Establishment of Sewage Sludge Requirements on a Case-by-Case Basis**

If permit conditions based on existing regulations are insufficient to protect public health and the environment from adverse effects that may occur from toxic pollutants in sewage sludge, permit conditions should be developed on a case-by-case basis using Best Professional Judgment (BPJ) to fulfill the statutory standard.



**· EXHIBIT 7-2: EPA REGULATIONS FOR SLUDGE MANAGEMENT**

Coverage	Reference	Application
PCBs	40 CFR Part 761	All sludges containing more than 50 milligrams per kilogram
New Sources of Air Emissions	40 CFR Part 60	Incineration of sludge at rates above 1,000 kilograms per day
Air Emissions	40 CFR Part 52	State Implementation Plans (SIPs) which may also regulate certain parameters
NESHAPS* Mercury and Beryllium	40 CFR Part 61	Incineration and heat drying of sludge
Co-disposal with municipal wastes	40 CFR Part 258	Land application and surface disposal
Toxicity Characteristics Leachate Procedure	55 FR 11290	Defines whether sludges are hazardous
Municipal Solid Waste Land Fill	40 CFR Part 258	Regulates municipal solid waste landfills
Land Application, Surface Disposal, Incineration	40 CFR 503	Sewage sludge only

\*NESHAPS-National Emission Standards for Hazardous Air Pollutants

Using BPJ to develop sludge requirements follows the same general principles for developing BPT effluent limits in NPDES permits. Permit conditions developed using BPJ are based on the sound technical opinion of the permit writer after consideration of all reasonably available pertinent data or information. This may include such information as Federal, Regional, State, and local regulations or guidance. Exhibit 7-3 lists pollutants known to be subject to State or Federal regulations or suggested to be regulated pursuant to guidance.

It is important to note that permit writers are not restricted to addressing these pollutants when writing BPJ limits. If a particular pollutant is causing or threatening to cause a disposal problem, the permit writer may establish a limit for the parameter in the permit. As a general rule, pollutants of concern (i.e., those which exceed or potentially exceed the level appropriate to protect public health and the environment), whether addressed in Federal or State guidance or regulations, should be limited in the permit.

**EXHIBIT 7-3: POLLUTANTS ADDRESSED IN STATE OR FEDERAL GUIDANCE**

Pollutant	State Regulation	Federal Guidance	State Requirements	Part 503 Proposed
Aldrin			X	X
Aluminum			X	
Arsenic	X <sup>4</sup>	X <sup>5</sup>	X	X
Barium		X <sup>5</sup>	X	
Benzene			X	X
Benzo(a)pyrene				X
Beryllium	X <sup>6</sup>		X	X
Bis(2 ethylhexyl)phthalate				X
Boron			X	
Cadmium	X <sup>4,9</sup>	X <sup>5</sup>	X	X
Carbon Monoxide	X <sup>8</sup>		X	
Chlordane			X	X
Chlorine		X <sup>1</sup>		
Chromium	X <sup>4</sup>	X <sup>5</sup>	X	X
Cobalt			X	
Copper	X <sup>4</sup>	X	X	X
Cyanide		X <sup>3</sup>	X <sup>3</sup>	
2,4-D		X <sup>5</sup>		
DDD/DDE/DDT		X	X	X
Dieldrin		X	X	X
Dimethylnitrosamine				X
Dioxin			X	X
Endrin		X <sup>5</sup>	X	
Fluoride		X <sup>5</sup>	X	
Heptachlor			X	X
Heptachlor Epoxide			X	
Iron		X <sup>2</sup>		
Lead		X,X <sup>5</sup>	X	X
Lindane		X <sup>5</sup>	X	X
Lithium			X	
Manganese			X	
Mercury	X <sup>6</sup>	X,X <sup>5</sup>	X	X
Methoxychlor		X <sup>5</sup>	X	
Mirex			X	
Molybdenum			X	X
Nickel	X <sup>4</sup>	X	X	X
Nitrogen Compounds	X <sup>8</sup>	X <sup>2</sup>	X	
Nitrates		X <sup>5</sup>		
Oil & Grease			X	
Organics			X	

**EXHIBIT 7-4: POLLUTANTS ADDRESSED IN STATE OR FEDERAL GUIDANCE  
(CONTINUED)**

Pollutant	State Regulation	Federal Guidance	State Requirements	Part 503 Proposed
Phenols			X	
Pesticides			X	
Phosphorous		X <sup>2</sup>	X	
Potassium			X	
PCBs	X <sup>7,9</sup>	X	X	X
Radium		X, X <sup>5</sup>	X	
Radon		X	X	
Selenium	X <sup>4</sup>	X <sup>5</sup>	X	X
Silver		X <sup>5</sup>	X	
Silvex		X <sup>5</sup>		
Sodium			X <sup>3</sup>	
Total Hydrocarbons				X
Total Organic Carbon		X <sup>1</sup>		
Toxaphene		X <sup>5</sup>		
Trichloroethylene				X
Uranium		X	X	
Vinyl Chloride			X	X
Zinc	X <sup>4</sup>	X	X	X

\* In addition, pathogen reduction standards will apply to land application and to distribution and marketing. See 40 CFR Part 257, Appendix II.

- 1 *Process Design Manual for Municipal Sludge Landfills* (EPA 1978) recommended monitoring for these parameters at landfills.
- 2 *Process Design Manual for Land Application of Municipal Sludge* (EPA 1983) recommends monitoring for these parameters at land application sites.
- 3 State monitoring and reporting requirements for sludge and compost (EPA 1987).
- 4 Final revisions to the New Source Performance Standards for Sewage Sludge Incinerators (40 CFR 60.150 [53 FR 39412]) require initial testing for these metals.
- 5 Maximum Groundwater Contaminant Limits from 40 CFR Part 257 are found in Appendix C of Part 257. Appendix C of Part 257 also provides maximum contaminant limits for coliform bacteria, radium-226, and gross alpha radiation.
- 6 NESHAP (40 CFR Part 61).
- 7 Sewage sludge containing more than 50 mg/kg PCBs must comply with TSCA (40 CFR Part 761).
- 8 National Ambient Air Quality Standards (40 CFR Part 50).
- 9 40 CFR Part 257.

EPA's *Guidance for Writing Case-By-Case Permit Requirements for Municipal Sewage Sludge* contains information to assist permit writers in developing contaminant limits and management practice requirements on a case-by-case basis to protect public health and the environment from adverse effects that may occur from toxic pollutants in sewage sludge.

Generally, EPA permit writers should also include any applicable State requirements, unless they are less stringent than what is required by federal regulation (since federal requirements must be included as a minimum). This will help minimize disruption to existing State programs. Again, the permit writer should use best professional judgment in applying State requirements and recommendations. While incorporation of State requirements would be appropriate in most cases, permit writers should do as much as possible to ensure that the requirements adopted can be reasonably defended.

## **8. ADMINISTRATIVE PROCEDURES**

Chapter 3, supplemented by the industry- and municipal-specific National Pollutant Discharge Elimination System (NPDES) permit considerations provided in Chapters 4 and 5 and the water quality-based considerations specified in Chapter 6, discussed the process involved in the development of a permit. However, the following tasks, among others, which must be accomplished prior to the permit becoming effective:

- Supporting the permit development through documentation
- Providing public notice, conducting hearings if appropriate, and responding to comments prior to permit issuance
- Defending the permit and, if appropriate, modifying the permit after permit issuance.

This chapter focuses on these activities.

### **8.1 DOCUMENTATION FOR DEVELOPMENT OF THE DRAFT PERMIT**

#### **8.1.1 *General Considerations***

The initial sections of Chapter 3 described the importance of documentation in the permit development process, including the importance of:

- Ensuring development of a thorough permit in a logical fashion
- Meeting legal requirements for preparation of an administrative record, fact sheet, and statement of basis
- Helping to substantiate permit decisions where challenges are made to the derivation of permit terms, conditions, and limitations
- Explaining the permit's basis for use in future permit actions.

The following sections describe the requirements pertaining to the development of permit documentation, particularly the administrative record and the fact sheet.

#### **8.1.2 *Administrative Record***

The administrative record is the foundation for issuing permits. If the U.S. Environmental Protection Agency (EPA) is the issuer, the contents of the administrative record are prescribed by regulation (see 40 *Code of Federal Regulations* [CFR] 124.9 and 124.18). All supporting materials must be made available to the public, whether a State or EPA issues the permit. The importance of maintaining the permit records in a neat, orderly,

complete, and retrievable form cannot be over emphasized. The record allows personnel from the regulatory agency to reconstruct the justification for a given permit. It also must be made available to the public and may be examined during the public comment period and any subsequent public hearing.

The record for a draft permit consists, at a minimum, of certain specific documents, namely:

- The application and supporting data
- The draft permit
- The statement of basis or fact sheet
- All items cited in the statement of basis or fact sheet, including calculations used to derive the permit limits
- All other items in the supporting file
- For new sources, any environmental assessment, the draft/final environmental impact statement (EIS), or other such background information, such as a Findings of No Significant Impact.

Materials that are readily available in the issuing Regional office or published material that is generally available, does not need to be physically included with the record as long as it is specifically referred to in the fact sheet or statement of basis. If EPA issues new source draft permits, the administrative record requires including any EIS or environmental assessment.

The administrative record includes all meeting reports and correspondence with the applicant and correspondence with other regulatory agency personnel. In addition, trip reports and telephone memos are included in the record. These reports must be complete and clear. Standard report forms should be used when available. If the reports are fairly short, they can be handwritten provided they are neat and legible. This applies also to calculations and sketches. All correspondence, notes, and calculations should indicate the date and the name of the writer, as well as all other persons involved. Since correspondence is subject to public scrutiny, references or comments that do not serve an objective purpose should be avoided. Finally, when performing calculations or documenting decisions, they should be presented in such a way that they can be reconstructed and the logic supporting the decisions or calculation can be easily gleaned. It is actually better to be redundant in these cases. Decisions or calculations that are used as part of the development of the fact sheet or

statement of basis are very important because they may be needed to defend the permit if it is challenged.

The record for the final permit consists of the record for the draft permit, as well as copies of the following:

- 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.

#### **8.1.3 *Fact Sheet Development***

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 the permit is in the draft stage, the fact sheet and supporting documentation serve to explain to the permittee and the general public the rationale and assumptions used in deriving the limits. When the permit is issued, the fact sheet and supporting documentation (administrative record) are the primary support for defending the permit in administrative appeals and evidentiary hearings.

Both EPA and State-issued permits must be accompanied by a fact sheet if the permit (1) involves a major facility, (2) incorporates a variance, (3) is an NPDES general permit, or (4) is subject to widespread public interest (see 40 CFR 124.8). However, a prudent permit writer will develop a fact sheet for any permit that required complex calculations or special conditions. This will be particularly true for permit conditions based on best professional judgement (BPJ). EPA permit writers are required to prepare at least a statement of basis for all permits that do not merit the detail of a fact sheet. Such statements briefly describe the derivation of the effluent limits and the reasons for special conditions (see 40 CFR 124.7). The required contents of a fact sheet, as specified in 40 CFR 124.8 and 124.56 include the following:

- A brief description of the type of facility
- The type and quantity of wastes discharged

- For a prevention of significant deterioration (PSD) permit, the degree of increment consumption expected to result from operation of the facility
- A brief summary of the basis for the draft permit conditions
- Reasons why any requested variances do not appear justified
- A description of the procedures for reaching a final decision on the draft permit, including:
  - The dates of the public comment period and the address where comments will be received
  - Procedures for requesting a hearing
  - Any other public participation procedures
- Name and telephone number of person to contact for additional information
- Provisions satisfying the requirements of 40 CFR 124.56:
  - Explanation of derivation of effluent limitations
  - Explanation of any conditions applicable to toxic, internal waste streams, or indicator pollutants
  - A sketch or detailed description of the location of the discharge
  - For EPA issued permits, the requirements of any State certification.

#### **8.1.3.1 Requirements for the Development of a Fact Sheet**

The NPDES regulations set forth in 40 CFR 124.8(a) require that a fact sheet be prepared for major NPDES permits, NPDES permits that incorporate a variance, permits that require an explanation under 40 CFR 124.56(b) (toxic pollutants, internal waste stream, and indicator pollutants and for privately owned waste treatment facilities), NPDES general permits, and permits that the Director finds are the subject of widespread interest or that raise major issues.

With a well-documented rationale, much of the work in reissuing a permit in the future will be done. This will avoid any conjecture and guessing concerning the development of any conditions that are being carried forward from the expired permit to the next permit. This is also true if a modification is initiated during the life of the permit.

A permit rationale can be as short as 2 to 3 pages for a relatively simple permit or as long as 20 to 100 pages for an extremely complicated permit (e.g., several discharge points, BPJ determinations).

#### **8.1.3.2 Basis Portion of a Fact Sheet**

A detailed discussion of the development of limits for each pollutant should be included in the fact sheet. For each pollutant the following information should be included:



- Calculations and assumptions
  - Production
  - 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, Best Pollutant Control Conventional Technology (BCT), or Best Available Treatment Economically Achievable (BAT)
- The water quality standards or criteria used
- Whether any pollutants were indicators for other pollutants
- Citations to appropriate wasteload allocations studies, guidance documents, etc.

Occasionally, confidential or proprietary information will be required to establish permit limitations for a particular facility. In addition, production data for a facility not covered by a guideline may be required to draft permit limits. In such cases, the permittee may claim that such information is confidential and, therefore, should not appear in documents available to the public, such as the fact sheet. Such claims should be carefully evaluated in cooperation with the legal staff of the permitting authority in order to determine whether the confidentiality requirements under 40 CFR 122.7 apply.

Often, it is as important to keep a record of items that were not included in the draft permit, such as the following:

- Why was BPJ or effluent guidelines used instead of water quality-based limitations (i.e., were the limitations checked to see that water quality considerations did not govern the setting of permit limits)?
- Why was biomonitoring not included?
- Why were pollutants that were reported on Form 2C not specifically limited in the permit?
- Why is a previously limited pollutant no longer limited in the draft permit?

## **8.2 ITEMS TO ADDRESS PRIOR TO ISSUANCE OF A FINAL PERMIT**

### **8.2.1 *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 NPDES permit or of other significant actions with respect to a NPDES permit or permit application. The basic intent of this requirement is to ensure that permitting decisions are not made in a vacuum and that all interested parties have an opportunity to comment on significant agency actions with respect to a permit

application or a permit. The exact scope, required contents, and methods for effecting public notices may be found in 40 CFR 124.10.

#### **8.2.1.1 Actions That Must Receive Public Notice**

The following types of actions must receive public notice:

- Tentative denial of an NPDES permit application (not necessarily applicable to State programs)
- Preparation of a draft NPDES permit, including a proposal to terminate a permit
- Scheduling of a public hearing
- Granting of an evidentiary appeal of an EPA-issued permit under 40 CFR 124.74.

The permit writer should be primarily concerned with the first three items above. It is important to note that no public notice is required when a request for a permit modification, revocation, reissuance, or termination is denied.

#### **8.2.1.2 Scheduling of the Public Notice**

Public notice of the preparation of the draft permit (including a notice of intent to deny a permit application) must allow 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. State-issued permits will typically undergo public notice after EPA has reviewed and commented on the draft permit. In the special case of those EPA-issued permits that require an EIS, public notice is not given until after a draft EIS is issued.

#### **8.2.1.3 Methods Applicable to the Public Notice Process**

Public notice of the various NPDES-related activities that require the public notice process is given by several methods:

- Publication of a notice in daily or weekly newspaper within the area affected by the facility or activity. In addition, for permits issued by EPA, publication in the *Federal Register* is required.
- 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 is required to issue a Resource Conservation and Recovery Act, Underground Injection Control, Corps of Engineers, or PSD permit for the same facility
- All appropriate government authorities (e.g., sister agencies, U.S. Fish and Wildlife Services, National Marine Fisheries Service, neighboring states)
- Users identified in the permit application of a privately owned treatment works.

#### **8.2.1.4 Contents of the Public Notice**

A public notice should contain certain basic information, including the following:

- Name and address of the office processing the permit action
- Name and address of the permittee or applicant and, if different, of the facility regulated by the permit
- A brief description of the business conducted at the facility
- Name, address, and telephone number of a contact from whom interested persons can obtain additional information
- A brief description of the comment procedures required
- For EPA-issued permits, the location and availability of the administrative record
- Any additional information considered necessary.

#### **8.2.2 Public Comments**

Public notice of a draft permit elicits 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, those parties providing comments must submit all reasonable arguments and factual material in support of their positions. 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 (see Section 8.1). 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 defuse a potentially controversial situation by providing further explanation of permit terms and conditions. It is also good public relations to inform parties who provide public comments that their comments have been received and are being considered.

The regulatory 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 EPA-issued

permits) or at the same time a final permit is actually issued (in the case of State-issued permits). The response should incorporate the following elements:

- Changes in any of the provisions of the draft permit and the reasons for the changes
- Description and response to all significant comments on the draft permit raised during the public comment period or during any hearing.

#### **8.2.2.1 Reopening of the Public Comment Period**

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 may occur:

- A new draft permit is prepared
- A revised fact sheet or statement of basis is prepared
- 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.

#### **8.2.3 *Public Hearing***

##### **8.2.3.1 Conduct of Public Hearing**

A public hearing may be requested in writing by any interested party. The request 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 30-day 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.

##### **8.2.3.2 Public Notice of Public Hearing**

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). Scheduling a hearing automatically extends the comment period until at least the close of the hearing (40 CFR 124.12(c)).

The public notice of the hearing should contain the following information:

- Reference to the dates of any other public notices relating to the permit
- Date, time, and place of the hearing
- Brief description of the nature and purpose of the hearing, including the applicable rules and procedures.

#### **8.2.3.3 Contents of Public Hearing**

A presiding officer is responsible for the hearing's scheduling and orderly conduct. Anyone may submit written or oral comments concerning the draft permit at the hearing. The presiding officer should set reasonable time limits for oral statements. The public comment period may be extended by so stating during the hearing. It should be noted that a transcript or recording of the hearing must be available to interested persons.

#### **8.2.4 Issuance of Final Permit**

The final permit may be issued after the close of the public notice period and after State certification has been received (for permits issued by EPA). State certification involves the review and concurrence by States of the content of permits and is designed to ensure that State initiatives and policies are addressed in permits, as well as ensure consistency between State- and EPA-issued permits. 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)
- Any extensions or reopening of the comment period.

Final EPA permit decisions are effective immediately upon issuance unless comments 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). 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 after a final decision is reached (in the case of EPA).

Once the final permit has been issued, the issuing authority should integrate the permit limitations and any special conditions into the NPDES tracking system (i.e., the permit compliance system). This will ensure that the facility's performance will be tracked and the agency will be alerted to the need for corrective action in the event of violations of permit limitations, terms, or conditions.

### **8.3 ITEMS TO BE ADDRESSED AFTER FINAL PERMIT ISSUANCE**

#### **8.3.1 *Permit Appeals***

In the process of developing a draft permit and during the public notice period, the permit writer should carefully consider the legitimate concerns of the permittee as well as the concerns of any third party who may have an interest in the permit terms and conditions. However, 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 an interested party may choose to legally contest or appeal the NPDES permit.

Various mechanisms are available to resolve legal challenges to NPDES permits. In the case of EPA-issued permits, the administrative procedure involved is called an evidentiary hearing. Many NPDES States have similar administrative procedures designed to resolve challenges to the conditions of a permit. These procedures involve hearings presided over by an administrative law judge. For the sake of convenience, these hearings will hereafter be referred to as evidentiary hearings. They will naturally be known by different names in different States. However, permit writers will, from time-to-time, be involved in permit appeals and need to be concerned with the types of issues discussed in the following section.

##### **8.3.1.1 Role of the Permit Writer**

Aside from preparation of the administrative record and notices, the permit writer need not concern himself or herself with procedural matters relating to evidentiary hearings. All requests for evidentiary hearings are coordinated through the office of the EPA Regional Counsel or the appropriate State legal personnel. The permit writer's first involvement with the hearing process will come as a result of designation of the trial staff and his role will be limited to that of a witness and technical advisor to legal counsel.

The permit writer should not concern himself or herself with the legal defense of a permit or permit conditions, but should be familiar with those laws, regulations, and policies that may affect the permit. The permit writer should be thoroughly familiar with the technical basis for the permit conditions. For example, if the effluent limits are based on water quality requirements, the permit writer should thoroughly study any applicable basin plan or water quality simulation used to develop the effluent limits and be prepared to defend any assumptions inherent in the plan or simulation. If BPJ limits are based on proposed effluent guidelines, it will be necessary to carefully review not only the guidelines themselves but all applicable data, including the development document for the specific guidelines. The technical

defense of other BPJ requirements is much more difficult. The permit writer should be sure that (1) the information on which BPJ limits are based are unimpeachable, (2) the limits were derived from the data in a logical manner, in accordance with established procedures, and (3) the BPJ limits so derived are technically sound and meet BCT or BAT standards for economic reasonableness.

As technical advisor to legal counsel, the permit writer's most important function is to develop direct testimony in support of 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 EPA or the State agency withdraw those conditions.

The second most important advisory function of the permit writer is assisting counsel in the development of 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. If a question must be phrased in such a way that the witness could attempt lengthy explanations, counsel should be forewarned.

Finally, the permit writer should remember that in requesting an evidentiary hearing the permittee has declared an adversary 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 witness and/or technical advisor, 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
- Always maintain good communication with counsel.

### **8.3.2 *Permit Modification, Revocation, and Transfer***

After the final permit is issued, the permit may still need to be modified or revoked prior to the expiration date. 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. A permit modification may be triggered in several ways. For example, a representative of the regulatory agency may conduct an inspection of the facility, that

indicates 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 request that a permit modification be made.

There are two classifications of modifications: major and minor. From a procedural standpoint, they differ primarily with respect to the public notice requirement. Major modifications require public notice; minor modifications do not.

#### **8.3.2.1 Major Modifications**

Virtually all modifications that result in less stringent conditions must be treated as a major modification, with provisions for public notice and comment. Generally speaking, a permit will not be modified during the term of the permit if the facility is in full compliance with permit conditions. Conditions that would necessitate a major modification of a permit are described in 40 CFR 122.62 and include the following:

- ***Alterations***—When alterations or changes in operations occur that justify new conditions that are different from the existing permit.
- ***Information***—When information is received that was not available at the time of permit issuance.
- ***New Regulations***—When standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision.
- ***Compliance Schedules***—When good cause for modification of a compliance schedule exists, such as an Act of God, strike, or flood.
- ***Variance Requests***—When requests for variances, net effluent limitations, pretreatment, etc., are filed within the specified time but not granted until after permit issuance.
- ***Reopener***—Conditions in the permit that required 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) and (h).
- ***Pretreatment***—To require that an approved program be implemented 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 discharge 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 that are not limited in the permit but must be reported if concentrations in the discharge exceed these levels.
- ***Technical Mistakes***—To correct technical mistakes or mistaken interpretations of law made in developing the permit conditions.
- ***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.
- ***Failed BPJ Compliance***—When BPJ technology is installed and properly operated and maintained but the permittee is unable to meet its limits, the limits may be reduced to reflect actual removal; but in no case may they be less than the guideline limits. If BPJ operation and maintenance costs are totally disproportionate to the costs considered in a subsequent guideline, the permittee may be allowed to backslide to the guideline limits.

#### **8.3.2.2 Minor Modifications**

Minor modifications are generally non-substantive changes (e.g., typographical errors that require more stringent permit conditions). The conditions for minor modification, described in 40 CFR 122.63, are summarized as follows:

- To correct typographical errors
- To require more frequent monitoring or reporting
- To change 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
- To allow for a change in ownership when no other change is necessary
- To allow for a change in the construction schedule for a new source discharger
- To allow for the deletion of a point source outfall that does not result in the discharge of pollutants from other outfalls except in accordance with permit limits.

#### **8.3.2.3 Termination of Permits**

Situations may arise during the life of the permit that are cause for termination (i.e., cancellation) of the permit. Such circumstances include the following (see 40 CFR 122.62(b)):

- Noncompliance by the permittee with any condition of the permit
- Misrepresentation or omission of relevant facts by the permittee
- A determination that the permitted activity endangers human health or the environment

- A temporary or permanent reduction or elimination of a discharge (e.g., plant closure)
- Notification of a proposed transfer of a permit.

Once the permit is terminated, it can be placed into effect again only by the reissuance process, which requires a new permit application. All of the above situations may also be addressed through the permit modification process on a case-by-case determination.

#### **8.3.2.4 Transfer of Permits**

Regulatory agencies will occasionally receive notification of a change in ownership of a facility covered by an NPDES 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 modification, either major or minor. It may also be addressed by revoking and subsequently reissuing the permit.
- ***Automatic Transfer***—A permit may be automatically 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 on the terms of the transfer
  - The Director of the regulatory agency does not indicate that the subject permit will be modified or revoked.

## **9. PERMIT COMPLIANCE AND ENFORCEMENT**

### **9.1 OVERVIEW**

It is essential that the limitations and conditions contained in an National Pollutant Discharge Elimination System (NPDES) permit be met by the permittee, otherwise the permit becomes a meaningless document. Various methods may be used by a regulatory agency to determine whether or not a permittee is in compliance with the permit limits and the various other conditions of the NPDES permit. In addition, numerous enforcement actions which may be taken by the regulatory agency in response to various permit violations.

The permit writer may or may not become actively involved with the compliance monitoring and enforcement of the terms and conditions of the NPDES permits that he or she has written. The extent of the permit writer's involvement will usually depend upon the organizational structure of the regulatory agency. Larger, centrally organized agencies will typically have specialized personnel responsible for enforcing the terms of NPDES permits. In other organizations, the individual who writes the permit will also be responsible for such enforcement activities as Discharge Monitoring Report (DMR) tracking, facility inspections, and enforcement recommendations. In the event of a judicial enforcement action, the permit writer may be called upon to testify regarding the specific requirements of the permit or its basis.

Regardless of the type of organizational structure within a regulatory agency, the permit writer should have an appreciation for the various aspects of a meaningful NPDES compliance enforcement program. The way in which permit requirements are expressed has a direct bearing on the permittee's self-monitoring program and on the regulatory agency's compliance monitoring and enforcement activities.

### **9.2 COMPLIANCE MONITORING**

Compliance monitoring is a generic term that includes all activities undertaken by Federal or State regulatory agencies to ascertain a permittee's adherence to an NPDES permit. Compliance monitoring data collected as part of the NPDES program are used in compliance evaluation and in support of enforcement. The process includes receiving data, reviewing data, entering data into the Permit Compliance System (PCS) data base, identifying violators, and responding with enforcement.

A primary function of the compliance monitoring program is the verification of compliance with permit conditions, including effluent limitations and compliance schedules. Compliance monitoring may be described as comprising two elements:

- **Compliance Review**—The review of all written reports and other material relating to the status of a permittee's compliance
- **Compliance Inspections**—Field-related regulatory activities, including sampling, conducted to determine compliance.

### **9.2.1 Compliance Review**

Compliance and enforcement personnel use two primary sources of information to carry out their compliance review responsibilities:

- **Permit/Compliance Files**—These files include compliance schedule reports, compliance inspection reports, DMRs, enforcement actions, and any other correspondence (e.g., summaries of telephone calls, copies of warning letters). Compliance personnel periodically review this information and use it to determine if enforcement is necessary and what level of enforcement is appropriate.
- **PCS**—PCS is a data management system used to compile all relevant facts about a facility's permit conditions, self-monitoring data, the inspections performed, and any enforcement actions taken. PCS is the national data base for the NPDES program. As such, PCS promotes national consistency and uniformity in permit and compliance evaluations. To accomplish this goal, all required data are entered into and maintained regularly in PCS.

NPDES permits must be enforceable and capable of being tracked by PCS. There may be situations where permit limits and monitoring conditions are not initially compatible with PCS entry and tracking. In these cases, States should ensure that appropriate steps are taken by the permit writer to identify difficult permits to the PCS coder (either in the State or the Region) and to mutually resolve any coding issues. To assist PCS coders in accurately interpreting and coding the permit into PCS and to assist enforcement personnel in reviewing permittee self-monitoring data and reports in a timely manner, permit writers should apply the practices discussed in Section 9.2.2.

### **9.2.2 Compliance Inspections**

Compliance inspections refer to all field-related regulatory activities conducted to determine permit compliance. Such field activities may include evaluation inspections (nonsampling), sampling inspections, other specialized inspections, and remote sensing. Certain inspections, such as diagnostic inspections and performance audit inspections, in

addition to providing information to support enforcement action, aid the regulatory agency in evaluating the facility's problems. Biomonitoring inspections are specifically targeted at facilities with effluent suspected or identified as causing toxicity problems that threaten the ecological balance of the receiving waters.

Compliance inspections are undertaken for one or more of the following purposes:

- To establish a regulatory presence to defer violations
- To ensure that permit requirements are being met or to determine if permit conditions are adequate
- To check the completeness and accuracy of a permittee's performance and compliance records
- To assess the adequacy of the permittee's self-monitoring and reporting program
- To determine the progress or completion of corrective action
- To obtain independent compliance data on a facility's discharge
- To evaluate the permittee's operation and maintenance activities
- To observe the status of construction required by the permit.

## **9.2 QUARTERLY NONCOMPLIANCE REPORTS**

EPA Regional Offices and States that have been approved to administer the NPDES program are required by regulation to report quarterly on major facilities that are not in compliance with the terms and conditions of their permit (i.e., effluent limitations meet the criteria for reportable noncompliance [RNC], schedules, and reporting requirements).

The regulations in 40 *Code of Federal Regulations (CFR)* 123.45 established requirements for listing facility violations and resulting regulatory enforcement action or quarterly noncompliance reports (QNCRs). This regulation established reporting requirements for violations that meet specific, quantifiable reporting criteria, as well as for violations that are more difficult to quantify but are of sufficient concern to be considered reportable. The regulation also specifies the format that the reports must follow and the schedule for their submission.

Only facilities within an RNC that are considered to be major must be reported on the QNCR. RNC consist of five general types of violations:

- Violation of Monthly Average Effluent Limits:

- Data that exceeds or equals the limit times the Technical Review Criteria (TRC) for 2 months during a six month period, where the TRC is 1.4 for Group I pollutants and 1.2 for Group II pollutants (Appendix A to 40 CFR Part 123 contains a list of Group I and II pollutants)
- Data that exceeds the limit for 4 months during a six month period
- Interim Effluent Limits Set Forth in a Formal Enforcement Action—Any violation of any magnitude
- Schedule—Missing a compliance schedule milestone date by 90 days
- Reporting—Missing a report due date by 30 days
- Single Event—A violation of any magnitude considered to have an adverse effect on water quality or public health (e.g., unauthorized bypass, unpermitted discharge, frequent discharges of a variety of pollutants).

A subset of instances of RNC that appear on the QNCR may be noted as significant noncompliance (SNC). This distinction is used solely for management accountability purposes as a means of tracking trends in compliance and evaluating relative timeliness of appropriate enforcement response toward priority violations. The definition of SNC is not regulatory and may change as the NPDES program change to encompass new initiatives. Generally, the designation of SNC indicates a violation is of sufficient magnitude and/or duration to be considered among the Agency's priorities for regulatory review and/or response. The categories of SNC are:

- Violation of enforcement action requirements (i.e., administrative effluent limits, key compliance schedule milestones, and key reports)
- Violation of permit effluent limits
- Violation of key compliance schedule milestones contained in a permit
- Violation of key reporting requirements in a permit
- Any unauthorized discharge or bypass considered significant by the NPDES program director
- Violations associated with water quality or health impacts.

The Regions and NPDES States are expected to prioritize rapid enforcement action against all SNC violations by the time they appear on the first QNCR. Prior to a permittee appearing on the subsequent QNCR for the same instance of SNC, the permittee should either be in compliance or the administering agency should have initiated an appropriate formal enforcement action to achieve final compliance. If the facility is still considered SNC after two quarters and no formal enforcement action has been taken, the facility is placed on

the Exceptions List. Although there are some legitimate justifications for facilities appearing on the Exception List, the Exceptions List generally indicates facilities for which the administering agency failed to handle enforcement in a timely and appropriate manner.

### **9.3 ENFORCEMENT**

Once a facility has been identified as having apparent permit violations, the U.S. Environmental Protection Agency (EPA) or the NPDES-authorized State will review the facility's compliance history. Such a review should focus on the magnitude, frequency, and duration of violations. Significant permit violations are identified and a determination of the appropriate enforcement response is made.

Section 309 of the Act authorizes the Agency to bring civil or criminal action against facilities which violating their NPDES permit conditions. The EPA Regions and the NPDES States have specific procedures for reviewing self-monitoring and inspection data and for deciding what type of enforcement action is warranted. Typical types of enforcement actions include the following activities (listed in increasing order of severity):

- Inspection debriefing, calling attention to deficiencies
- Telephone call
- Letter of violation
- Notice of violation
- Administrative order
- Administrative fine of up to \$125,000 per proceeding
- Civil lawsuit
- Criminal prosecution.

Considerations when making determinations on the level of the enforcement response include (1) the severity of the permit violation, (2) the degree of economic benefit obtained through the violation, (3) previous enforcement actions taken against the violator, and (4) the deterrent effect of the response on similarly situated permittees. Equally important are considerations of fairness and equity, national consistency, and the integrity of the NPDES program.

In the final analysis, the way in which a permit is written directly affects the type of enforcement action that can be taken. Each permit must be written clearly and without

ambiguities so that it can be tracked effectively and enforced in the event of frequent and significant violations.



## **APPENDIX A—GLOSSARY**

## APPENDIX A—GLOSSARY

**Acute** - A stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less typically is considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality.

**Administrator** - The Administrator of the United States Environmental Protection Agency or an authorized representative.

**Antidegradation** - Policies are part of each State's water quality standards. These policies are designed to protect water quality and provide a method of assessing activities that may impact the integrity of the waterbody.

**Authorized Program or Authorized State** - A State or interstate program which has been approved or authorized by EPA under Part 323.

**Average Monthly Discharge Limitations** - The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during that month (except in the case of fecal coliform).

**Average Weekly Discharge Limitation** - The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

**Best Management Practices (BMPs)** - Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include but are not limited to treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage.

**Best Professional Judgment (BPJ)** - The highest quality technical opinion developed by a permit writer after consideration of all reasonable available and pertinent data or information which forms the basis for the terms and conditions of a permit.

**Bioassay** - A test used to evaluate the relative potency of a chemical or a mixture of chemicals by comparing its effect on a living organism with the effect of a standard

preparation on the same type of organism. Bioassays frequently are used in the pharmaceutical industry to evaluate the potency of vitamins and drugs.

Biochemical Oxygen Demand (BOD) - A measurement of the amount of oxygen depletion over a specified time period (usually 5 days) in a wastewater sample; it is a measurement of non-toxic organic strength of a wastewater.

Chronic - A stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of a chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.

Code of Federal Regulations (40 CFR) - Title 40 of the Code of Federal Regulations published in a U.S. government publication, the *Federal Register*, which contains environmental regulations.

Composite Sample - Sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

Concentration-based Limit - A limit based on the relative strength of a pollutant in a wastestream, usually expressed in mg/l.

Continuous Discharge - A discharge which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

Control Authority - A POTW with an approved pretreatment program or the Approval Authority in the absence of a POTW pretreatment program.

CWA - The Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92-500, as amended by Public Law 96-483 and Public Law 97-117, 33 U.S.C. 1251 et. seq.

CWA and Regulations - The Clean Water Act (CWA) and applicable regulations promulgated thereunder. In the case of an approved State program, it includes State program requirements.

**Daily Discharge** - The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitation expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharges over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) daily discharge is calculated as the average measurement of the pollutant over the day. Daily discharge is calculated as the average measurement of the pollutant over the day.

**Daily Maximum** - The maximum allowable value of any single observation in a given day.

**Development Document** - Detailed report of studies conducted by the Environmental Protection Agency for the purpose of developing effluent guidelines and categorical pretreatment standards.

**Director** - The Regional Administrator or State Director, as the context requires, or an authorized representative. When there is no approved State program, and there is an EPA administered program, Director means the Regional administrator. When there is an approved State program, "Director" normally means the State Director. In some circumstances, however, EPA retains the authority to take certain actions even where there is an approved State program.

**Discharge of a Pollutant** - Any addition of any pollutant or combination of pollutants to Waters of the United States from any point source, or any addition of any pollutant or combination of pollutants to the waters of the contiguous zone or the ocean from any point other than a vessel or other floating craft which is being used as a means of transportation.

**Discharge Monitoring Report (DMR)** - The EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by approved States as well as by EPA.

**Draft Permit** - A document prepared under 40 CFR 124.6 indicating the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a permit. A notice of intent to terminate a permit, and a notice of intent to deny a permit, as discussed in 40 CFR 124.5, are types of draft permits. A denial of a request for modification, revocation and reissuance, or termination, as discussed in 40 CFR 124.5, is not a draft permit.

**Effluent** - Wastewater discharge at the end of a treatment process or treatment facility.

**Effluent Limitation** - Any restriction imposed by the Director on quantities, discharge rates, and concentrations or pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

**Effluent Limitations Guidelines** - A regulation published by the Administrator under section 304(b) of CWA to adopt or revise effluent limitations.

**Facility or Activity** - Any NPDES permit issued under 40 CFR 122.28 authorizing a category of discharges under the CWA within a geographical area.

**Flow Proportional Composite Sample** - Combination of individual samples proportional to the flow of the wastestream at the time of sampling.

**General Permit** - An NPDES permit issued under 40 CFR 122.28 authorized a category of discharges under the CWA within a geographical area.

**Grab Sample** - A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time.

**Hazardous Substance** - Any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

**Indirect Discharge** - A nondomestic discharge introducing pollutants to a publicly owned treatment works.

**Industrial User (IU)** - A source of Indirect Discharge which does not constitute a "discharge of pollutants" under regulations issued pursuant to Section 402 of the Clean Water Act.

**Major Facility** - Any NPDES facility or activity classified as such as by the Regional Administrator, or in the case of approved State programs, the Regional Administrator in conjunction with the State Director.

**Mass-Based Standard** - A discharge limit which is measured in a mass unit such as pounds per day.

**Municipality** - A city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of the CWA.

**National Pollutant Discharge Elimination System (NPDES)** - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of CWA.

**New Discharger** - Any building, structure, facility, or installation:

- a. From which there is or may be a discharge of pollutants.
- b. That did not commence the discharge of pollutants at that particular site prior to August 13, 1979.
- c. Which is not a new source.
- d. Which has never received a finally effective NPDES permit for discharges at that site.

**New Source** - Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:

- a. After promulgation of standards of performance under Section 306 of the CWA which are applicable to such source, or
- b. After proposal of standards of performance in accordance with Section 306 of the CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 of the CWA within 120 days of their proposal.
- c. Except as otherwise provided in an applicable new source performance standards, a source is a new source if it meets the definition in 40 CFR 122.2, and
  - i. It is constructed at a site at which no other source is located; or
  - ii. It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
  - iii. Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.

**Owner or Operator** - The owner or operator of any facility or activity subject to regulation under the NPDES program.

**Point Source** - Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are or may be discharged.

**Pollutant** - Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

**Pretreatment** - The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW.

**Pretreatment Standards for Existing Sources (PSES)** - Categorical standards and requirements applicable to industrial sources that began construction prior to the publication of the proposed pretreatment standards for that industrial category. (See individual categorical standards to 40 CFR Parts 405-471 for specific dates.)

**Pretreatment Standards for New Sources (PSNS)** - Categorical standards and requirements applicable to industrial sources that began construction after the publication of the proposed pretreatment standards for that industrial category. (See individual categorical standards in 40 CFR Parts 405-471 for specific dates.)

**Primary Industry Category** - Any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 verify (D.D.C. 1976), modified 12 E.R.C. 1833 (D.D.C. 1979); also listed in Appendix A of 40 CFR Part 122.

**Priority Pollutants** - Those pollutants listed by the Administrator under CWA Section 307(a).

**Privately Owned Treatment Works** - Any device or system which is (a) used to treat wastes from any facility whose operator is not the operator of the treatment works and (b) not a POTW.

**Process Wastewater** - Any water which, during manufacturing or processing, comes into direct contact with, or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

**Production-based Standard** - A discharge limitation expressed in terms of allowable pollutant mass discharge rate per unit of production which is applied directly to an industrial user's manufacturing process.

**Proposed Permit** - A State NPDES permit prepared after the close of the public comment period (and, when applicable, any public hearing and administrative appeals) which is sent to EPA for review before final issuance by the State.

**Publicly Owned Treatment Works (POTW)** - 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. This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

**Quality Assurance** - Refers to a management/administrative check on procedures and practices used during sampling and analysis that ensures the accuracy, precision, reproductibility, and representativeness of reported data.

**Quality Control** - Routine application of procedures to control the accuracy and precision of the sampling and analytical measurement processed (as a function of quality assurance).

**Regional Administrator** - The Regional Administrator of the appropriate Regional Office of the Environmental Protection Agency or the authorized representative of the Regional Administrator.

**Self-monitoring** - Sampling and analyses performed by a facility to ensure compliance with a permit or other regulatory requirements.



**Schedule of Compliance** - A schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (i.e., actions, operations, or milestone events) leading to compliance with the CWA and regulations.

**Secondary Industry Category** - Any industry category which is not a primary industry category.

**Significant Industrial User (SIU)** - Includes:

- a. all categorical industrial users or
- b. any noncategorical industrial user that
  - i. discharges 25,000 gallons per day or more of process wastewater ("process wastewater" excludes sanitary noncontact cooling, and boiler blowdown wastewaters)
  - ii. contributes a process wastestream which makes up five percent or more of the average dry weather hydraulic or organic (BOD, TSS, etc.) capacity of the treatment plant
  - iii. has a reasonable potential, in the opinion of the Control or Approval Authority, to adversely affect the POTW's operation or to violate any pretreatment standard or requirement.

**State Director** - The chief administrative officer of any State or interstate agency operating an authorized program, or the delegated representative of the State Director.

**STORET** - EPA's computerized water quality data base that includes physical, chemical, and biological data measured in waterbodies throughout the United States.

**Time Proportional Composite Sample** - Combination of individual samples with fixed volumes taken at specific time intervals.

**Toxicity Reduction Evaluation (TRE)** - A site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

**Toxicity Test** - A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.

**Toxic Pollutants** - Those pollutants listed by the Administrator under CWA Section 307(a).

**Water Quality Criteria** - Comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

**Water Quality Standard** - A law or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

**Whole Effluent Toxicity** - The total toxic effect of an effluent measured directly with a toxicity test.

## **APPENDIX B—OUTLINE OF 40 CFR PART 122**

**APPENDIX B—OUTLINE OF 40 CFR PART 122**

**PART 122 - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

**SUBPART A - DEFINITIONS AND GENERAL PROGRAM REQUIREMENTS**

- 122.1 Purpose and Scope
- 122.2 Definitions
- 122.3 Exclusions
- 122.4 Prohibitions \*
- 122.5 Effect of a permit
- 122.6 Continuation of expiring permits
- 122.7 Confidentiality of information

**SUBPART B - PERMIT APPLICATION AND SPECIAL NPDES PROGRAM REQUIREMENTS**

- 122.21 Application for a permit \*
- 122.22 Signatories to permit applications and reports \*
- 122.23 Concentrated animal feeding operations \*
- 122.24 Concentrated aquatic animal production facilities \*
- 122.25 Aquaculture projects \*
- 122.26 Separate storm sewers \*
- 122.27 Silvicultural activities \*
- 122.28 General permits \*
- 122.29 New sources and new discharges

**SUBPART C - PERMIT CONDITIONS**

- 122.41 Conditions applicable to all permits \*
- 122.42 Additional conditions applicable to specified categories of NPDES permits \*
- 122.43 Establishing permit conditions \*
- 122.44 Establishing limitations, standards and other permit conditions \*
- 122.45 Calculating NPDES permit conditions \*
- 122.46 Duration of permits \*
- 122.47 Schedules of compliance
- 122.48 Requirements for recording and reporting of monitoring results \*
- 122.49 Considerations under Federal law

- 122.50      · Disposal of pollutants into wells, into publicly owned treatment works or by land application \*

**SUBPART D - TRANSFER, MODIFICATION, REVOCATION AND REISSUANCE,  
AND TERMINATION OF PERMITS**

- 122.61      Transfer of permits \*  
122.62      Modification or revocation and reissuance of permits \*  
122.63      Minor modifications of permits  
122.64      Termination of permits \*

\* Applicable to State NPDES Programs (See 40 CFR 123.25).

**Authority:**    *The Clean Water Act, 33 U.S.C. part 1251 et. seq.*

- Appendix A -    NPDES Primary Industry Categories  
Appendix B -    Criteria for Determining a Concentrated Animal Feeding Operation (40 CFR 122.230)  
Appendix C -    Criteria for Determining a Concentrated Aquatic Animal Production Facility (40 CFR 122.24)  
Appendix D -    NPDES Permit Application Testing Requirements (40 CFR 122.21)

## **APPENDIX C—INDEX TO NPDES REGULATIONS**

# **APPENDIX C—INDEX TO NPDES REGULATIONS**

## **CLEAN WATER ACT**

### **SECTION NUMBER**

301(b)

301(h)

301(i)

301(k)

303(c)

304(e)

316(a)

## **40 CFR**

### **SECTION NUMBER**

122.21(m)(1), 125 Subparts  
A and D

125 Subpart G

125 Subpart J

125 Subpart C

131 Subparts A,B,and C

125 Subpart K

124.66, 125 Subpart H

## **SUBJECT A**

### **Administrative Procedures Act**

- Permit Continuation

122.6

### **Administrative Record**

- Draft Permit
- Final Permit

124.9

124.18

### **Anti-Backsliding (Reissued Permits)**

122.44(l), 122.62(a)(16)

### **Application**

- Completeness
- Existing Facilities
- State Program
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- Duty to Reapply

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## **APPENDIX D—NPDES PERMIT APPLICATION TESTING REQUIREMENTS**

**APPENDIX D—NPDES PERMIT APPLICATION TESTING REQUIREMENTS****TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRIAL CATEGORY FOR EXISTING DISCHARGES**

Industrial category	GC/MS Fraction <sup>1</sup>			
	Volatile	Acid	Base/ neutral	Pesticide
Adhesives and Sealants.....	2	2	2	
Aluminum Forming.....	2	2	2	
Auto and Other Laundries.....	2	2	2	2
Battery Manufacturing.....	2		2	
Coal Mining.....	2	2	2	2
Coil Coating.....	2	2	2	
Copper Forming.....	2	2	2	
Electric and Electronic Components.....	2	2	2	2
Electroplating.....	2	2	2	
Explosives Manufacturing.....		2	2	
Foundries.....	2	2	2	
Gum and Wood Chemicals.....	2	2	2	2
Inorganic Chemicals Manufacturing.....	2	2	2	
Iron and Steel Manufacturing.....	2	2	2	
Leather Tanning and Finishing.....	2	2	2	2
Mechanical Products Manufacturing.....	2	2	2	
Nonferrous Metals Manufacturing.....	2	2	2	2

**TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRIAL CATEGORY FOR EXISTING DISCHARGES (CONTINUED)**

Industrial category	GC/MS Fraction <sup>1</sup>			
	Volatile	Acid	Base/ neutral	Pesticide
Ore Mining.....	2	2	2	2
Organic Chemicals Manufacturing.....	2	2	2	2
Paint and Ink Formulation.....	2	2	2	2
Pesticides.....	2	2	2	2
Petroleum Refining.....	2	2	2	2
Pharmaceutical Preparations.....	2	2	2	
Photographic Equipment and Supplies.....	2	2	2	2
Plastic and Synthetic Materials Manufacturing.....	2	2	2	2
Plastic Processing.....	2			
Porcelain Enameling.....	2		2	2
Printing and Publishing.....	2	2	2	2
Pulp and Paper Mills.....	2	2	2	2
Rubber Processing.....	2	2	2	
Soap and Detergent Manufacturing.....	2	2	2	
Steam Electric Power Plants.....	2	2	2	
Textile Mills.....	2	2	2	2
Timber Products Processing.....	2	2	2	2

<sup>1</sup> The toxic pollutants in each fraction are listed in Table II.<sup>2</sup> Testing required.



**TABLE II—ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN  
ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)**

Volatiles	
1V	acrolein
2V	acrylonitrile
3V	benzene
5V	bromoform
6V	carbon tetrachloride
7V	chlorobenzene
8V	chlorodibromomethane
9V	chloroethane
10V	2-chloroethylvinyl ether
11V	chloroform
12V	dichlorobromomethane
14V	1,1-dichloroethane
15V	1,2-dichloroethane
16V	1,1-dichloroethylene
17V	1,2-dichloropropane
18V	1,3-dichloropropylene
19V	ethylbenzene
20V	methyl bromide
21V	methyl chloride
22V	methylene chloride
23V	1,1,2,2-tetrachloroethane
24V	tetrachloroethylene
25V	toluene
26V	1,2-trans-dichloroethylene
27V	1,1,1-trichloroethane
28V	1,1,2-trichloroethane
29V	trichloroethylene
31V	vinyl chloride
Acid Compounds	
1A	2-chlorophenol
2A	2,4-dichlorophenol
3A	2,4-dimethylphenol
4A	4,6-dinitro-o-cresol
5A	2,4-dinitrophenol
6A	2-nitrophenol
7A	4-nitrophenol
8A	p-chloro-m-cresol
9A	pentachlorophenol
10A	phenol
11A	2,4,6-trichlorophenol

**TABLE II—ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN  
ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)  
(CONTINUED)**

Base/Neutral	
1B	acenaphthene
2B	acenaphthylene
3B	anthracene
4B	benzidine
5B	benzo(a)anthracene
6B	benzo(a)pyrene
7B	3,4-benzofluoranthene
8B	benzo(ghi)perylene
9B	benzo(k)fluoranthene
10B	bis(2-chloroethoxy)methane
11B	bis(2-chloroethyl)ether
12B	bis(2-chloroisopropyl)ether
13B	bis(2-ethylhexyl)phthalate
14B	4-bromophenyl phenyl ether
15B	butylbenzyl phthalate
16B	2-chloronaphthalene
17B	4-chlorophenyl phenyl ether
18B	chrysene
19B	dibenzo(a,h)anthracene
20B	1,2-dichlorobenzene
21B	1,3-dichlorobenzene
22B	1,4-dichlorobenzene
23B	3,3'-dichlorobenzidine
24B	diethyl phthalate
25B	dimethyl phthalate
26B	di-n-butyl phthalate
27B	2,4-dinitrotoluene
28B	2,6-dinitrotoluene
29B	di-n-octyl phthalate
30B	1,2-diphenylhydrazine (as azobenzene)
31B	fluoranthene
32B	fluorene
33B	hexachlorobenzene
34B	hexachlorobutadiene
35B	hexachlorocyclopentadiene
36B	hexachloroethane
37B	indeno(1,2,3-cd)pyrene
38B	isophorone
39B	naphthalene
40B	nitrobenzene
41B	N-nitrosodimethylamine
42B	N-nitrosodi-n-propylamine
43B	N-nitrosodiphenylamine

**TABLE II—ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN  
ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)  
(CONTINUED)**

<b>Base/Neutral (continued)</b>	
44B	phenanthrene
45B	pyrene
46B	1,2,4-trichlorobenzene
<b>Pesticides</b>	
1P	aldrin
2P	alpha-BHC
3P	beta-BHC
4P	gamma-BHC
5P	delta-BHC
6P	chlordan
7P	4,4'-DDT
8P	4,4'-DDE
9P	4,4'-DDD
10P	dieldrin
11P	alpha-endosulfan
12P	beta-endosulfan
13P	endosulfan sulfate
14P	endrin
15P	endrin aldehyde
16P	heptachlor
17P	heptachlor epoxide
18P	PCB-1242
19P	PCB-1254
20P	PCB-1221
21P	PCB-1232
22P	PCB-1248
23P	PCB-1260
24P	PCB-1016
25P	toxaphene

**TABLE III—OTHER TOXIC POLLUTANTS (METALS AND CYANIDE) AND TOTAL PHENOLS**

Antimony, Total	
Arsenic, Total	
Beryllium, Total	
Cadmium, Total	
Chromium, Total	
Copper, Total	
Lead, Total	
Mercury, Total	
Nickel, Total	
Selenium, Total	
Silver, Total	
Thallium, Total	
Zinc, Total	
Cyanide, Total	
Phenols, Total	

**TABLE IV—CONVENTIONAL AND NONCONVENTIONAL POLLUTANTS REQUIRED  
TO BE TESTED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT**

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Organic
Oil and Grease
Phosphorus, Total
Radioactivity
Sulfate
Sulfide
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Manganese, Total
Tin, Total
Titanium, Total

**TABLE V—TOXIC POLLUTANTS AND HAZARDOUS SUBSTANCES REQUIRED TO BE IDENTIFIED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT**

Toxic Pollutants	
Asbestos	
Hazardous Substances	
Acetaldehyde	Isopropanolamine Dodecylbenzene sulfonate
Allyl alcohol	Kelthane
Allyl chloride	Kepon
Amyl acetate	Malathion
Aniline	Mercaptodimethur
Benzonitrile	Methoxychlor
Benzyl chloride	Methyl mercaptan
Butyl acetate	Methyl methacrylate
Butylamine	Methyl parathion
Captan	Mevinphos
Carbaryl	Mexacarbate
Carbofuran	Monoethyl amine
Carbon disulfide	Monomethyl amine
Chlorpyrifos	Naled
Coumaphos	Napthenic acid
Cresol	Nitrotoluene
Crotonaldehyde	Parathion
Cyclohexane	Phenolsulfanate
2,4-D (2,4-Dichlorophenoxy acetic acid)	Phosgene
Diazinon	Propargite
Dicamba	Propylene oxide
Dichlobenil	Pyrethrins
Dichlone	Quinoline
2,2-Dichloropropionic acid	Resorcinol
Dichlorvos	Strontium
Diethyl amine	Strychnine
Dimethyl amine	Styrene
Dinitrobenzene	2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
Diquat	TDE (Tetrachlorodiphenylethane)
Disulfoton	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Diuron	Trichlorofan
Epichlorohydrin	Triethanolamine dodecylbenzenesulfonate
Ethion	Triethylamine
Ethylene diamine	Trimethylamine
Ethylene dibromide	Uranium
Formaldehyde	Vanadium
Furfural	Vinyl acetate
Guthion	Xylene
Isoprene	Xylenol
	Zirconium

**TABLE V—TOXIC POLLUTANTS AND HAZARDOUS SUBSTANCES REQUIRED TO BE  
IDENTIFIED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT  
(CONTINUED)**

[Note 1: The Environmental Protection Agency has suspended the requirements of § 122.21(g)(7)(ii)(A) and Table I of Appendix D as they apply to certain industrial categories. The suspensions are as follows:

- a. At 46 FR 2046, Jan. 8, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) as it applies to coal mines.
- b. At 46 FR 22585, Apr. 20, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:
  1. Testing and reporting for all four organic fractions in the Greige Mills Subcategory of the Textile Mills industry (Subpart C—Low water use processing of 40 CFR Part 410), and testing and reporting for the pesticide fraction in all other subcategories of this industrial category.
  2. Testing and reporting for the volatile, base/neutral and pesticide fractions in the Base and Precious Metals Subcategory of the Ore Mining and Dressing industry (Subpart B of 40 CFR Part 440), and testing and reporting for all four fractions in all other subcategories of this industrial category.
  3. Testing and reporting for all four GC/MS fractions in the Porcelain Enameling industry.
- c. At 46 FR 35090, July 1, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:
  1. Testing and reporting for the pesticide fraction in the Tall Oil Rosin Subcategory (Subpart D) and Rosin-Based Derivatives Subcategory (Subpart F) of the Gum and Wood Chemicals industry (40 CFR Part 454), and testing and reporting for the pesticide and base/neutral fractions in all other subcategories of this industrial category.
  2. Testing and reporting for the pesticide fraction in the Leather Tanning and Finishing, Paint and Ink Formulation, and Photographic Supplies industrial categories.
  3. Testing and reporting for the acid, base/neutral and pesticide fractions in the Petroleum Refining industrial category.
  4. Testing and reporting for the pesticide fraction in the Papergrade Sulfite subcategories (Subparts J and U) of the Pulp and Paper industry (40 CFR Part 430); testing and reporting for the base/neutral and pesticide fractions in the following subcategories: Deink (Subpart Q), Dissolving Kraft (Subpart F), and Paperboard from Waste Paper (Subpart E); testing and reporting for the volatile, base/neutral and pesticide fractions in the following subcategories: BCT Bleached Kraft (Subpart H), Semi-Chemical (Subparts B and C), and

- Nonintegrated-Fine Papers (Subpart R); and testing and reporting for the acid, base/neutral, and pesticide fractions in the following subcategories: Fine Bleached Kraft (Subpart I), Dissolving Sulfite Pulp (Subpart K), Groundwood-Fine Papers (Subpart O), Market Bleached Kraft (Subpart G), Tissue from Wastepaper (Subpart T), and Nonintegrated-Tissue Papers (Subpart S).
5. Testing and reporting for the base/neutral fraction in the Once-Through Cooling Water, Fly Ash and Bottom Ash Transport Water process wastestreams of the Steam Electric Power Plant industrial category.

This revision continues these suspensions.)\*

For the duration of the suspensions, therefore, Table I effectively reads:



**TABLE 1—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY  
INDUSTRY CATEGORY**

Industry Category	GC/MS Fraction <sup>2</sup>			
	Volatile	Acid	Base/ Neutral	Pesti- cide
Adhesives and Sealants.....	(1)	(1)	(1)	
Aluminum forming.....	(1)	(1)	(1)	
Auto and other laundries.....	(1)	(1)	(1)	(1)
Battery Manufacturing.....	(1)		(1)	
Coal Mining.....				
Coil Coating.....	(1)	(1)	(1)	
Copper forming.....	(1)	(1)	(1)	
Electric and Electronic Components.....	(1)	(1)	(1)	(1)
Electroplating.....	(1)	(1)	(1)	
Explosives manufacturing...		(1)	(1)	
Foundries.....	(1)	(1)	(1)	
Gum and wood (all sub- parts except D and F.....	(1)	(1)		
Subpart D—tall oil rosin.....	(1)	(1)	(1)	
Subpart F—rosin-based derivatives.....	(1)	(1)	(1)	
Inorganic chemicals manu- facturing.....	(1)	(1)	(1)	
Iron and steel manufactur- ing.....	(1)	(1)	(1)	
Leather tanning and finish- ing.....	(1)	(1)	(1)	
Mechanical products manu- facturing.....	(1)	(1)	(1)	
Nonferrous metals manu- facturing.....	(1)	(1)	(1)	(1)

**TABLE 1—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY  
INDUSTRY CATEGORY (CONTINUED)**

Industry Category	GC/MS Fraction <sup>2</sup>			
	Volatile	Acid	Base/ Neutral	Pesti- cide
Ore mining (applies to the base and precious metals/Subpart B).....		(1)		
Organic chemicals manufacturing.....	(1)	(1)	(1)	(1)
Paint and ink formulation.....	(1)	(1)	(1)	
Pesticides.....	(1)	(1)	(1)	(1)
Petroleum refining.....	(1)			
Pharmaceutical preparations.....	(1)	(1)	(1)	
Photographic equipment and supplies.....	(1)	(1)	(1)	
Plastic and synthetic materials manufacturing.....	(1)	(1)	(1)	(1)
Plastic processing.....	(1)			
Porcelain enameling.....				
Printing and publishing.....	(1)	(1)	(1)	(1)
Pulp and paper board mills—see footnote <sup>3</sup> .....				
Rubber processing.....	(1)	(1)	(1)	
Soap and detergent manufacturing.....	(1)	(1)	(1)	
Steam electric power plants.....	(1)	(1)		
Textile mills (Subpart C—Greige mills are exempt from this table).....	(1)	(1)	(1)	
Timber products processing.....	(1)	(1)	(1)	(1)

<sup>1</sup> Testing required.<sup>2</sup> The pollutants in each fraction are listed in Item V-C.<sup>3</sup> Pulp and Paperboard Mills.

Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

**TABLE 1—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY  
INDUSTRY CATEGORY(CONTINUED)**

Subpart <sup>3</sup>	GC/MS Fraction			
	VOA	Acid	Base/ Neutral	Pesti- cides
A.....	2	(1)	2	(1)
B.....	2	(1)	2	2
C.....	2	(1)	2	2
D.....	2	(1)	2	2
E.....	(1)	(1)	2	(1)
F.....	(1)	(1)	2	2
G.....	(1)	(1)	2	2
H.....	(1)	(1)	2	2
I.....	(1)	(1)	2	2
J.....	(1)	(1)	(1)	2
K.....	(1)	(1)	2	2
L.....	(1)	(1)	2	2
M.....	(1)	(1)	2	2
N.....	(1)	(1)	2	2
O.....	(1)	(1)	2	2
P.....	(1)	(1)	2	2
Q.....	(1)	(1)	2	(1)
R.....	2	(1)	2	2
S.....	(1)	(1)	2	(1)
T.....	(1)	(1)	2	(1)
U.....	(1)	(1)	(1)	2

<sup>1</sup> Must test.<sup>2</sup> Do not test unless "reason to believe" it is discharged.<sup>3</sup> Subparts are defined in 40 CFR Part 430.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985]

## **APPENDIX E—PRIORITY POLLUTANTS**

## APPENDIX E—PRIORITY POLLUTANTS

### Volatile Compounds

Acrolein	Vinyl Chloride
Benzene	Acrylonitrile
Carbon Tetrachloride	Bromoform
Chlorodibromomethane	Chlorobenzene
2-Chloroethylvinyl Ether	Chloroethane
Dichlorobromomethane	Chloroform
1,2-Dichloroethane	1,1-Dichloroethane
1,2-Dichloropropane	1,1-Dichloroethylene
Ethylbenzene	1,3-Dichloropropylene
Methyl Chloride	Methyl Bromide
1,1,2,2-Tetrachloroethane	Methylene Chloride
Toluene	Tetrachloroethylene
1,1,1-Trichloroethane	1,2-Trans-Dichloroethylene
Trichloroethylene	1,1,2-Trichloroethane

### Acid Compounds

Chlorophenol	2,4-Dichlorophenol
2,4-Dimethylphenol	4,6-Dinitro-O-Cresol
2,4-Dinitrophenol	2-Nitrophenol
4-Nitrophenol	P-Chloro-M-Cresol
Pentachlorophenol	Phenol
2,4,6-Trichlorophenol	

### Base/Neutral Compounds

Acenaphthene	Acenaphthylene
Anthracene	Benzidine
Benzo(a)Anthracene	Benzo(a)Pyrene
Benzo(b)Fluoranthene	Benzo(ghi)Perylene
Benzo(k)Fluoranthene	Bis(2-Chloroethoxy)Methane
Bis(2-Chloroethyl)Ether	Bis(2-Chloroisopropyl)Ether
Bis(Chloromethyl)Ether	4-Bromophenyl Phenyl Ether
Bis(2-Ethylhexyl)Phthalate	2-Chloronaphthalene
Butyl Benzyl Phthalate	Chrysene
4-Chlorophenyl Phenyl Ether	1,2-Dichlorobenzene
Dibenzo(a,h)Anthracene	1,4-Dichlorobenzene
1,3-Dichlorobenzene	Diethyl Phthalate
3,3-Dichlorobenzidine	Di-N-Butyl Phthalate
Dimethyl Phthalate	2,6-Dinitrotoluene
2,4-Dinitrotoluene	1,2-Diphenylhydrazine (as Azobenzene)
Di-N-Octyl Phthalate	Hexachlorobenzene
Fluoranthene	Hexachlorocyclopentadiene
Fluorene	Indeno(1,2,3-cd)Pyrene
Hexachlorobutadiene	Naphthalene
Hexachloroethane	N-Nitrosodimethylamine
Isophorone	N-Nitrosodiphenylamine
Nitrobenzene	Pyrene
N-Nitrosodi-N-Propylamine	1,2,4-Trichlorobenzene
Phenanthrene	

## **APPENDIX E—PRIORITY POLLUTANTS (Continued)**

### **Pesticides and PCBs**

Aldrin	Gamma-BHC
Alpha-BHC	Delta-BHC
Beta-BHC	Chlordane
4,4'-DDT	4,4'-DDE
4,4'-DDD	Dieldrin
Alpha-Endosulfan	Beta-Endosulfan
Endosulfan Sulfate	Endrin
Endrin Aldehyde	Heptachlor
Heptachlor Epoxide	PCB-1242
PCB-1254	PCB-1221
PCB-1232	PCB-1248
PCB-1260	PCB-1016
Toxaphene	

### **Metals and Cyanide**

Antimony	Arsenic
Beryllium	Cadmium
Chromium	Copper
Lead	Mercury
Nickel	Selenium
Silver	Thallium
Zinc	Cyanide

### **Miscellaneous**

2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD)  
Asbestos

## **APPENDIX F—SIC CODE AND CRF CROSS REFERENCE**

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977- SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
211	211	BEEF CATTLE FEEDLOTS	412	A	All Feedlots Except Ducks
212	212	BEEF CATTLE, EXCEPT FEEDLOTS		NR	Beef Cattle not in Feedlots
213	213	HOGS	412	A	All Feedlots Except Ducks
213	213	HOGS		NR	Hogs not in Feedlots
214	214	SHEEP AND GOATS	412	A	All Feedlots except Ducks
214	214	SHEEP AND GOATS		NR	Sheep and Goats not in Feedlots
219	219	GENERAL LIVESTOCK, NEC		NR	General Livestock Farms
241	241	DAIRY FARMS	412	A	All Feedlots Except Ducks
241	241	DAIRY FARMS		NR	DAIRY CATTLE NOT CONFINED
251	251	BROILER, FRYER AND ROASTER CHICKENS	412	A	All Feedlots Except Ducks
252	252	CHICKEN EGGS	412	A	All Feedlots Except Ducks
253	253	TURKEY AND TURKEY EGGS	412	A	All Feedlots Except Ducks
254	254	POULTRY HATCHERIES		NR	Hatcheries Without Poultry Feeding
259	259	POULTRY AND EGGS, NEC	412	B	Ducks
259	259	POULTRY AND EGGS, NEC		NR	Other Poultry Farms
271	271	FUR-BEARING ANIMALS AND RABBITS		NR	
272	272	HORSES AND OTHER EQUINES		NR	
273	279	ANIMAL SPECIALTIES, NEC		NR	
279	279	ANIMAL SPECIALTIES, NEC		NR	
291	291	GENERAL FARMS, PRIMARILY LIVESTOCK		NR	
291	291	GENERAL FARMS, PRIMARILY LIVESTOCK		NR	
721	721	CROP PLANTING & PROTECTION		NR	Crop Dusting & Spraying
721	721	CROP PLANTING & PROTECTION		NR	Crop Planting/Cultivation
921	921	FISH HATCHERIES AND PRESERVES		NR	
1011	1011	IRON ORES	440	A	Iron Ore
1021	1021	COPPER ORES	440	J	Cu, Pb, Zn, Ag, Au, Mo Ores
1031	1031	LEAD AND ZINC ORES	440	J	Cu, Pb, Zn, Ag, Au, Mo Ores
1041	1041	GOLD ORES	440	J	Cu, Pb, Zn, Ag, Au, Mo Ores
1041	1041	GOLD ORES	440	M	Gold Placer Mines
1044	1044	SILVER ORES	440	J	Cu, Pb, Zn, Ag, Au, Mo Ores
1061	1061	FERROALLOY ORES, EXCEPT VANADIUM	440	F	Tungsten Ore
1061	1061	FERROALLOY ORES, EXCEPT VANADIUM	440	G	Nickel Ores
1061	1061	FERROALLOY ORES, EXCEPT VANADIUM	440	J	Cu, Pb, Zn, Ag, Au, Mo Ores
1061	1061	FERROALLOY ORES, EXCEPT VANADIUM		NR	Ferroalloy Ores, NEC
1081	1081	METAL MINING SERVICES		NR	Exploration/Development
1094	1094	URANIUM-RADIUM-VANADIUM ORES	440	C	Uranium-Radium-Vanadium Ores
1094	1094	URANIUM-RADIUM-VANADIUM ORES	440	H	Vanadium Ore
1099	1051	BAUXITE & OTHER ALUMINUM ORES	440	B	Aluminum Ore
1099	1092	MERCURY ORES	440	D	Mercury Ores
1099	1099	METAL ORES, NEC	440	E	Titanium Ores
1099	1099	METAL ORES, NEC	440	I	Antimony Ore
1099	1099	METAL ORES, NEC	440	K	Platinum Ores
1099	1099	METAL ORES, NEC		NR	Metal Ore, NEC
1221	1211	BITUMINOUS COAL AND LIGNITE	434	B	Coal Preparation Plants
1221	1211	BITUMINOUS COAL AND LIGNITE	434	C	Acid or Ferruginous Mine Drainage
1221	1211	BITUMINOUS COAL AND LIGNITE	434	D	Alkaline Mine Drainage
1221	1211	BITUMINOUS COAL AND LIGNITE	434	E	Post Mining Areas
1222	1211	BITUMINOUS COAL AND LIGNITE	434	B	COAL PREPARATION PLANTS
1222	1211	BITUMINOUS COAL AND LIGNITE	434	C	ACID OR FERRUGINOUS MINE DRAINAGE
1222	1211	BITUMINOUS COAL AND LIGNITE	434	D	ALKALINE MINE DRAINAGE
1222	1211	BITUMINOUS COAL AND LIGNITE	434	E	POST MINING AREAS
1231	1111	ANTHRACITE MINING	434	B	Coal Preparation Plants
1231	1111	ANTHRACITE MINING	434	C	Acid or Ferruginous Mine Drainage
1231	1111	ANTHRACITE MINING	434	D	Alkaline Mine Drainage
1231	1111	ANTHRACITE MINING	434	E	Post Mining Areas
1241	1112	ANTHRACITE MINING SERVICES		NR	
1241	1213	BITUMINOUS COAL AND LIGNITE MINING SERVICES		NR	
1311	1311	CRUDE PETROLEUM AND NATURAL GAS	435	A	Offshore
1311	1311	CRUDE PETROLEUM AND NATURAL GAS	435	C	Onshore
1311	1311	CRUDE PETROLEUM AND NATURAL GAS	435	D	Coastal
1311	1311	CRUDE PETROLEUM AND NATURAL GAS	435	E	Agricultural & Wildlife Water Use
1311	1311	CRUDE PETROLEUM AND NATURAL GAS	435	F	Stripper
1321	1321	NATURAL GAS LIQUIDS		NR	
1381	1381	DRILLING OIL AND GAS WELLS	435	C	Onshore
1382	1382	OIL AND GAS FIELD EXPLORATION SERVICES		NR	
1389	1389	OIL AND GAS FIELD SERVICES, NEC		NR	
1411	1411	DIMENSION STONE	436	A	Dimension Stone
1422	1422	CRUSHED AND BROKEN LIMESTONE	436	B	Crushed Stone



APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
1423	1423	CRUSHED AND BROKEN GRANITE	436	B	Crushed Stone
1429	1429	CRUSHED AND BROKEN STONE, NEC	436	B	Crushed Stone
1442	1442	CONSTRUCTION SAND AND GRAVEL	436	C	CONSTRUCTION SAND AND GRAVEL
1446	1446	INDUSTRIAL SAND	436	D	Industrial Sand
1455	1455	KAOLIN AND BALL CLAY	436	AG	Kaolin
1455	1455	KAOLIN AND BALL CLAY	436	AH	Ball Clay
1459	1452	BENTONITE	436	V	Bentonite
1459	1453	FIRE CLAY	436	AA	Fire Clay
1459	1454	FULLER'S EARTH		NR	
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC	436	AI	FELDSPAR
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC	436	AC	KYANITE
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC	436	AD	SHALE AND COMMON CLAY
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC	436	AE	APLITE
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC	436	W	MAGNESITE
1459	1459	CLAY, CERAMIC AND REFRACTORY MATERIALS, NEC		NR	OTHER CLAY, CERAMIC AND REFR MINERALS NR
1474	1474	POTASH, SODA AND BORATE MINERALS	436	L	SALINES FROM BRINE LAKES
1474	1474	POTASH, SODA AND BORATE MINERALS	436	N	POTASH
1474	1474	POTASH, SODA AND BORATE MINERALS	436	M	BORAX
1474	1474	POTASH, SODA AND BORATE MINERALS	436	O	SODIUM SULFATE
1474	1474	POTASH, SODA AND BORATE MINERALS		NR	OTHER POTASH, SODA AND BORATE MINERALS NR
1474	1474	POTASH, SODA AND BORATE MINERALS	436	P	TRONA
1475	1475	PHOSPHATE ROCK	436	R	Phosphate Rock
1479	1472	BARITE	436	J	BARITE
1479	1473	FLUORSPAR	436	K	FLUORSPAR
1479	1476	ROCK SALT	436	Q	ROCK SALT
1479	1477	SULFUR	436	S	FRASCH SULFER
1479	1479	CHEMICAL AND FERTILIZER MINERAL MINING, NEC	436	T	MINERAL PIGMENTS
1479	1479	CHEMICAL AND FERTILIZER MINERAL MINING, NEC	436	U	LITHIUM
1479	1479	CHEMICAL AND FERTILIZER MINERAL MINING, NEC		NR	OTHER CHEMICAL/FERTILIZER MINERALS NR
1481	1481	NONMETALLIC MINERALS (EXCEPT FUELS) SERVICES		NR	
1499	1492	GYPSUM	436	E	GYPSUM
1499	1496	TALC, SOAPSTONE AND PYROPHYLLITE	436	AJ	TALC, STEATITE, SOAPSTONE AND PYROPHYLLITE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	G	ASBESTOS AND WOLLASTONITE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	F	ASPHALTIC MINERAL
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	I	MICA AND SERACITE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	X	DIATOMITE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	Y	JADE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	AF	TRIPOLI
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	AK	GARNET
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC	436	AL	GRAPHITE
1499	1499	MISCELLANEOUS NONMETALLIC MINERALS, NEC		NR	OTHER MISC NONMETALLIC MINERALS NR
2011	2011	MEAT PACKING PLANTS	432	A	SIMPLE SLAUGHTERHOUSE
2011	2011	MEAT PACKING PLANTS	432	B	COMPLEX SLAUGHTERHOUSE
2011	2011	MEAT PACKING PLANTS	432	C	LOW-PROCESSING PACKING HOUSE
2011	2011	MEAT PACKING PLANTS	432	D	HIGH-PROCESSING PACKING HOUSE
2013	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	432	E	SMALL PROCESSOR
2013	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	432	F	MEAT CUTTER
2013	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	432	G	SAUSAGE AND LUNCHEON MEATS PROCESSOR
2013	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	432	H	HAM PROCESSOR
2013	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	432	I	CANNED MEATS PROCESSOR
2015	2016	POULTRY DRESSING PLANTS	432	B	COMPLEX SLAUGHTERHOUSE
2015	2016	POULTRY DRESSING PLANTS	432	A	SIMPLE SLAUGHTERHOUSE
2015	2016	POULTRY DRESSING PLANTS	432	C	LOW-PROCESSING PACKING HOUSE
2015	2016	POULTRY DRESSING PLANTS	432	D	HIGH-PROCESSING PACKING HOUSE
2015	2017	POULTRY AND EGG PROCESSING	432	E	SMALL PROCESSOR
2015	2017	POULTRY AND EGG PROCESSING	432	F	MEAT CUTTER
2015	2017	POULTRY AND EGG PROCESSING	432	G	SAUSAGE AND LUNCHEON MEATS PROCESSOR
2015	2017	POULTRY AND EGG PROCESSING	432	H	HAM PROCESSOR
2015	2017	POULTRY AND EGG PROCESSING	432	I	CANNED MEATS PROCESSOR
2021	2021	CREAMERY BUTTER	405	D	BUTTER
2022	2022	CHEESE, NATURAL AND PROCESSED	405	F	NATURAL AND PROCESSED CHEESE
2023	2023	CONDENSED AND EVAPORATED MILK	405	I	CONDENSED MILK
2023	2023	CONDENSED AND EVAPORATED MILK	405	J	DRY MILK
2023	2023	CONDENSED AND EVAPORATED MILK	405	K	CONDENSED WHEY
2023	2023	CONDENSED AND EVAPORATED MILK	405	L	DRY WHEY
2024	2024	ICE CREAM AND FROZEN DESSERTS	405	H	ICE CREAM, FROZEN DESSERTS, NOVELTIES
2026	2026	FLUID MILK	405	B	FLUID PRODUCTS
2026	2026	FLUID MILK	405	C	CULTURED PRODUCTS

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2026	2026	FLUID MILK	405	E	COTTAGE CHEESE AND CULTURED CREAM CHEESE
2026	2026	FLUID MILK	405	G	FLUID MIX FOR ICE CREAM, OTHER DESSERTS
2032	2032	CANNED SPECIALTIES	407	H	CANNED AND MISC. SPECIALTIES
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	A	APPLE JUICE
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	B	APPLE PRODUCTS
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	C	CITRUS PRODUCTS
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	F	CANNED AND PRESERVED FRUITS
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	G	CANNED AND PRESERVED VEGETABLES
2033	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS & JELLI	407	H	CANNED AND PRESERVED SPECIALTIES
2034	2034	DRIED & DEHYDRATED FRUITS, VEGETABLES & SOUP MIX	407	E	DEHYDRATED POTATO PRODUCTS
2034	2034	DRIED & DEHYDRATED FRUITS, VEGETABLES & SOUP MIX	407	F	CANNED AND PRESERVED FRUITS
2034	2034	DRIED & DEHYDRATED FRUITS, VEGETABLES & SOUP MIX	407	G	CANNED AND PRESERVED VEGETABLES
2035	2035	PICKLED FRUITS & VEG., VEG. SAUCES & SEASON., SALAD	407	F	CANNED AND PRESERVED FRUITS
2035	2035	PICKLED FRUITS & VEG., VEG. SAUCES & SEASON., SALAD	407	G	CANNED AND PRESERVED VEGETABLES
2035	2035	PICKLED FRUITS & VEG., VEG. SAUCES & SEASON., SALAD	407	H	CANNED AND MISC SPECIALTIES
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	A	APPLE JUICES
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	G	CANNED AND PRESERVED VEGETABLES
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	C	CITRUS PRODUCTS
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	D	FROZEN POTATO PRODUCTS
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	F	CANNED AND PRESERVED FRUITS
2037	2037	FROZEN FRUITS, FRUIT JUICES & VEGETABLES	407	B	APPLE PRODUCTS
2038	2038	FROZEN SPECIALTIES	407	H	CANNED AND MISCELLANEOUS SPECIALTIES
2041	2041	FLOUR AND OTHER GRAIN MILL PRODUCTS	406	B	CORN DRY MILLING
2041	2041	FLOUR AND OTHER GRAIN MILL PRODUCTS	406	C	NORMAL WHEAT FLOUR MILLING
2041	2041	FLOUR AND OTHER GRAIN MILL PRODUCTS	406	D	BULGUR WHEAT FLOUR MILLING
2043	2043	CEREAL BREAKFAST FOODS	406	H	HOT CEREAL
2043	2043	CEREAL BREAKFAST FOODS	406	I	READY-TO-EAT CEREAL
2044	2044	RICE MILLING	406	E	NORMAL RICE MILLING
2044	2044	RICE MILLING	406	F	PARBOILED RICE PROCESSING
2045	2045	BLENDED AND PREPARED FLOUR		NR	
2046	2046	WET CORN MILLING	406	A	CORN WET MILLING
2046	2046	WET CORN MILLING	406	J	WHEAT STARCH AND GLUTEN
2047	2047	DOG, CAT AND OTHER PET FOOD	406	G	ANIMAL FEED
2048	2047	DOG, CAT, AND OTHER PET FOOD	406	G	ANIMAL FEED
2048	2048	PREPARED FEEDS & FEED INGREDIENTS FOR ANIMALS, FOW	406	G	ANIMAL FEED
2051	2051	BREAD & OTHER BAKERY PRODUCTS, EXCEPT COOKIES &		NR	
2052	2052	COOKIES AND CRACKERS		NR	
2053	2038	FROZEN SPECIALTIES	407	H	CANNED AND MISCELLANEOUS SPECIALTIES
2061	2061	CANE SUGAR, EXCEPT REFINING ONLY	409	D	LOUISIANA RAW CANE SUGAR PROCESSING
2061	2061	CANE SUGAR, EXCEPT REFINING ONLY	409	E	FLORIDA & TEXAS RAW CANESUGAR PROCESSING
2061	2061	CANE SUGAR, EXCEPT REFINING ONLY	409	F	HILO-HANAKUA/HAWAII CANESUGAR PROCESSING
2061	2061	CANE SUGAR, EXCEPT REFINING ONLY	409	G	HAWAIIAN RAW CANE SUGAR PROCESSING
2061	2061	CANE SUGAR, EXCEPT REFINING ONLY	409	H	PUERTO RICAN RAW CANE SUGAR PROCESSING
2062	2062	CANE SUGAR REFINING	409	B	CRYSTALLINE CANE SUGAR REFINING
2062	2062	CANE SUGAR REFINING	409	C	LIQUID CANE SUGAR REFINING
2063	2063	BEET SUGAR	409	A	BEET SUGAR PROCESSING
2064	2065	CANDY & OTHER CONFECTIONARY PRODUCTS		NR	
2066	2066	CHOCOLATE AND COCOA PRODUCTS		NR	
2066	2099	FOOD PREPARATIONS, NEC		NR	
2067	2067	CHEWING GUM		NR	
2068	2034	DRIED & DEHYDRATED FRUITS, VEGETABLES & SOUP MIX		NR	
2068	2065	CANDY & OTHER CONFECTIONARY PRODUCTS		NR	
2068	2099	FOOD PREPARATIONS, NEC		NR	
2074	2074	COTTONSEED OIL MILLS		NR	
2075	2075	SOYBEAN OIL MILLS		NR	
2076	2076	VEG. OIL MILLS, EXCEPT CORN, COTTONSEED & SOYBEAN		NR	
2077	2077	ANIMAL AND MARINE FATS AND OILS	408	O	FISH MEAL PROCESSING
2077	2077	ANIMAL AND MARINE FATS AND OILS		NR	
2079	2079	SHORTENING, TABLE OILS, MARGARINE & OTHER EDIBLE		NR	
2082	2082	MALT BEVERAGES		NR	
2083	2083	MALT		NR	
2084	2084	WINES, BRANDY AND BRANDY SPIRITS		NR	
2085	2085	DISTILLED, RECTIFIED AND BLENDED LIQUORS		NR	
2086	2086	BOTTLED & CANNED SOFT DRINKS & CARBONATED WATERS		NR	
2087	2087	FLAVORING EXTRACTS & FLAVORING SYRUPS, NEC		NR	
2091	2032	CANNED SPECIALTIES			
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	M	BREADED SHRIMP PROC/CONTIGUOUS STATES
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	R	W COAST HAND-BUTCHERED SALMON PROCESSING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	B	CONVENTIONAL BLUE CRAB PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	C	MECHANIZED BLUE CRAB PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	D	NON-REMOTE ALASKAN CRAB MEAT PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	E	REMOTE ALASKAN CRAB MEAT PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	F	NON-REMOTE ALASKAN CRAB/SECTION PROCESS
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	G	REMOTE ALASKAN CRAB/SECTION PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	H	DUNG & TANNER CRAB PROCESS/CONTIG STATES
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	I	NON-REMOTE ALASKAN SHRIMP PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	W	HAND-SHUCKED CLAM PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	X	MECHANIZED CLAM PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	K	NORTHERN SHRIMP PROCESSING/CONTIG STATES
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	Y	PAC COAST HAND-SHUCKED OYSTER PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	N	TUNA PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	Z	AT/GLF COAST HAND-SHUCKED OYSTER PROCESS
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	Q	ALASKAN MECHANIZED SALMON PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AA	STEAMED AND CANNED OYSTER PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	T	ALASKAN BOTTOM FISH PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AB	SARDINE PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	V	NON-ALASKAN MECH BOTTOM FISH PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AC	ALASKAN SCALLOP PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	L	SO NON-BREADED SHRIMP PROCESS/CNTG STS
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	S	WEST COAST MECHANIZED SALMON PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	U	NON-ALASKAN CONV BOTTOM FISH PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	J	REMOTE ALASKAN SHRIMP PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	P	ALASKAN HAND-BUTCHERED SALMON PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AD	NON-ALASKAN SCALLOP PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AE	ALASKAN HERRING FILLET PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AF	NON-ALASKAN HERRING FILLET PROCESSING
2091	2091	CANNED AND CURED FISH AND SEAFOODS	408	AG	ABALONE PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	A	FARM RAISED CATFISH PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	Y	PAC COAST HAND-SHUCKED OYSTER PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	Z	AT/GLF CST HND-SHUCKED OYSTER PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	C	MECHANIZED BLUE CRAB PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AB	SARDINE PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	E	REMOTE ALASKAN CRAB MEAT PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AC	ALASKAN SCALLOP PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	G	REMOTE ALA WHOLE CRAB/SECTION PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AD	NON-ALASKAN SCALLOP PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	I	NON-REMOTE ALASKAN SHRIMP PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AE	ALASKAN HERRING FILLET PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	K	NORTHERN SHRIMP PROCESSING/CONTIG STATES
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AF	NON-ALASKAN HERRING FILLET PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	M	BREADED SHRIMP PROCESSING/CONTIG STATES
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	AG	ABALONE PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	Q	ALASKAN MECHANIZED SALMON PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	P	ALASKAN HAND-BUTCHERED SALMON PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	S	WEST COAST MECHANIZED SALMON PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	U	NON-ALASKAN CONV BOTTOM FISH PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	H	DUNG & TANNER CRAB PROCESS/CONTIG STATES
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	J	REMOTE ALASKAN SHRIMP PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	X	MECHANIZED CLAM PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	D	NON-REMOTE ALASKAN CRAB MEAT PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	F	NON-REMOTE WHOLE CRAB/SECTION PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	W	HAND-SHUCKED CLAM PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	B	CONVENTIONAL BLUE CRAB PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	L	S NON-BREAD SHRIMP PROCESS/CONTIG STATES
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	N	TUNA PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	R	W COAST HAND BUTCHERED SALMON PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	T	ALASKAN BOTTOM FISH PROCESSING
2092	2092	FRESH OR FROZEN PACKAGED FISH AND SEAFOODS	408	V	NON-ALASKAN MECH BOTTOM FISH PROCESSING
2095	2095	ROASTED COFFEE		NR	
2096	2099	FOOD PREPARATIONS, NEC		NR	
2097	2097	MANUFACTURED ICE		NR	
2098	2098	MACARONI, SPAGHETTI, VERMICELLI AND NOODLES		NR	
2099	2099	FOOD PREPARATIONS, NEC		NR	
2111	2111	CIGARETTES		NR	
2121	2121	CIGARS		NR	
2131	2131	TOBACCO (CHEWING AND SMOKING) AND SNUFF		NR	

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2141	2141	TOBACCO STEMMING AND REDRYING		NR	
2211	2211	BROAD WOVEN FABRIC MILLS, COTTON	410	C	LOW WATER USE PROCESSING
2211	2211	BROAD WOVEN FABRIC MILLS, COTTON	410	C	LOW WATER USE PROCESSING
2211	2211	BROAD WOVEN FABRIC MILLS, COTTON	410	D	WOVEN FABRIC FINISHING
2221	2221	BROAD WOVEN FABRIC MILLS, SYNTHETICS	410	D	WOVEN FABRIC FINISHING
2221	2221	BROAD WOVEN FABRIC MILLS, SYNTHETICS	410	C	LOW WATER USE PROCESSING
2221	2221	BROAD WOVEN FABRIC MILLS, SYNTHETICS	410	C	LOW WATER USE PROCESSING
2231	2231	BROAD WOVEN FABRIC MILLS, WOOL	410	B	WOOL FINISHING
2231	2231	BROAD WOVEN FABRIC MILLS, WOOL	410	C	LOW WATER USE PROCESSING
2241	2241	NARROW FABRICS AND OTHER SMALLWARES MILLS	410	C	LOW WATER USE PROCESSING
2241	2241	NARROW FABRICS AND OTHER SMALLWARES MILLS	410	C	LOW WATER USE PROCESSING
2251	2251	WOMEN'S FULL LENGTH & KNEE LENGTH HOSIERY	410	E	KNIT FABRIC FINISHING
2251	2251	WOMEN'S FULL LENGTH & KNEE LENGTH HOSIERY		NR	NO FINISHING
2252	2252	HOSIERY, EXC WOMEN'S FULL LENGTH & KNEE LENGTH	410	E	KNIT FABRIC FINISHING
2252	2252	HOSIERY, EXC WOMEN'S FULL LENGTH & KNEE LENGTH		NR	NO FINISHING
2253	2253	KNIT OUTERWEAR MILLS	410	E	KNIT FABRIC FINISHING
2253	2253	KNIT OUTERWEAR MILLS		NR	NO FINISHING
2254	2254	KNIT UNDERWEAR MILLS	410	E	KNIT FABRIC FINISHING
2254	2254	KNIT UNDERWEAR MILLS		NR	NO FINISHING
2257	2257	CIRCULAR KNIT FABRIC MILLS	410	E	KNIT FABRIC FINISHING
2257	2257	CIRCULAR KNIT FABRIC MILLS		NR	NO FINISHING
2258	2258	WARP KNIT FABRIC MILLS	410	E	KNIT FABRIC FINISHING
2258	2258	WARP KNIT FABRIC MILLS		NR	NO FINISHING
2258	2292	LACE GOODS	410	C	LOW WATER USE PROCESSING
2258	2292	LACE GOODS	410	E	KNIT FABRIC FINISHING
2259	2259	KNITTING MILLS, NEC	410	E	KNIT FABRIC FINISHING
2259	2259	KNITTING MILLS, NEC		NR	NO FINISHING
2261	2261	FINISHERS OF BROAD WOVEN FABRICS OF COTTON	410	D	WOVEN FABRIC FINISHING
2262	2262	FINISHERS OF BROAD WOVEN FABRICS/MAN-MADE FIBER	410	D	WOVEN FABRIC FINISHING
2269	2269	FINISHERS OF TEXTILES, NEC	410	D	WOVEN FABRIC FINISHING
2269	2269	FINISHERS OF TEXTILES, NEC	410	G	STOCK & YARN FINISHING
2273	2271	WOVEN CARPETS AND RUGS	410	C	LOW WATER USE PROCESSING
2273	2271	WOVEN CARPETS AND RUGS	410	F	CARPET FINISHING
2273	2272	TUFTED CARPETS AND RUGS	410	C	LOW WATER USE PROCESSING
2273	2272	TUFTED CARPETS AND RUGS	410	F	CARPET FINISHING
2273	2279	CARPETS AND RUGS, NEC	410	F	CARPET FINISHING
2273	2279	CARPETS AND RUGS, NEC	410	C	LOW WATER USE PROCESSING
2281	2281	YARN SPINNING MILLS:COTTON, MAN-MADE FIBER & SILK	410	C	LOW WATER USE PROCESSING
2281	2281	YARN SPINNING MILLS:COTTON, MAN-MADE FIBER & SILK	410	C	LOW WATER USE PROCESSING
2281	2283	YARN MILLS, WOOL, INCLUDING CARPET & RUG YARN	410	C	LOW WATER USE PROCESSING
2282	2282	YARN TEXTURIZING, THROWING, TWISTING & WINDOW M.	410	C	LOW WATER USE PROCESSING
2282	2282	YARN TEXTURIZING, THROWING, TWISTING & WINDOW M.	410	C	LOW WATER USE PROCESSING
2282	2283	YARN MILLS, WOOL, INCLUDING CARPET AND RUG YARN	410	C	LOW WATER USE PROCESSING
2284	2283	YARN MILLS, WOOL, INCLUDING CARPET & RUG YARN	410	C	LOW WATER USE PROCESSING
2284	2283	YARN MILLS, WOOL, INCLUDING CARPET AND RUG YARN	410	G	STOCK AND YARN FINISHING
2284	2284	THREAD MILLS	410	C	LOW WATER USE PROCESSING
2284	2284	THREAD MILLS	410	G	STOCK AND YARN FINISHING
2295	2295	COATED FABRICS, NOT RUBBERIZED	410	C	LOW WATER USE PROCESSING
2296	2296	TIRE CORD AND FABRIC	410	C	LOW WATER USE PROCESSING
2297	2297	NONWOVEN FABRICS	410	H	NONWOVEN MANUFACTURING
2298	2298	CORDAGE AND TWINE	410	C	LOW WATER USE PROCESSING
2299	2291	FELT GOODS, EXC WOVEN FELTS AND HATS	410	I	FELTED FABRIC PROCESSING
2299	2293	PADDINGS AND UPHOLSTERY FILLING		NR	PADDING AND UPHOLSTERY FILLING
2299	2294	PROCESSED WASTE AND RECOVERED FIBERS AND FLOCK	410	C	LOW WATER USE PROCESSING
2299	2299	TEXTILE GOODS NEC	410	A	WOOL SCOURING
2299	2299	TEXTILE GOODS NEC	410	C	LOW WATER USE PROCESSING
2311	2311	MEN'S, YOUTH'S, BOY'S SHIRTS (EXCEPT WORKSHIRTS)		NR	
2321	2321	MEN'S, YOUTH'S, BOY'S SHIRTS (EXCEPT WORKSHIRTS)		NR	
2322	2321	MEN'S, YOUTH'S, BOY'S SHIRTS (EXCEPT WORKSHIRTS)		NR	
2322	2322	MEN'S, YOUTH'S & BOY'S UNDERWEAR		NR	
2323	2323	MEN'S, YOUTH'S & BOY'S NECKWEAR		NR	
2325	2327	MEN'S, YOUTH'S & BOY'S SEPARATE TROUSERS		NR	
2325	2328	MEN'S, YOUTH'S & BOY'S WORK CLOTHING		NR	
2326	2328	MEN'S, YOUTH'S & BOY'S WORK CLOTHING		NR	
2329	2329	MEN'S, YOUTH'S & BOY'S CLOTHING, NEC		NR	
2331	2331	WOMEN'S, MISSES & JUNIORS' BLOUSES, WAISTS & SHIRT		NR	
2335	2335	WOMEN'S, MISSES' & JUNIORS' DRESSES		NR	
2337	2337	WOMEN'S, MISSES' & JUNIORS' SUITS, SHIRTS & COATS		NR	

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2339	2339	WOMEN'S, MISSES' & JUNIORS' OUTERWEAR, NEC		NR	
2341	2341	WOMEN'S, MISSES', CHILDREN'S & INFANTS' UNDERWEAR		NR	
2342	2342	BRASSIERS, GIRDLES & ALLIED GARMENTS		NR	
2353	2351	MILLINERY		NR	
2353	2352	HATS & COATS, EXCEPT MILLINERY		NR	
2361	2361	GIRL'S, CHILDREN'S & INFANT'S DRESSES, BLOUSES,		NR	
2369	2363	GIRL'S, CHILDREN'S & INFANT'S COATS & SUITS		NR	
2369	2369	GIRL'S, CHILDREN'S & INFANT'S OUTERWEAR, NEC		NR	
2371	2371	FUR GOODS		NR	
2381	2381	DRESS & WORK GLOVES, EXCEPT KNIT & ALL-LEATHER		NR	
2384	2384	ROBES & DRESSING GOWNS		NR	
2385	2385	RAINCOATS & OTHER WATERPROOF OUTER GARMENTS		NR	
2386	2386	LEATHER & SHEEP-LINED CLOTHING		NR	
2387	2387	APPAREL BELTS		NR	
2389	2389	APPAREL & ACCESSORIES, NEC		NR	
2391	2391	CURTAINS & DRAPERIES		NR	
2392	2392	HOUSEFURNISHINGS, EXCEPT CURTAINS & DRAPERIES		NR	
2393	2393	TEXTILE BAGS		NR	
2394	2394	CANVAS & RELATED PRODUCTS		NR	
2395	2395	PLEATING, DECORATIVE & NOVELTY STITCHING		NR	
2396	2396	AUTOMOTIVE TRIMMINGS, APPAREL FINDINGS		NR	
2397	2397	SCHIFFLI MACHINE EMBROIDERIES		NR	
2399	2399	FABRICATED TEXTILE PRODUCTS, NEC		NR	
2411	2411	LOGGING CAMPS AND LOGGING CONTRACTORS	429	I	WET STORAGE
2411	2411	LOGGING CAMPS AND LOGGING CONTRACTORS	429	U	LOG WASHING
2411	2411	LOGGING CAMPS AND LOGGING CONTRACTORS		NR	
2411	2421	SAWMILLS & PLANING MILLS, GENERAL			
2421	2421	SAWMILLS & PLANING MILLS, GENERAL	429	A	BARKING
2421	2421	SAWMILLS & PLANING MILLS, GENERAL	429	K	SAWMILLS AND PLANING MILLS
2421	2421	SAWMILLS & PLANING MILLS, GENERAL	429	L	FINISHING
2426	2426	HARDWOOD DIMENSION & FLOORING MILLS	429	A	BARKING
2426	2426	HARDWOOD DIMENSION & FLOORING MILLS	429	I	WET STORAGE
2426	2426	HARDWOOD DIMENSION & FLOORING MILLS	429	J	LOG WASHING
2426	2426	HARDWOOD DIMENSION & FLOORING MILLS	429	K	SAWMILLS AND PLANING MILLS
2426	2426	HARDWOOD DIMENSION & FLOORING MILLS	429	L	FINISHING
2429	2429	SPECIAL PRODUCT SAWMILLS NEC	429	I	WET STORAGE
2429	2429	SPECIAL PRODUCT SAWMILLS NEC	429	J	LOG WASHING
2429	2429	SPECIAL PRODUCT SAWMILLS NEC	429	K	SAWMILLS AND PLANING MILLS
2429	2429	SPECIAL PRODUCT SAWMILLS NEC	429	L	MILLWORK
2431	2431	MILLWORK	429	K	SAWMILLS AND PLANING MILLS
2431	2431	MILLWORK	429	L	MILLWORK
2431	3442	METAL DOORS, SASH AND TRIM			
2434	2434	WOOD KITCHEN CABINETS	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2434	2434	WOOD KITCHEN CABINETS	429	P	WOOD FURN & FIXTURE PRODUCTION W/WATER
2435	2435	HARDWOOD VENEER AND PLYWOOD	429	A	BARKING
2435	2435	HARDWOOD VENEER AND PLYWOOD	429	B	VENEER
2435	2435	HARDWOOD VENEER AND PLYWOOD	429	C	PLYWOOD
2435	2435	HARDWOOD VENEER AND PLYWOOD	429	I	WET STORAGE
2435	2435	HARDWOOD VENEER AND PLYWOOD	429	J	LOG WASHING
2436	2436	SOFTWOOD VENEER AND PLYWOOD	429	A	BARKING
2436	2436	SOFTWOOD VENEER AND PLYWOOD	429	B	VENEER
2436	2436	SOFTWOOD VENEER AND PLYWOOD	429	C	PLYWOOD
2436	2436	SOFTWOOD VENEER AND PLYWOOD	429	I	WET STORAGE
2436	2436	SOFTWOOD VENEER AND PLYWOOD	429	J	LOG WASHING
2439	2439	STRUCTURAL WOOD MEMBERS, NEC		NR	
2441	2441	NAILED & LOCK CORNER WOOD BOXES & SHOOK		NR	
2448	2448	WOOD PALLETS AND SKIDS		NR	
2449	2449	WOOD CONTAINERS NEC	429	K	SAWMILLS & PLANING MILLS
2451	2451	MOBILE HOMES		NR	
2452	2452	PREFABRICATED WOOD BUILDINGS AND COMPONENTS		NR	
2491	2491	WOOD PRESERVING	429	A	BARKING
2491	2491	WOOD PRESERVING	429	J	LOG WASHING
2491	2491	WOOD PRESERVING	429	G	WOOD PRESERVING-STEAM
2491	2491	WOOD PRESERVING	429	H	WOOD PRESERVING-BOULTONIZING
2491	2491	WOOD PRESERVING	429	I	WET STORAGE
2491	2491	WOOD PRESERVING	429	F	WOOD PRESERVING
2493	2492	PARTICLEBOARD	429	M	PARTICLEBOARD
2493	2499	WOOD PRODUCTS NEC		NR	

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2493	2661	BUILDING PAPER & BUILDINGBOARD MILLS	429	NR	PARTICLEBOARD
2499	2499	WOOD PRODUCTS, NEC	429	M	PARTICLEBOARD
2499	2499	WOOD PRODUCTS, NEC	429	A	BARKING
2499	2499	WOOD PRODUCTS, NEC	429	D	HARDBOARD - DRY PROCESS
2499	2499	WOOD PRODUCTS, NEC	429	E	HARDBOARD - WET PROCESS
2499	2499	WOOD PRODUCTS, NEC	429	I	WET STORAGE
2499	2499	WOOD PRODUCTS, NEC	429	J	LOG WASHING
2499	2499	WOOD PRODUCTS, NEC	429	L	FINISHING
2511	2511	WOOD HOUSEHOLD FURNITURE, EXCEPT UPHOLSTERED	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2511	2511	WOOD HOUSEHOLD FURNITURE, EXCEPT UPHOLSTERED	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2512	2512	WOOD HOUSEHOLD FURNITURE, UPHOLSTERED	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2512	2512	WOOD HOUSEHOLD FURNITURE, UPHOLSTERED	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2514	2514	METAL HOUSEHOLD FURNITURE	433	A	METAL FINISHING
2514	2514	METAL HOUSEHOLD FURNITURE		NR	NO ELECTROPLATING
2515	2515	MATTRESSES AND BEDSPRINGS		NR	
2517	2517	WOOD TV, RADIO, PHONOGRAPH & SEWING MACHINE CABINE	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2517	2517	WOOD TV, RADIO, PHONOGRAPH & SEWING MACHINE CABINE	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2519	2519	HOUSEHOLD FURNITURE, NEC	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2519	2519	HOUSEHOLD FURNITURE, NEC	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2521	2521	WOOD OFFICE FURNITURE	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2521	2521	WOOD OFFICE FURNITURE	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2522	2522	METAL OFFICE FURNITURE	433	A	METAL FINISHING
2522	2522	METAL OFFICE FURNITURE		NR	NO ELECTROPLATING
2522	2599	FURNITURE AND FIXTURES, NEC	433	A	METAL FINISHING
2522	2599	FURNITURE AND FIXTURES, NEC		NR	NO ELECTROPLATING
2531	2531	PUBLIC BUILDING AND RELATED FURNITURE	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2531	2531	PUBLIC BUILDING AND RELATED FURNITURE	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2541	2541	WOOD PARTITIONS, SHELVING, LOCKERS & OFFICE & STOR	429	O	WOOD FURN & FIXTURE PROD W/O WATER
2541	2541	WOOD PARTITIONS, SHELVING, LOCKERS & OFFICE & STOR	429	P	WOOD FURN & FIXTURE PROD W/ WATER
2542	2542	METAL PARTITIONS, SHELVING, LOCKERS & OFFICE & STO	433	A	METAL FINISHING
2542	2542	METAL PARTITIONS, SHELVING, LOCKERS & OFFICE & STO		NR	NO ELECTROPLATING
2542	2599	FURNITURE AND FIXTURES, NEC	433	A	METAL FINISHING
2542	2599	FURNITURE AND FIXTURES, NEC			NO ELECTROPLATING
2591	2591	DRAPERY HARDWARE & WINDOW BLINDS AND SHADES		NR	
2599	2599	FURNITURE AND FIXTURES, NEC	429	O	WOOD FURNITURE & FIXTURE PROD. W/O WATER
2599	2599	FURNITURE AND FIXTURES, NEC	429	P	WOOD FURNITURE & FIXTURE PROD. W/ WATER
2611	2611	PULP MILLS	430	A	UNBLEACHED KRAFT
2611	2611	PULP MILLS	430	B	SEMI-CHEMICAL
2611	2611	PULP MILLS	430	J	PAPER GRADE SULFITE(BLOW PIT WASH)
2611	2611	PULP MILLS	430	D	UNBL KRAFT-NTRL SULFITE-SEMI-CHEM
2611	2611	PULP MILLS	430	G	MARKET BLEACHED KRAFT
2611	2611	PULP MILLS	430	H	BOARD, COARSE & KRAFT BLEACHED KRAFT
2611	2611	PULP MILLS	430	I	FINE BLEACHED KRAFT
2611	2611	PULP MILLS	430	F	DISSOLVING KRAFT
2611	2611	PULP MILLS	430	K	DISSOLVING SULFITE PULP
2611	2611	PULP MILLS	430	L	GROUNDWOOD CHEMI-MECHANICAL
2611	2611	PULP MILLS	430	M	GROUNDWOOD THERMO-MECHANICAL
2611	2611	PULP MILLS	430	N	GROUNDWOOD COARSE, MOLDED & NEWS PAPERS
2611	2611	PULP MILLS	430	O	GROUNDWOOD FINE PAPERS
2611	2611	PULP MILLS	430	P	SODA
2611	2611	PULP MILLS	430	U	PAPER GRADE SULFITE (DRUM WASH)
2611	2611	PULP MILLS	430	V	UNBLEACHED KRAFT & SEMI-CHEMICAL
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	A	UNBLEACHED KRAFT
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	B	SEMI-CHEMICAL
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	D	UNBL KRAFT-NTRL SULFITE SEMI-CHEM
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	F	DISSOLVING KRAFT
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	G	MARKET BLEACHED KRAFT
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	H	BOARD, COARSE & KRAFT BLEACHED KRAFT
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	I	FINE BLEACHED KRAFT
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	J	PAPER GRADE SULFITE(BLOW PIT WASH)
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	O	GROUNDWOOD FINE PAPERS
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	L	GROUNDWOOD CHEMI-MECHANICAL
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	M	GROUNDWOOD THERMO-MECHANICAL
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	N	GROUNDWOOD COARSE, MOLDED & NEWSPAPERS
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	K	DISSOLVING SUFFITE PULP
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	P	SODA
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	U	PAPER GRADE SULFITE (DRUM WASH)
2611	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	V	UNBLEACHED KRAFT AND SEMI-CHEMICAL

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2611	2631	PAPERBOARD MILLS	430	A	UNBLEACHED KRAFT
2611	2631	PAPERBOARD MILLS	430	B	SEMI-CHEMICAL
2611	2631	PAPERBOARD MILLS	430	D	UNBLEACHED KRAFT-NTRL SULFITE-SEMI-CHEM
2611	2631	PAPERBOARD MILLS	430	H	BOARD, COARSE & TISSUE BLEACHED KRAFT
2611	2631	PAPERBOARD MILLS	430	I	FINE BLEACHED KRAFT
2611	2631	PAPERBOARD MILLS	430	J	PAPER GRADE SULFITE (BLOW PIT WASH)
2611	2631	PAPERBOARD MILLS	430	L	GROUNDWOOD CHEMI-MECHANICAL
2611	2631	PAPERBOARD MILLS	430	M	GROUNDWOOD THERMO-MECHANICAL
2611	2631	PAPERBOARD MILLS	430	N	GROUNDWOOD COARSE, MOLDED & NEWSPAPERS
2611	2631	PAPERBOARD MILLS	430	P	SODA
2611	2631	PAPERBOARD MILLS	430	R	NONINTEGRATED FINE PAPERS
2611	2631	PAPERBOARD MILLS	430	V	UNBLEACHED KRAFT & SEMI-CHEMICAL
2611	2631	PAPERBOARD MILLS	430	Y	NONINTEGRATED FILTER AND NONWOVEN PAPERS
2611	2631	PAPERBOARD MILLS	430	O	GROUNDWOOD FINE PAPERS
2611	2631	PAPERBOARD MILLS	430	U	PAPERGRADE SULFITE (DRUM WASH)
2611	2631	PAPERBOARD MILLS	430	X	NONINTEGRATED LIGHTWEIGHT PAPERS
2611	2631	PAPERBOARD MILLS	430	Q	DEINK
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	A	UNBLEACHED KRAFT
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	B	SEMI-CHEMICAL
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	D	UNBLEACHED KRAFT-NTRL SULFITE-SEMI-CHEM
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	U	PAPERGRADE SULFITE (DRUM WASH)
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	V	UNBLEACHED KRAFT & SEMI-CHEMICAL
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	I	FINE BLEACHED KRAFT
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	X	NONINTEGRATED LIGHTWEIGHT PAPERS
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	L	GROUNDWOOD CHEMI-MECHANICAL
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	Y	NONINTEGRATED FILTER AND NONWOVEN PAPERS
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	N	GROUNDWOOD COARSE, MOLDED & NEWSPAPERS
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	P	SODA
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	R	NONINTEGRATED FINE PAPERS
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	H	BOARD, COARSE & TISSUE BLEACHED KRAFT
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	J	PAPER GRADE SULFITE (BLOW PIT WASH)
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	M	GROUNDWOOD THERMO-MECHANICAL
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	O	GROUNDWOOD FINE PAPERS
2621	2621	PAPER MILLS EXCEPT BUILDING PAPER	430	Q	DEINK
2621	2661	BUILDING PAPER & BUILDINGBOARD MILLS	431	A	BUILDER'S PAPER AND ROOFING FELT
2631	2631	PAPERBOARD MILLS	430	A	SEMI-CHEMICAL
2631	2631	PAPERBOARD MILLS	430	D	UNBL KRAFT NTRL SULFITE SEMI-CHEM.
2631	2631	PAPERBOARD MILLS	430	E	PAPERBOARD FROM WASTEPAPER
2631	2631	PAPERBOARD MILLS	430	H	BOARD, COARSE TISSUE BLEACHED KRAFT
2631	2631	PAPERBOARD MILLS	430	S	NONINTEGRATED TISSUE PAPERS
2631	2631	PAPERBOARD MILLS	430	V	UNBLEACHED KRAFT AND SEMI-CHEMICAL
2631	2631	PAPERBOARD MILLS	430	A	UNBLEACHED KRAFT
2631	2631	PAPERBOARD MILLS	430	Z	NONINTEGRATED PAPERBOARD
2652	2652	SET-UP PAPERBOARD BOXES		NR	CONVERTED PAPER
2653	2653	CORRUGATED AND SOLID FIBER BOXES		NR	CONVERTED PAPER
2655	2655	FIBER CANS, TUBES, DRUMS AND SIMILAR PRODUCTS		NR	CONVERTED PAPER
2656	2654	SANITARY FOOD CONTAINERS		NR	CONVERTED PAPER
2657	2651	FOLDING PAPERBOARD BOXES		NR	CONVERTED PAPER
2657	2654	SANITARY FOOD CONTAINERS		NR	CONVERTED PAPER
2671	2641	PAPER COATING AND GLAZING		NR	CONVERTED PAPER
2672	2641	PAPER COATING AND GLAZING		NR	CONVERTED PAPER
2673	2643	BAGS, EXCEPT TEXTILE BAGS		NR	CONVERTED PAPER
2674	2643	BAGS, EXCEPT TEXTILE BAGS		NR	CONVERTED PAPER
2675	2645	DIE-CUT PAPER, PAPERBOARD AND CARDBOARD		NR	CONVERTED PAPER
2676	2647	SANITARY PAPER PRODUCTS		NR	CONVERTED PAPER
2677	2642	ENVELOPES		NR	CONVERTED PAPER
2678	2648	STATIONERY, TABLETS AND RELATED PRODUCTS		NR	CONVERTED PAPER
2679	2646	PRESSED AND MOLDED PULP GOODS		NR	CONVERTED PAPER
2679	2649	CONVERTED PAPER AND PAPERBOARD PRODUCTS, NEC		NR	CONVERTED PAPER
2711	2711	NEWSPAPERS: PUBLISHING, PUBLISHING & PRINTING		NR	
2721	2721	PERIODICALS: PUBLISHING, PUBLISHING & PRINTING		NR	
2731	2731	BOOKS: PUBLISHING, PUBLISHING & PRINTING		NR	
2732	2732	BOOK PRINTING		NR	
2741	2741	MISCELLANEOUS PUBLISHING		NR	
2752	2752	COMMERCIAL PRINTING, LITHOGRAPHIC		NR	
2754	2754	COMMERCIAL PRINTING, GRAVURE		NR	
2759	2751	COMMERCIAL PRINTING, LETTERPRESS & SCREEN		NR	
2759	2753	ENGRAVING & PLATE PRINTING		NR	

APPENDIX F -  
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1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2761	2761	MANIFOLD BUSINESS FORMS		NR	
2771	2771	GREETING CARD PUBLISHING		NR	
2782	2782	BLANKBOOKS, LOOSELEAF BINDERS & DEVICES		NR	
2789	2789	BOOKBINDING & RELATED WORK		NR	
2791	2791	TYPESETTING		NR	
2796	2753	ENGRAVING & PLATE PRINTING		NR	
2796	2754	COMMERCIAL PRINTING, GRAVURE		NR	
2796	2793	PHOTOENGRAVING		NR	
2796	2794	ELECTROTYPING & STEREOTYPING		NR	
2796	2795	LITHOGRAPHIC PLATEMAKING & RELATED SERVICES		NR	
2812	2812	ALKALIES AND CHLORINE	415	F	CHLORINE & SODIUM OR POTASSIUM HYDR.
2812	2812	ALKALIES AND CHLORINE	415	F	CHLORINE & SOD/POT HYDR.(MERCURY CELL)
2812	2812	ALKALIES AND CHLORINE	415	F	CHLORINE & SOD/POT HYDR.(DIAPHRAGM CELL)
2812	2812	ALKALIES AND CHLORINE	415	N	SODIUM BICARBONATE
2812	2812	ALKALIES AND CHLORINE	415	O	SODIUM CARBONATE
2812	2812	ALKALIES AND CHLORINE		NR	POTASSIUM CARBONATE
2812	2812	ALKALIES AND CHLORINE		NR	NON-CONTACT COOLING WATER ONLY
2813	2813	INDUSTRIAL GASES	415	AF	CARBON DIOXIDE
2813	2813	INDUSTRIAL GASES	415	AO	HYDROGEN
2813	2813	INDUSTRIAL GASES	415	AW	OXYGEN & NITROGEN
2813	2813	INDUSTRIAL GASES		NR	GASES,IND COMPRESSED LIQUID/SOLID,NEC
2813	2813	INDUSTRIAL GASES		NR	NITROUS OXIDE
2813	2813	INDUSTRIAL GASES		NR	NON-CONTACT COOLING WATER ONLY
2816	2816	INORGANIC PIGMENTS	415	V	TITANIUM DIOXIDE (SULFATE PROCESS)
2816	2816	INORGANIC PIGMENTS	415	V	TITANIUM DIOXIDE (CHLORIDE PROCESS)
2816	2816	INORGANIC PIGMENTS	415	AH	CHROME PIGMENTS
2816	2816	INORGANIC PIGMENTS		NR	BARYTES PIGMENTS
2816	2816	INORGANIC PIGMENTS	415	BJ	ZINC OXIDE
2816	2816	INORGANIC PIGMENTS		NR	LEAD DIOXIDE, BROWN (PbO2)
2816	2816	INORGANIC PIGMENTS		NR	LEAD OXIDE, RED (Pb3O4)
2816	2816	INORGANIC PIGMENTS		NR	BARIUM SULFATE
2816	2816	INORGANIC PIGMENTS		NR	WHITE LEAD PIGMENT (Pb(OH)2+PbCO)3
2816	2816	INORGANIC PIGMENTS		NR	IRON COLORS
2816	2816	INORGANIC PIGMENTS		NR	IRON OXIDE, BLACK
2816	2816	INORGANIC PIGMENTS		NR	IRON OXIDE, MAGNETIC
2816	2816	INORGANIC PIGMENTS		NR	IRON OXIDE, YELLOW
2816	2816	INORGANIC PIGMENTS		NR	OTHERS
2816	2816	INORGANIC PIGMENTS		NR	SATIN WHITE PIGMENT
2816	2816	INORGANIC PIGMENTS		NR	NON-CONTACT COOLING WATER ONLY
2816	2816	INORGANIC PIGMENTS		NR	ULTRAMARINE PIGMENT
2816	2816	INORGANIC PIGMENTS		NR	UMBERS
2816	2816	INORGANIC PIGMENTS		NR	WHITING
2816	2816	INORGANIC PIGMENTS		NR	SIENNAS
2816	2816	INORGANIC PIGMENTS	415	BL	CADMIUM PIGMENTS
2819	2819	INORGANIC CHEMICALS NEC	415	A	ALUMINUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	B	ALUMINUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	C	CALCIUM CARBIDE
2819	2819	INORGANIC CHEMICALS NEC	415	D	CALCIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	J	NITRIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	G	HYDROCHLORIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	H	HYDROFLUORIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	I	HYDROGEN PEROXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	E	CALCIUM OXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	K	POTASSIUM METAL
2819	2819	INORGANIC CHEMICALS NEC	415	L	POTASSIUM DICHROMATE
2819	2819	INORGANIC CHEMICALS NEC	415	M	POTASSIUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	P	SODIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	Q	SODIUM DICHROMATE/SODIUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	R	SODIUM METAL
2819	2819	INORGANIC CHEMICALS NEC	415	AD	CALCIUM CARBONATE
2819	2819	INORGANIC CHEMICALS NEC	415	AE	CALCIUM HYDROXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	T	SODIUM SULFITE
2819	2819	INORGANIC CHEMICALS NEC	415	AG	CALCIUM MONOXIDE & BY-PRODUCT HYDROGEN
2819	2819	INORGANIC CHEMICALS NEC	415	W	ALUMINUM FLUORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AI	CHROMIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	Y	AMMONIUM HYDROXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AJ	COPPER SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	AA	BORAX



APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2819	2819	INORGANIC CHEMICALS NEC	415	AK	CUPROUS OXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AC	BROMINE
2819	2819	INORGANIC CHEMICALS NEC	415	AL	FERRIC CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	U	SULFURIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	Z	BARIUM CARBONATE
2819	2819	INORGANIC CHEMICALS NEC	415	AB	BORIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	S	SODIUM SILICATE
2819	2819	INORGANIC CHEMICALS NEC	415	X	AMMONIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AM	FERROUS SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	AN	FLUORINE
2819	2819	INORGANIC CHEMICALS NEC	415	AO	HYDROGEN
2819	2819	INORGANIC CHEMICALS NEC	415	AP	HYDROGEN CYANIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AQ	IODINE
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER OXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AR	LEAD MONOXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	SODA ALUM
2819	2819	INORGANIC CHEMICALS NEC	415	AT	MANGANESE SULFATE
2819	2819	INORGANIC CHEMICALS NEC		NR	SODIUM ANTIMONIATE
2819	2819	INORGANIC CHEMICALS NEC	415	AV	NITRIC ACID (STRONG)
2819	2819	INORGANIC CHEMICALS NEC	415	BN	SODIUM CHLORATE
2819	2819	INORGANIC CHEMICALS NEC	415	AY	POTASSIUM IODIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	SODIUM COMPOUNDS, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC	415	BA	SILVER NITRATE
2819	2819	INORGANIC CHEMICALS NEC		NR	SODIUM CYANIDE
2819	2819	INORGANIC CHEMICALS NEC	415	BC	SODIUM FLUORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	STANNIC AND STANNOUS CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	BE	SODIUM HYDROSULFITE
2819	2819	INORGANIC CHEMICALS NEC		NR	STRONTIUM CARBONATE (PRECIPITATED/OXIDE)
2819	2819	INORGANIC CHEMICALS NEC	415	BG	SODIUM THIOSULFATE
2819	2819	INORGANIC CHEMICALS NEC		NR	STRONTIUM NITRATE
2819	2819	INORGANIC CHEMICALS NEC	415	BI	SULFUR DIOXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	SULFIDES & SULFITES
2819	2819	INORGANIC CHEMICALS NEC	415	BK	ZINC SULFATE
2819	2819	INORGANIC CHEMICALS NEC		NR	SULFOCYANIDES
2819	2819	INORGANIC CHEMICALS NEC		NR	ALUMINUM HYDROXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	SULFUR CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	ALUMS
2819	2819	INORGANIC CHEMICALS NEC		NR	SULFUR HEXAFLUORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	AMMONIUM COMPOUNDS
2819	2819	INORGANIC CHEMICALS NEC		NR	THIOCYANATES, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC		NR	AMMONIUM PERCHLORATE
2819	2819	INORGANIC CHEMICALS NEC		NR	TIN COMPOUNDS, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC		NR	BARIUM COMPOUNDS (NOT PRODUCED AT MINES)
2819	2819	INORGANIC CHEMICALS NEC		NR	URANIUM SLAG, RADIOACTIVE
2819	2819	INORGANIC CHEMICALS NEC		NR	BORON COMPOUNDS (NOT PRODUCED AT MINES)
2819	2819	INORGANIC CHEMICALS NEC	415	BO	ZINC CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	BRINE CHEMICALS
2819	2819	INORGANIC CHEMICALS NEC		NR	ZINC SULFIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	CALCIUM HYPOCHLORITE
2819	2819	INORGANIC CHEMICALS NEC		NR	CALCIUM
2819	2819	INORGANIC CHEMICALS NEC		NR	CHLOROSULFONIC ACID
2819	2819	INORGANIC CHEMICALS NEC		NR	NON-CONTACT COOLING ONLY
2819	2819	INORGANIC CHEMICALS NEC		NR	CHROMIUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC	419	E	INTEGRATED REFINERIES (SULFUR RECOVERY)
2819	2819	INORGANIC CHEMICALS NEC	415	BM	COBALT SALTS (COBALT SULFATE)
2819	2819	INORGANIC CHEMICALS NEC	421	A	BAUXITE REFINING
2819	2819	INORGANIC CHEMICALS NEC		NR	COPPER CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	421	A	BAUXITE REFINING (ALUMINA)
2819	2819	INORGANIC CHEMICALS NEC		NR	FISSIONABLE MATERIALS PRODUCTION
2819	2819	INORGANIC CHEMICALS NEC	421	O	BERYLLIUM OXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	HYDRATED ALUMINUM SILICATE
2819	2819	INORGANIC CHEMICALS NEC	422	A	PHOSPHORUS PRODUCTION
2819	2819	INORGANIC CHEMICALS NEC		NR	HYDROPHOSPHITES
2819	2819	INORGANIC CHEMICALS NEC	422	B	PHOSPHORUS CONSUMING
2819	2819	INORGANIC CHEMICALS NEC		NR	INORGANIC ACIDS (EXC HNO2 OR H2PO4)
2819	2819	INORGANIC CHEMICALS NEC	422	C	PHOSPHATE
2819	2819	INORGANIC CHEMICALS NEC		NR	ISOTOPES, RADIOACTIVE
2819	2819	INORGANIC CHEMICALS NEC	422	D	DEFLUORINATED PHOSPHATE ROCK

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SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2819	2819	INORGANIC CHEMICALS NEC		NR	LEAD SILICATE
2819	2819	INORGANIC CHEMICALS NEC	422	E	DEFLUORINATED PHOSPHORIC ACID
2819	2819	INORGANIC CHEMICALS NEC		NR	LUMINOUS COMPOUNDS (RADIUM)
2819	2819	INORGANIC CHEMICALS NEC	422	F	SODIUM PHOSPHATES
2819	2819	INORGANIC CHEMICALS NEC		NR	MANGANESE DIOXIDE (POWDER SYNTHETIC)
2819	2819	INORGANIC CHEMICALS NEC	415	AU	NICKEL SALTS (NICKEL CHLORIDE)
2819	2819	INORGANIC CHEMICALS NEC		NR	MERCURY OXIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AU	NICKEL SALTS (NICKEL NITRATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	NUCLEAR FUEL REACTOR CASES, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC	415	AU	NICKEL SALTS (NICKEL FLUOBORATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	OLEUM (FUMING SULFURIC ACID)
2819	2819	INORGANIC CHEMICALS NEC	415	AU	NICKEL SALTS (NICKEL CARBONATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	PERCHLORIC ACID
2819	2819	INORGANIC CHEMICALS NEC	415	AJ	COPPER SALTS (COPPER CHLORIDE)
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASH ALUM
2819	2819	INORGANIC CHEMICALS NEC	415	AJ	COPPER SALTS (COPPER IODIDE)
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM ALUMINUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	AJ	COPPER SALTS (COPPER NITRATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM CYANIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AJ	COPPER SALTS (COPPER CARBONATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM COMPOUNDS, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC	415	BL	CADIUM SALTS (CADIUM CHLORIDE)
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM NITRATE & SULFATE
2819	2819	INORGANIC CHEMICALS NEC	415	BL	CADIUM SALTS (CADIUM NITRATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	RADIUM LUMINOUS COMPOUNDS
2819	2819	INORGANIC CHEMICALS NEC	415	BL	CADIUM SALTS (CADIUM SULFATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	REAGENT GRADE CHEM (INORG REF FROM TECH)
2819	2819	INORGANIC CHEMICALS NEC	415	BM	COBALT SALTS (COBALT NITRATE)
2819	2819	INORGANIC CHEMICALS NEC		NR	SILICA AMORPHOUS
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER BROMIDE
2819	2819	INORGANIC CHEMICALS NEC	415	BM	COBALT SALTS (COBALT CHLORIDE)
2819	2819	INORGANIC CHEMICALS NEC		NR	COBALT 60 (RADIOACTIVE)
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER CYANIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	COPPER IODIDE
2819	2819	INORGANIC CHEMICALS NEC	415	AS	LITHIUM CARBONATE
2819	2819	INORGANIC CHEMICALS NEC		NR	HEAVY WATER (DEUTERIUM OXIDE)
2819	2819	INORGANIC CHEMICALS NEC	415	AX	POTASSIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	HYDROGEN SULFIDE
2819	2819	INORGANIC CHEMICALS NEC	415	BB	SODIUM BISULFITE
2819	2819	INORGANIC CHEMICALS NEC		NR	INDIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC	415	BF	SODIUM SILICOFLUORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	IODIDES
2819	2819	INORGANIC CHEMICALS NEC	415	BJ	ZINC OXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	LEAD ARSENATE
2819	2819	INORGANIC CHEMICALS NEC		NR	ALUMINUM OXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	LITHIUM COMPOUNDS
2819	2819	INORGANIC CHEMICALS NEC		NR	AMMONIUM MOLYBDATE
2819	2819	INORGANIC CHEMICALS NEC		NR	MAGNESIUM COMPOUNDS (INORGANIC)
2819	2819	INORGANIC CHEMICALS NEC		NR	BLEACHING POWDER
2819	2819	INORGANIC CHEMICALS NEC		NR	MERCURY CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	CALCIUM COMPOUNDS (INORGANIC)
2819	2819	INORGANIC CHEMICALS NEC		NR	NICKEL AMMONIUM SULFATE
2819	2819	INORGANIC CHEMICALS NEC		NR	CHROMIUM OXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	NUCLEAR FUEL SCRAP RE-PROCESSING
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER IODIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	OXIDATION CATALYST FROM PORCELAIN
2819	2819	INORGANIC CHEMICALS NEC	415	AZ	POTASSIUM PERMANGANATE
2819	2819	INORGANIC CHEMICALS NEC		NR	PEROXIDES, INORGANIC
2819	2819	INORGANIC CHEMICALS NEC	415	BH	STANNIC OXIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASH MAGNESIA
2819	2819	INORGANIC CHEMICALS NEC		NR	AMMONIA ALUM
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM BROMIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	BOROSILICATE
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM CHLORATE
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	POTASSIUM HYPOCHLORITE
2819	2819	INORGANIC CHEMICALS NEC	415	BD	SODIUM HYDROSULFIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	AMMONIUM THIOSULFATE

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
2819	2819	INORGANIC CHEMICALS NEC		NR	CERIUM SALTS
2819	2819	INORGANIC CHEMICALS NEC	415	AU	NICKEL SULFATE
2819	2819	INORGANIC CHEMICALS NEC		NR	ALUMINUM COMPOUNDS
2819	2819	INORGANIC CHEMICALS NEC		NR	RADIUM CHLORIDE
2819	2819	INORGANIC CHEMICALS NEC		NR	RARE EARTH METAL SALTS
2819	2819	INORGANIC CHEMICALS NEC		NR	SALTS OF RARE EARTH METALS
2819	2819	INORGANIC CHEMICALS NEC		NR	SILICA GEL
2819	2819	INORGANIC CHEMICALS NEC		NR	SILVER CARBONATE
2819	2869	INDUSTRIAL ORGANIC CHEMICALS NEC		NR	
2821	2821	PLASTIC MATERIALS, SYN RESINS & NONVUL ELASTOMERS	414/416	B	RAYON FIBERS
2821	2821	PLASTIC MATERIALS, SYN RESINS & NONVUL ELASTOMERS	414/416	D	THERMOPLASTIC RESINS
2821	2821	PLASTIC MATERIALS, SYN RESINS & NONVUL ELASTOMERS	414/416	E	THERMOSETTING RESINS
2821	2821	PLASTIC MATERIALS, SYN RESINS & NONVUL ELASTOMERS		NR	NON-CONTACT COOLING WATER ONLY
2821	2821	PLASTIC MATERIALS, SYN RESINS & NONVUL ELASTOMERS	414/416	C	OTHER FIBERS
2822	2822	SYNTHETIC RUBBER (VULCANIZABLE ELASTOMERS)	414/416	D	THERMOPLASTIC RESINS (SILICONES)
2822	2822	SYNTHETIC RUBBER (VULCANIZABLE ELASTOMERS)	428	B	EMULSION CRUMB RUBBER
2822	2822	SYNTHETIC RUBBER (VULCANIZABLE ELASTOMERS)	428	C	SOLUTION CRUMB RUBBER
2822	2822	SYNTHETIC RUBBER (VULCANIZABLE ELASTOMERS)	428	D	LATEX RUBBER
2822	2822	SYNTHETIC RUBBER (VULCANIZABLE ELASTOMERS)		NR	NON-CONTACT COOLING WATER ONLY
2823	2823	CELLULOSIC MAN-MADE FIBERS		NR	NON-CONTACT COOLING WATER ONLY
2823	2823	CELLULOSIC MAN-MADE FIBERS	416	B	RAYON FIBERS
2823	2823	CELLULOSIC MAN-MADE FIBERS	416	C	OTHER FIBERS
2824	2824	SYNTHETIC ORGANIC FIBERS, EXCEPT CELLULOSIC	416	C	OTHER FIBERS
2824	2824	SYNTHETIC ORGANIC FIBERS, EXCEPT CELLULOSIC		NR	NON-CONTACT COOLING WATER ONLY
2833	2833	MEDICINAL CHEMICALS & BOTANICAL PRODUCTS	439	A	FERMENTATION PRODUCTS
2833	2833	MEDICINAL CHEMICALS & BOTANICAL PRODUCTS	439	B	EXTRACTION PRODUCTS
2833	2833	MEDICINAL CHEMICALS & BOTANICAL PRODUCTS	439	C	CHEMICAL SYNTHESIS PRODUCTS
2833	2833	MEDICINAL CHEMICALS & BOTANICAL PRODUCTS		NR	NON-CONTACT COOLING WATER ONLY
2834	2834	PHARMACEUTICAL PREPARATIONS	439	D	MIXING/COMPOUNDING-FORMULATION
2834	2834	PHARMACEUTICAL PREPARATIONS		NR	NON-CONTACT COOLING WATER ONLY
2835	2831	BIOLOGICAL PRODUCTS	439	A	FERMENTATION PRODUCTS
2835	2831	BIOLOGICAL PRODUCTS	439	B	EXTRACTION PRODUCTS
2836	2831	BIOLOGICAL PRODUCTS	439	A	FERMENTATION PRODUCTS
2836	2831	BIOLOGICAL PRODUCTS	439	B	EXTRACTION PRODUCTS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	A	SOAP MANUFACTURING BY BATCH KETTLE
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	B	FATTY ACID MANUFACTURING BY FATSPLITTING
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	C	SOAP MANUFAC BY FATTYACID NEUTRALIZATION
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	D	GLYCERINE CONCENTRATION
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	P	MANUFACTURING OF LIQUID DETERGENTS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	E	GLYCERINE DISTILLATION
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	G	MANUFACTURING OF BAR SOAPS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	H	MANUFACTURING OF LIQUID SOAPS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	O	MANUFACTURING OF SPRAY DRIED DETERGENTS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	F	MANUFACTURING OF SOAP FLAKES & POWDERS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	Q	MANUFACTURING OF DETERGENTS BY DRY BLEND
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	R	MANUFACTURING OF DRUM DRIED DETERGENTS
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS	417	S	MANUFACTURING OF DETERGENT BARS & CAKES
2841	2841	SOAP & OTHER DETERGENTS, EXC SPECIALTY CLEANERS		NR	NON-CONTACT COOLING WATER ONLY
2842	2842	SPECIALTY CLEANING, POLISHING & SANITARY PREP.	417	H	MANUFACTURING OF LIQUID SOAPS
2842	2842	SPECIALTY CLEANING, POLISHING & SANITARY PREP.	417	P	MANUFACTURING OF LIQUID DETERGENTS
2842	2842	SPECIALTY CLEANING, POLISHING & SANITARY PREP.		NR	OTHER PREPARATIONS, NEC
2842	2842	SPECIALTY CLEANING, POLISHING & SANITARY PREP.		NR	NON-CONTACT COOLING WATER ONLY
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.		NR	NON-CONTACT COOLING WATER ONLY
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	I	OLEUM SULFONATION & SULFATION
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	J	AIR-SO3 SULFONATION & SULFATION
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	K	SO3 SOLVENT & VACUUM SULFONATION
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	L	SULFAMIC ACID SULFATION
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	M	CHLOROSULFONIC ACID SULFATION
2843	2843	SURFACE ACTIVE AGENTS, FINISHING AGENTS, ETC.	417	N	NEUTRAL SULFURIC ACID ESTERS & SULFONIC
2844	2844	PERFUMES, COSMETICS & OTHER TOILET PREPARATIONS	417	H	MANUFACTURING OF LIQUID SOAPS
2844	2844	PERFUMES, COSMETICS & OTHER TOILET PREPARATIONS		NR	OTHER PREPARATIONS, NEC
2851	2851	PAINTS/VARNISHES/LACQUERS/ENAMELS & ALLIED PROD		NR	OTHER PAINTS
2851	2851	PAINTS/VARNISHES/LACQUERS/ENAMELS & ALLIED PROD	446	A	OIL-BASE SOLVENT WASH PAINT
2861	2861	GUM AND WOOD CHEMICALS	454	A	CHAR & CHARCOAL BRIQUETTES
2861	2861	GUM AND WOOD CHEMICALS	454	B	GUM ROSIN & TURPENTINE
2861	2861	GUM AND WOOD CHEMICALS		NR	NON-CONTACT COOLING WATER ONLY
2861	2861	GUM AND WOOD CHEMICALS	454	D	TALL OIL, ROSIN, PITCH, FATTY ACIDS
2861	2861	GUM AND WOOD CHEMICALS	454	E	ESSENTIAL OILS

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977	1987		CFR	CFR	CFR
SIC	SIC	1987 SIC TITLE	NUMBER	CODE	DESCRIPTION
CODE	CODE				
2861	2861	GUM AND WOOD CHEMICALS	454	F	ROSIN BASED DERIVATIVES
2861	2861	GUM AND WOOD CHEMICALS	454	C	WOOD ROSIN, TURPENTINE & PINE OIL
2865	2865	CYCLIC CRUDES INTERM., DYES & ORGANIC PIGMENTS	414/416	F	COMMODITY
2865	2865	CYCLIC CRUDES INTERM., DYES & ORGANIC PIGMENTS		NR	NON-CONTACT COOLING WATER ONLY
2865	2865	CYCLIC CRUDES INTERM., DYES & ORGANIC PIGMENTS	414/416	G	BULK
2865	2865	CYCLIC CRUDES INTERM., DYES & ORGANIC PIGMENTS	414/416	H	SPECIALTY
2869	2869	INDUSTRIAL ORGANIC CHEMICALS, NEC	414/416	H	SPECIALTY
2869	2869	INORGANIC CHEMICALS NEC	455	A	ORGANIC PESTICIDE CHEMICALS MFG.
2869	2869	INDUSTRIAL ORGANIC CHEMICALS, NEC	414/416	F	COMMODITY
2869	2869	INDUSTRIAL ORGANIC CHEMICALS, NEC	414/416	G	BULK
2869	2869	INORGANIC CHEMICALS NEC	455	B	METALLO-ORGANIC PESTICIDES
2873	2873	NITROGEN FERTILIZERS	418	B	AMMONIA
2873	2873	NITROGEN FERTILIZERS	418	C	UREA
2873	2873	NITROGEN FERTILIZERS	418	D	AMMONIUM NITRATE
2873	2873	NITROGEN FERTILIZERS	418	E	NITRIC ACID
2873	2873	NITROGEN FERTILIZERS	418	F	AMMONIUM SULFATE PRODUCTION
2874	2874	PHOSPHATIC FERTILIZERS	418	A	PHOSPHATE
2874	2874	PHOSPHATIC FERTILIZERS		NR	NON-CONTACT COOLING WATER ONLY
2875	2875	FERTILIZERS, MIXING ONLY	418	G	MIXED & BLEND FERTILIZER PRODUCTION
2879	2879	PESTICIDES & AGRICULTURAL CHEMICALS NEC	455	C	PESTICIDE CHEMICALS FORMULATING
2891	2891	ADHESIVES AND SEALANTS		NR	ADHESIVES & SEALANTS
2892	2892	EXPLOSIVES	457	A	MANUFACTURE OF EXPLOSIVES
2892	2892	EXPLOSIVES	457	C	EXPLOSIVES LOAD, ASSEMBLE & PACK PLANTS
2892	2892	EXPLOSIVES		NR	NON-CONTACT COOLING WATER ONLY
2893	2893	PRINTING INK	447	A	OIL-BASED SOLVENT WASH INK
2893	2893	PRINTING INK		NR	OTHER INKS
2895	2895	CARBON BLACK	458	A	CARBON BLACK FURNACE PROCESS
2895	2895	CARBON BLACK	458	C	CARBON BLACK CHANNEL PROCESS
2895	2895	CARBON BLACK	458	D	CARBON BLACK LAMP PROCESS
2895	2895	CARBON BLACK		NR	NON-CONTACT COOLING WATER ONLY
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC	417	B	FATTY ACID MFG. BY FAT SPLITTING
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC	424	F	ROSIN-BASED DERIVATIVES
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC	454	D	TALL OIL ROSIN, PITCH & FATTY ACIDS
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC	457	C	EXPLOSIVES LOAD, ASSEMBLE & PACK PLANTS
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC		NR	OTHER CHEMICAL PREPARATIONS NEC
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC		NR	NON-CONTACT COOLING WATER ONLY
2899	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NEC	454	E	ESSENTIAL OILS
2911	2911	PETROLEUM REFINING	419	A	TOPPING
2911	2911	PETROLEUM REFINING	419	B	CRACKING
2911	2911	PETROLEUM REFINING	419	C	PETROCHEMICAL
2911	2911	PETROLEUM REFINING	419	D	LUBE
2911	2911	PETROLEUM REFINING	419	E	INTEGRATED
2911	2911	PETROLEUM REFINING		NR	NON-CONTACT COOLING WATER ONLY
2911	2911	PETROLEUM REFINING	443	A	ASPHALT EMULSION
2951	2951	PAVING MIXTURES AND BLOCKS	443	A	ASPHALT EMULSION
2951	2951	PAVING MIXTURES AND BLOCKS	443	B	ASPHALT CONCRETE
2951	2951	PAVING MIXTURES AND BLOCKS		NR	NON-CONTACT COOLING WATER ONLY
2952	2952	ASPHALT FELT AND COATINGS	443	C	ASPHALT ROOFING
2952	2952	ASPHALT FELT AND COATINGS	443	D	LINOLEUM & PRINTED ASPHALT FELT
2952	2952	ASPHALT FELT AND COATINGS		NR	NON-CONTACT COOLING WATER ONLY
2992	2992	LUBRICATING OILS AND GREASES		NR	LUBE OIL RE-REFINING
2992	2992	LUBRICATING OILS AND GREASES		NR	WASTE OIL RECYCLING
2992	2992	LUBRICATING OILS AND GREASES		NR	OTHER OILS & GREASES NEC
2992	2992	LUBRICATING OILS AND GREASES		NR	NON-CONTACT COOLING WATER ONLY
2999	2999	PRODUCTS OF PETROLEUM AND COAL, NEC		NR	
3011	3011	TIRES AND INNER TUBES	428	A	TIRE & INNER TUBE PLANTS
3011	3011	TIRES AND INNER TUBES		NR	NON-CONTACT COOLING WATER ONLY
3021	3021	RUBBER AND PLASTICS FOOTWEAR	428	E	SM-SIZED GEN MOLDED, EXTR&FABR RUBBERPLNT
3021	3021	RUBBER AND PLASTICS FOOTWEAR	428	F	MD-SIZED GEN MOLDED, EXTR&FABR RUBBERPLNT
3021	3021	RUBBER AND PLASTICS FOOTWEAR	428	G	LG-SIZED GEN MOLDED, EXTR&FABR RUBBERPLNT
3021	3021	RUBBER AND PLASTICS FOOTWEAR	428	J	LATEX-DIPPED, MOLDED, EXTRUDED GOODS
3021	3021	RUBBER AND PLASTICS FOOTWEAR		NR	NON-CONTACT COOLING WATER ONLY
3021	3021	RUBBER AND PLASTICS FOOTWEAR	463	A	CONTACT COOLING & HEATING WATER (PLASTICS)
3021	3021	RUBBER AND PLASTICS FOOTWEAR	463	B	CLEANING (PLASTICS)
3052	3041	RUBBER & PLASTICS HOSE AND BELTING	428	E	SM-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3052	3041	RUBBER & PLASTICS HOSE AND BELTING	428	F	MD-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3052	3041	RUBBER & PLASTICS HOSE AND BELTING	428	G	LG-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3052	3041	RUBBER & PLASTICS HOSE AND BELTING		NR	NON-CONTACT COOLING WATER ONLY

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3052	3041	RUBBER & PLASTICS HOSE AND BELTING	463	A	CONTACT COOLING & HEATING WATER
3052	3041	RUBBER & PLASTICS HOSE AND BELTING	463	B	CLEANING WATER
3053	3293	GASKETS, PACKING & SEALING DEVICES	427	K	WET DUST COLLECTION (ASBESTOS)
3053	3293	GASKETS, PACKING & SEALING DEVICES	428	E	SM-SIZE GEN MOLDED, EXTR&FABR RUBBERPLANT
3053	3293	GASKETS, PACKING & SEALING DEVICES	428	F	MD-SIZE GEN MOLDED, EXTR&FABR RUBBERPLANT
3053	3293	GASKETS, PACKING & SEALING DEVICES	428	G	LG-SIZE GEN MOLDED, EXTR&FABR RUBBERPLANT
3053	3293	GASKETS, PACKING & SEALING DEVICES		NR	NON-RUBBER PRODUCTS
3061	3069	FABRICATED RUBBER PRODUCTS, NEC	428	E	SM-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3061	3069	FABRICATED RUBBER PRODUCTS, NEC	428	F	MD-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3061	3069	FABRICATED RUBBER PRODUCTS, NEC	428	G	LG-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3031	RECLAIMED RUBBER	428	H	WET DIGESTION RECLAIM
3069	3031	RECLAIMED RUBBER	428	I	PAN, DRY DIGESTION, & MECHANICAL RECLAIM
3069	3031	RECLAIMED RUBBER		NR	NON-CONTACT COOLING WATER ONLY
3069	3069	FABRICATED RUBBER PRODUCTS, NEC	428	G	LG-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3069	FABRICATED RUBBER PRODUCTS, NEC	428	F	MD-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3069	FABRICATED RUBBER PRODUCTS, NEC	428	E	SM-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3555	PRINTING TRADES MACHINERY	428	E	SM-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3555	PRINTING TRADES MACHINERY	428	F	MD-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3069	3555	PRINTING TRADES MACHINERY	428	G	LG-SIZED GEN MOLDED, EXTR&FABR RUBBERPLT
3081	3079	MISCELLANEOUS PLASTICS PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3081	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3081	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3081	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3082	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3082	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3082	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3082	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3083	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3083	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3083	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3083	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3084	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3084	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3084	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3084	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER
3085	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3085	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3085	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3085	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3086	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3086	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3086	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3086	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3087	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3087	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3087	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3087	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3088	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3088	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3088	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3088	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3089	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER
3089	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3089	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3089	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3111	3111	LEATHER TANNING AND FINISHING	425	A	HAIR PULP, CHROME TAN, RETAN-WET FINISH
3111	3111	LEATHER TANNING AND FINISHING	425	I	RETAIN-WET FINISH - SPLITS
3111	3111	LEATHER TANNING AND FINISHING		NR	NON-CONTACT COOLING WATER ONLY
3111	3111	LEATHER TANNING AND FINISHING	425	C	HAIR SAVE, NON-CHROME TAN, RETAN-WET FINIS
3111	3111	LEATHER TANNING AND FINISHING	425	E	NO BEAMHOUSE
3111	3111	LEATHER TANNING AND FINISHING	425	G	SHEARLING
3111	3111	LEATHER TANNING AND FINISHING	425	H	PIGSKIN
3111	3111	LEATHER TANNING AND FINISHING	425	B	HAIR SAVE, CHROME TAN, RETAN-WET FINISH
3111	3111	LEATHER TANNING AND FINISHING	425	D	RETAN-WET FINISH SIDES
3111	3111	LEATHER TANNING AND FINISHING	425	F	THROUGH-THE-BLUE
3131	3131	BOOT & SHOE CUT STOCK & FINDINGS		NR	
3142	3142	HOUSE SLIPPERS		NR	
3143	3143	MEN'S FOOTWEAR, EXCEPT ATHLETIC		NR	

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3144	3144	WOMEN'S FOOTWEAR, EXCEPT ATHLETIC		NR	
3149	3149	FOOTWEAR, EXCEPT RUBBER NEC		NR	
3151	3151	LEATHER GLOVES AND MITTENS		NR	
3161	3161	LUGGAGE		NR	
3171	3171	WOMEN'S HANDBAGS AND PURSES		NR	
3172	3172	PERSONAL LEATHER GOODS, EXCEPT WOMEN'S HANDBAGS		NR	
3199	3199	LEATHER GOODS NEC		NR	
3211	3211	FLAT GLASS	426	B	SHEET GLASS MFG
3211	3211	FLAT GLASS	426	C	ROLLED GLASS MFG
3211	3211	FLAT GLASS	426	D	PLATE GLASS MFG
3211	3211	FLAT GLASS	426	E	FLOAT GLASS MFG
3211	3211	FLAT GLASS	426	F	AUTOMOTIVE GLASS TEMPERING
3211	3211	FLAT GLASS	426	G	AUTOMOTIVE GLASS LAMINATING
3221	3221	GLASS CONTAINERS	426	H	GLASS CONTAINER MFG
3229	3229	PRESSED & BLOWN GLASS & GLASSWARE NEC	426	I	MACHINE PRESSED & BLOWN GLASS MFG
3229	3229	PRESSED & BLOWN GLASS & GLASSWARE NEC	426	J	GLASS TUBING (DANNER) MFG
3229	3229	PRESSED & BLOWN GLASS & GLASSWARE NEC	426	K	TELEVISION PICTURE TUBE ENVELOPE MFG
3229	3229	PRESSED & BLOWN GLASS & GLASSWARE NEC	426	L	INCANDESCENT LAMP ENVELOPE MFG
3229	3229	PRESSED & BLOWN GLASS & GLASSWARE NEC	426	M	HAND PRESSED & BLOWN GLASS MFG
3231	3231	GLASS PRODUCTS MADE OF PURCHASED GLASS	426	F	AUTOMOTIVE GLASS TEMPERING
3231	3231	GLASS PRODUCTS MADE OF PURCHASED GLASS	426	G	AUTOMOTIVE GLASS LAMINATING
3241	3241	CEMENT, HYDRAULIC	411	A	NONLEACHING
3241	3241	CEMENT, HYDRAULIC	411	B	LEACHING
3241	3241	CEMENT, HYDRAULIC	411	C	MATERIALS STORAGE PILES RUNOFF
3251	3251	BRICK AND STRUCTURAL CLAY TILE		NR	
3253	3253	CERAMIC WALL AND FLOOR TILE		NR	
3255	3255	CLAY REFRACTORIES		NR	
3259	3259	STRUCTURAL CLAY PRODUCTS NEC		NR	
3261	3261	VITREOUS CHINA PLUMBING FIXTURES, ETC.		NR	
3262	3262	VITREOUS CHINA TABLE & KITCHEN ARTICLES		NR	
3263	3263	FINE EARTHENWARE		NR	
3264	3264	PORCELAIN ELECTRICAL SUPPLIES		NR	
3264	3679	ELECTRONIC COMPONENTS, NEC		NR	
3269	3269	POTTERY PRODUCTS, NEC		NR	
3271	3271	CONCRETE BLOCK & BRICK		NR	
3272	3272	CONCRETE PRODUCTS EXCEPT BLOCK & BRICK		NR	
3273	3273	READY-MIXED CONCRETE		NR	
3274	3274	LIME	415	E	CALCIUM OXIDE PRODUCTION
3274	3274	LIME		NR	OTHER LIME PRODUCTION
3275	3275	GYPSUM PRODUCTS		NR	
3281	3281	CUT STONE & STONE PRODUCTS	436	A	DIMENSION STONE
3291	3291	ABRASIVE PRODUCTS		NR	
3292	3292	ASBESTOS PRODUCTS	427	A	ASBESTOS-CEMENT PIPE
3292	3292	ASBESTOS PRODUCTS	427	B	ASBESTOS-CEMENT SHEET
3292	3292	ASBESTOS PRODUCTS	427	I	SOLVENT RECOVERY
3292	3292	ASBESTOS PRODUCTS	427	F	ASBESTOS ROOFING
3292	3292	ASBESTOS PRODUCTS	427	G	ASBESTOS FLOOR TILE
3292	3292	ASBESTOS PRODUCTS	427	H	COATING OR FINISHING ASBESTOS TEXTILES
3292	3292	ASBESTOS PRODUCTS	427	E	ASBESTOS MILLBOARD
3292	3292	ASBESTOS PRODUCTS	427	J	VAPOR ABSORPTION
3292	3292	ASBESTOS PRODUCTS	427	K	WET DUST COLLECTION
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	J	BARITE
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	W	MAGNESITE
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	X	DIATOMITE
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	AG	KAOLIN
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	AJ	TALC, STEATITE, SOAPSTONE & PYROPHYLLITE
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED	436	AL	GRAPHITE
3295	3295	MINERALS & EARTHS, GROUND OR OTHERWISE TREATED		NR	OTHER MINERALS & EARTHS
3296	3296	MINERAL WOOL	426	A	INSULATION FIBERGLASS
3296	3296	MINERAL WOOL		NR	OTHER MINERAL WOOLS
3299	3299	NONMETALLIC MINERAL PRODUCTS, NEC		NR	
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	A	COKEMAKING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	B	SINTERING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	C	IRONMAKING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	D	STEELMAKING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	E	VACUUM DEGASSING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	F	CONTINUOUS CASTING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	G	HOT FORMING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS		NR	NON-CONTACT COOLING WATER ONLY
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	H	SALT BATH DESCALING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	J	COLD FORMING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	K	ALKALINE CLEANING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	L	HOT COATING
3312	3312	BLAST FURNACES, STEEL WORKS & ROLLING MILLS	420	I	ACID PICKLING
3313	3313	ELECTROMETALLURGICAL PRODUCTS	420	D	STEELMAKING
3313	3313	ELECTROMETALLURGICAL PRODUCTS	420	F	CONTINUOUS CASTING
3313	3313	ELECTROMETALLURGICAL PRODUCTS		NR	NON-CONTACT COOLING WATER ONLY
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	A	OPEN ELECTRIC FURNACES W/WET APC
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	B	COVERED ELECTRIC FURNACES W/WET APC
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	G	ELECTROLYTIC CHROMIUM
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	D	COVERED CALCIUM CARBIDE FURNACES W/WAPC
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	E	OTHER CALCIUM CARBIDE FURNACES
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	F	ELECTROLYTIC MANGANESE PRODUCTS
3313	3313	ELECTROMETALLURGICAL PRODUCTS	424	C	SLAG PROCESSING
3315	3315	STEEL WIRE DRAWING & STEEL NAILS & SPIKES	420	H	SALT BATH DESCALING
3315	3315	STEEL WIRE DRAWING & STEEL NAILS & SPIKES	420	J	COLD FORMING
3315	3315	STEEL WIRE DRAWING & STEEL NAILS & SPIKES	420	K	ALKALINE CLEANING
3315	3315	STEEL WIRE DRAWING & STEEL NAILS & SPIKES	420	I	ACID PICKLING
3316	3316	COLD ROLLED STEEL SHEET, STRIP & BARS	420	J	COLD FORMING
3316	3316	COLD ROLLED STEEL SHEET, STRIP & BARS	420	I	ACID PICKLING
3317	3317	STEEL PIPE AND TUBES	420	H	SALT BATH DESCALING
3317	3317	STEEL PIPE AND TUBES	420	G	HOT FORMING
3317	3317	STEEL PIPE AND TUBES	420	I	ACID PICKLING
3317	3317	STEEL PIPE AND TUBES	420	J	COLD FORMING
3317	3317	STEEL PIPE AND TUBES	420	K	ALKALINE CLEANING
3321	3321	GRAY IRON FOUNDRIES	464	C	FERROUS CASTING
3322	3322	MALLEABLE IRON FOUNDRIES	464	C	FERROUS CASTING
3324	3324	STEEL INVESTMENT FOUNDRIES	464	C	FERROUS CASTING
3325	3325	STEEL FOUNDRIES, NEC	464	C	FERROUS CASTING
3331	3331	PRIMARY SMELTING AND REFINING OF COPPER	421	D	PRIMARY COPPER SMELTING
3331	3331	PRIMARY SMELTING AND REFINING OF COPPER	421	E	PRIMARY ELECTROLYTIC COPPER REFINING
3331	3331	PRIMARY SMELTING AND REFINING OF COPPER	421	I	METALLURGICAL ACID PLANTS
3334	3334	PRIMARY PRODUCTION OF ALUMINUM	421	A	BAUXITE REFINING
3334	3334	PRIMARY PRODUCTION OF ALUMINUM	421	B	PRIMARY ALUMINUM SMELTING
3339	3332	PRIMARY SMELTING AND REFINING OF LEAD	421	G	PRIMARY LEAD
3339	3332	PRIMARY SMELTING AND REFINING OF LEAD	421	I	METALLURGICAL ACID PLANTS
3339	3333	PRIMARY SMELTING AND REFINING OF ZINC	421	H	PRIMARY ZINC
3339	3333	PRIMARY SMELTING AND REFINING OF ZINC	421	I	METALLURGICAL ACID PLANTS
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	I	METALLURGICAL ACID PLANTS(MOLYBDENUM)
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	J	PRIMARY TUNGSTEN
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	K	PRIMARY COLUMBIUM-TANTALUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	N	PRIMARY ANTIMONY
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	O	PRIMARY BERYLLIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	P	PRIMARY BORON
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	Q	PRIMARY CALCIUM & RUBIDIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	R	PRIMARY & SECONDARY GERMANIUM & GALLIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	424	G	ELECTROLYTIC CHROMIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	W	PRIMARY NICKEL & COBALT
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY ARSENIC
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY BARIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	AC	PRIMARY & SECONDARY TIN
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY BISMUTH
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY URANIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY CALCIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY PLATINUM GROUP
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY & SECONDARY INDIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY SELENIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY LITHIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	AA	PRIMARY RARE EARTH METALS
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	AG	PRIMARY ZIRCONIUM & HAFNIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY CADMIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY TELLURIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	AD	PRIMARY & SECONDARY TITANIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	PRIMARY MAGNESIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC		NR	NON-CONTACT COOLING WATER ONLY
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	424	F	ELECTROLYTIC MANGANESE PRODUCTS

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1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	U	PRIMARY MOLYBDENUM & RHENIUM
3339	3339	PRIMARY SMELT & REFIN OF NONFERROUS METALS NEC	421	Y	PRIMARY PRECIOUS METALS & MERCURY
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	C	SECONDARY ALUMINUM SMELTING
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	AB	SECONDARY TANTALUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	AE	SECONDARY TUNGSTEN & COBALT
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	L	SECONDARY SILVER-PHOTOGRAPHIC
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	AF	SECONDARY URANIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	M	SECONDARY LEAD
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	NR	SECONDARY BERYLLIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	T	SECONDARY MERCURY
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	NR	SECONDARY BABBITT
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	X	SECONDARY NICKEL
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	NR	SECONDARY BORON
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	F	SECONDARY COPPER
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	S	SECONDARY INDIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	V	SECONDARY MOLYBDENUM & VANADIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	Z	SECONDARY PRECIOUS METALS
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	421	L	SECONDARY SILVER-NON-PHOTOGRAPHIC
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY COLUMBIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY MAGNESIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY PLUTONIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY TIN
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY TITANIUM
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY ZINC
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	NON-CONTACT COOLING WATER ONLY
3341	3341	SECONDARY SMELT & REFIN OF NONFERROUS METALS	NR	NR	SECONDARY CADMIUM
3351	3351	ROLLING, DRAWING & EXTRUDING OF COPPER	468	A	COPPER FORMING
3351	3351	ROLLING, DRAWING & EXTRUDING OF COPPER	468	B	BERYLLIUM COPPER ALLOY FORMING
3351	3351	ROLLING, DRAWING & EXTRUDING OF COPPER	NR	NR	NON-CONTACT COOLING WATER ONLY
3353	3353	ALUMINUM SHEET, PLATE AND FOIL	464	A	ALUMINUM CASTING
3353	3353	ALUMINUM SHEET, PLATE AND FOIL	467	A	ROLLING WITH NEAT OILS
3353	3353	ALUMINUM SHEET, PLATE AND FOIL	467	B	ROLLING WITH EMULSIONS
3353	3353	ALUMINUM SHEET, PLATE AND FOIL	NR	NR	NON-CONTACT COOLING WATER ONLY
3354	3354	ALUMINUM EXTRUDED PRODUCTS	467	C	EXTRUSION
3354	3354	ALUMINUM EXTRUDED PRODUCTS	467	E	DRAWING WITH NEAT OILS
3354	3354	ALUMINUM EXTRUDED PRODUCTS	467	F	DRAWING WITH EMULSIONS OR SOAPS
3354	3354	ALUMINUM EXTRUDED PRODUCTS	NR	NR	NON-CONTACT COOLING WATER ONLY
3355	3355	ALUMINUM ROLLING & DRAWING NEC	464	A	ALUMINUM CASTING
3355	3355	ALUMINUM ROLLING & DRAWING NEC	467	A	ROLLING WITH NEAT OILS
3355	3355	ALUMINUM ROLLING & DRAWING NEC	467	B	ROLLING WITH EMULSIONS
3355	3355	ALUMINUM ROLLING & DRAWING NEC	467	E	DRAWING WITH NEAT OILS
3355	3355	ALUMINUM ROLLING & DRAWING NEC	467	F	DRAWING WITH EMULSIONS OR SOAPS
3355	3355	ALUMINUM ROLLING & DRAWING NEC	NR	NR	NON-CONTACT COOLING WATER ONLY
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	A	BERYLLIUM FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	B	LEAD/TIN/BISMUTH FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	D	NICKEL-COBALT FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	E	PRECIOUS METALS FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	F	REFRACTORY METALS FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	G	TITANIUM FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	H	URANIUM FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	I	ZINC FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	471	J	ZIRCONIUM/HAFNIUM FORMING
3356	3356	ROLLING, DRAWING & EXTRUDING NONFERROUS METALS	NR	NR	NON-CONTACT COOLING WATER ONLY
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	433	A	METAL FINISHING
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	463	A	CONTACT COOLING&HEATING WATER(PLASTICS)
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	463	B	CLEANING & FINISHING WATER (PLASTICS)
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	467	E	DRAWING WITH NEAT OILS (ALUMINUM)
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	467	F	DRAWING W/ EMULSIONS OR SOAPS (ALUMINUM)
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	468	A	COPPER FORMING
3357	3357	DRAWING & INSULATING OF NONFERROUS WIRE	NR	NR	NON-CONTACT COOLING WATER ONLY
3363	3361	ALUMINUM FOUNDRIES (CASTING)	464	A	ALUMINUM CASTING
3364	3362	BRASS, BRONZE, COPPER, COPPER BASE ALLOY FOUNDRY	464	B	COPPER CASTING
3364	3369	NONFERROUS FOUNDRIES (CASTINGS)NEC	464	B	COPPER CASTING
3365	3361	ALUMINUM FOUNDRIES (CASTING)	464	A	ALUMINUM CASTING
3366	3362	BRASS, BRONZE, COPPER, COPPER BASE ALLOY FOUNDRY	464	B	COPPER CASTING
3369	3369	NONFERROUS FOUNDRIES, NEC	464	D	ZINC CASTING
3398	3398	METAL HEAT TREATING	433	A	METAL FINISHING
3399	3399	PRIMARY METAL PRODUCTS, NEC	433	A	METAL FINISHING



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SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3399	3399	PRIMARY METAL PRODUCTS, NEC	471	K	METAL POWDERS
3399	3399	PRIMARY METAL PRODUCTS, NEC		NR	OTHER PRODUCTS
3411	3411	METAL CANS	465	D	CAN MAKING
3412	3412	METAL BARRELS, DRUMS AND PAILS	433	A	METAL FINISHING
3412	3412	METAL BARRELS, DRUMS AND PAILS		NR	DRUM RECYCLING
3412	3412	METAL BARRELS, DRUMS AND PAILS		NR	NO ELECTROPLATING
3421	3421	CUTLERY	433	A	METAL FINISHING
3421	3421	CUTLERY		NR	NO ELECTROPLATING
3423	3423	HAND AND EDGE TOOLS, NEC	433	A	METAL FINISHING
3423	3423	HAND AND EDGE TOOLS, NEC		NR	NO ELECTROPLATING
3423	3555	PRINTING TRADES MACHINERY	433	A	METAL FINISHING
3425	3425	HAND SAWS AND SAW BLADES	433	A	METAL FINISHING
3429	3429	HARDWARE, NEC	433	A	METAL FINISHING
3429	3429	HARDWARE, NEC		NR	NO ELECTROPLATING
3431	3431	METAL SANITARY WARE	466	B	CAST IRON BASIS MATERIAL
3432	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	A	CONTACT COOLING & HEATING WATER
3432	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	B	CLEANING WATER
3432	3079	MISCELLANEOUS PLASTIC PRODUCTS	463	C	FINISHING WATER
3432	3079	MISCELLANEOUS PLASTIC PRODUCTS		NR	NON CONTACT COOLING WATER ONLY
3432	3432	PLUMBING FITTINGS AND BRASS GOODS		NR	NO ELECTROPLATING
3432	3432	PLUMBING FITTINGS AND BRASS GOODS	433	A	METAL FINISHING
3432	3432	PLUMBING FITTINGS AND BRASS GOODS	468	A	COPPER FORMING
3433	3433	HEATING EQUIPMENT, EXCEPT ELECTRIC	433	A	METAL FINISHING
3433	3433	HEATING EQUIPMENT, EXCEPT ELECTRIC		NR	NO ELECTROPLATING
3441	3441	FABRICATED STRUCTURAL METAL		NR	
3442	3442	METAL DOORS, SASH, AND TRIM	433	A	METAL FINISHING
3442	3442	METAL DOORS, SASH, AND TRIM		NR	NO ELECTROPLATING
3443	3443	FABRICATED PLATE WORK (BOILER SHOPS)		NR	
3444	3444	SHEET METAL WORK		NR	
3446	3446	ARCHITECTURAL METAL WORK		NR	
3448	3448	PREFABRICATED METAL BUILDINGS		NR	
3449	3444	SHEET METAL WORK		NR	
3449	3449	MISCELLANEOUS METAL WORK		NR	
3449	3469	METAL STAMPINGS, NEC		NR	
3451	3451	SCREW MACHINE PRODUCTS	433	A	METAL FINISHING
3451	3451	SCREW MACHINE PRODUCTS		NR	NO ELECTROPLATING
3452	3452	BOLTS, NUTS, RIVETS AND WASHERS	433	A	METAL FINISHING
3452	3452	BOLTS, NUTS, RIVETS AND WASHERS		NR	NO ELECTROPLATING
3462	3462	IRON AND STEEL FORGINGS	433	A	METAL FINISHING
3462	3462	IRON AND STEEL FORGINGS		NR	NO ELECTROPLATING
3463	3463	NONFERROUS FORGINGS	433	A	METAL FINISHING
3463	3463	NONFERROUS FORGINGS	467	D	FORGING (ALUMINUM)
3463	3463	NONFERROUS FORGINGS	468	A	COPPER FORMING
3463	3463	NONFERROUS FORGINGS	471	A	BERYLLIUM FORMING
3463	3463	NONFERROUS FORGINGS	471	B	LEAD/TIN/BISMUTH FORMING
3463	3463	NONFERROUS FORGINGS	471	C	MAGNESIUM FORMING
3463	3463	NONFERROUS FORGINGS	471	D	NICKEL-COBALT FORMING
3463	3463	NONFERROUS FORGINGS	471	E	PRECIOUS METALS FORMING
3463	3463	NONFERROUS FORGINGS	471	J	ZIRCONIUM/HAFNIUM FORMING
3463	3463	NONFERROUS FORGINGS	471	G	TITANIUM FORMING
3463	3463	NONFERROUS FORGINGS	471	H	URANIUM FORMING
3463	3463	NONFERROUS FORGINGS	471	I	ZINC FORMING
3463	3463	NONFERROUS FORGINGS	471	F	REFRACTORY METALS FORMING
3463	3463	NONFERROUS FORGINGS		NR	NON-CONTACT COOLING WATER ONLY
3465	3465	AUTOMOTIVE STAMPINGS	433	A	METAL FINISHING
3465	3465	AUTOMOTIVE STAMPINGS		NR	NO ELECTROPLATING
3466	3466	CROWNS AND CLOSURES	433	A	METAL FINISHING
3466	3466	CROWNS AND CLOSURES		NR	NO ELECTROPLATING
3469	3469	METAL STAMPINGS, NEC		NR	
3471	3471	PLATING AND POLISHING	433	A	METAL FINISHING
3479	3479	METAL COATING AND ALLIED SERVICES	420	L	HOT COATING
3479	3479	METAL COATING AND ALLIED SERVICES	433	A	METAL FINISHING
3479	3479	METAL COATING AND ALLIED SERVICES		NR	NO ELECTROPLATING/COATING
3479	3479	METAL COATING AND ALLIED SERVICES	465	A	STEEL BASIS MATERIAL COATING
3479	3479	METAL COATING AND ALLIED SERVICES	465	B	GALVANIZED BASIS MATERIAL COATING
3479	3479	METAL COATING AND ALLIED SERVICES	465	C	ALUMINUM BASIS MATERIAL COATING
3482	3482	SMALL ARMS AMMUNITION	433	A	METAL FINISHING
3482	3482	SMALL ARMS AMMUNITION	457	C	EXPLOSIVES LOAD, ASSEMBLE & PACK PLANTS

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3482	3482	SMALL ARMS AMMUNITION		NR	NO ELECTROPLATING/EXPLOSIVES
3482	3482	SMALL ARMS AMMUNITION	463	A	CONTACT COOLING&HEATING WATER(PLASTICS)
3482	3482	SMALL ARMS AMMUNITION	463	B	CLEANING WATER (PLASTICS)
3483	3483	AMMUNITION, EXC. FOR SMALL ARMS, NEC	433	A	METAL FINISHING
3483	3483	AMMUNITION, EXC. FOR SMALL ARMS, NEC	457	C	EXPLOSIVES LOAD, ASSEMBLE & PACK PLANTS
3483	3483	AMMUNITION, EXC. FOR SMALL ARMS, NEC		NR	NO ELECTROPLATING/EXPLOSIVES
3484	3484	SMALL ARMS	433	A	METAL FINISHING
3484	3484	SMALL ARMS		NR	NO ELECTROPLATING
3489	3489	ORDNANCE AND ACCESSORIES, NEC	433	A	METAL FINISHING
3489	3489	ORDNANCE AND ACCESSORIES, NEC		NR	NO ELECTROPLATING
3491	3494	VALVES AND PIPE FITTINGS	433	A	METAL FINISHING
3492	3494	VALVES AND PIPE FITTINGS	433	A	METAL FINISHING
3492	3494	VALVES AND PIPE FITTINGS		NR	NO ELECTROPLATING
3492	3728	AIRCRAFT EQUIPMENT, NEC	433	A	METAL FINISHING
3492	3728	AIRCRAFT EQUIPMENT, NEC		NR	NO ELECTROPLATING
3493	3493	STEEL SPRINGS, EXCEPT WIRE	433	A	METAL FINISHING
3493	3493	STEEL SPRINGS, EXCEPT WIRE		NR	NO ELECTROPLATING
3494	3494	VALVES AND PIPE FITTINGS	433	A	METAL FINISHING
3494	3494	VALVES AND PIPE FITTINGS		NR	NO ELECTROPLATING
3494	3494	VALVES AND PIPE FITTINGS		NR	NO ELECTROPLATING
3495	3495	WIRE SPRINGS	433	A	METAL FINISHING
3495	3495	WIRE SPRINGS		NR	NO ELECTROPLATING
3496	3496	MISC. FABRICATED WIRE PRODUCTS	433	A	METAL FINISHING
3496	3496	MISC. FABRICATED WIRE PRODUCTS		NR	NO ELECTROPLATING
3497	3497	METAL FOIL AND LEAF	468	A	COPPER FORMING
3497	3497	METAL FOIL AND LEAF	471	E	PRECIOUS METALS FORMING
3497	3497	METAL FOIL AND LEAF	465	C	ALUMINUM BASIS MATERIAL COATING
3497	3497	METAL FOIL AND LEAF	471	B	LEAD/TIN/BISMUTH FORMING
3497	3497	METAL FOIL AND LEAF	471	C	MAGNESIUM FORMING
3497	3497	METAL FOIL AND LEAF	471	D	NICKEL-COBALT FORMING
3497	3497	METAL FOIL AND LEAF	471	A	BERYLLIUM FORMING
3497	3497	METAL FOIL AND LEAF	471	F	REFRACTORY METALS FORMING
3497	3497	METAL FOIL AND LEAF	471	G	TITANIUM FORMING
3497	3497	METAL FOIL AND LEAF	471	H	URANIUM FORMING
3497	3497	METAL FOIL AND LEAF	471	I	ZINC FORMING
3497	3497	METAL FOIL AND LEAF	471	J	ZIRCONIUM/HAFNIUM FORMING
3498	3498	FABRICATED PIPE AND FITTINGS	433	A	METAL FINISHING
3498	3498	FABRICATED PIPE AND FITTINGS		NR	NO ELECTROPLATING
3499	3499	FABRICATED METAL PRODUCTS, NEC	433	A	METAL FINISHING
3499	3499	FABRICATED METAL PRODUCTS, NEC		NR	NO ELECTROPLATING
3511	3511	TURBINES AND TURBINE GENERATOR SETS	433	A	METAL FINISHING
3511	3511	TURBINES AND TURBINE GENERATOR SETS		NR	NO ELECTROPLATING
3519	3519	INTERNAL COMBUSTION ENGINES, NEC	433	A	METAL FINISHING
3519	3519	INTERNAL COMBUSTION ENGINES, NEC		NR	NO ELECTROPLATING
3523	3523	FARM MACHINERY AND EQUIPMENT	433	A	METAL FINISHING
3523	3523	FARM MACHINERY AND EQUIPMENT		NR	NO ELECTROPLATING
3523	3555	PRINTING TRADES MACHINERY		NR	NO ELECTROPLATING
3524	3524	LAWN AND GARDEN EQUIPMENT	433	A	METAL FINISHING
3524	3524	LAWN AND GARDEN EQUIPMENT		NR	NO ELECTROPLATING
3531	3531	CONSTRUCTION MACHINERY	433	A	METAL FINISHING
3531	3531	CONSTRUCTION MACHINERY		NR	NO ELECTROPLATING
3531	3536	HOISTS, CRANES AND MONORAILS		NR	NO ELECTROPLATING
3532	3532	MINING MACHINERY	433	A	METAL FINISHING
3532	3532	MINING MACHINERY		NR	NO ELECTROPLATING
3533	3533	OIL FIELD MACHINERY	433	A	METAL FINISHING
3533	3533	OIL FIELD MACHINERY		NR	NO ELECTROPLATING
3534	3534	ELEVATORS AND MOVING STAIRWAYS	433	A	METAL FINISHING
3534	3534	ELEVATORS AND MOVING STAIRWAYS		NR	NO ELECTROPLATING
3535	3535	CONVEYORS AND CONVEYING EQUIPMENT	433	A	METAL FINISHING
3535	3535	CONVEYORS AND CONVEYING EQUIPMENT		NR	NO ELECTROPLATING
3536	3536	HOISTS, CRANES AND MONORAILS	433	A	METAL FINISHING
3536	3536	HOISTS, CRANES AND MONORAILS	433	A	METAL FINISHING
3536	3536	HOISTS, CRANES AND MONORAILS		NR	NO ELECTROPLATING
3536	3536	HOISTS, CRANES AND MONORAILS		NR	NO ELECTROPLATING
3537	3536	HOISTS, CRANES AND MONORAILS	433	A	METAL FINISHING
3537	3537	INDUSTRIAL TRUCKS AND TRACTORS	433	A	METAL FINISHING
3537	3537	INDUSTRIAL TRUCKS AND TRACTORS		NR	NO ELECTROPLATING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3541	3541	MACHINE TOOLS, METAL CUTTING TYPES	433	A	METAL FINISHING
3541	3541	MACHINE TOOLS, METAL CUTTING TYPES		NR	NO ELECTROPLATING
3542	3542	MACHINE TOOLS, METAL FORMING TYPES	433	A	METAL FINISHING
3542	3542	MACHINE TOOLS, METAL FORMING TYPES		NR	NO ELECTROPLATING
3543	3565	INDUSTRIAL PATTERNS	433	A	METAL FINISHING
3543	3565	INDUSTRIAL PATTERNS		NR	NO ELECTROPLATING
3544	3544	SPECIAL DIES, TOOLS, JIGS & FIXTURES	433	A	METAL FINISHING
3544	3544	SPECIAL DIES, TOOLS, JIGS & FIXTURES		NR	NO ELECTROPLATING
3545	3545	MACHINE TOOL ACCESSORIES	433	A	METAL FINISHING
3545	3545	MACHINE TOOL ACCESSORIES		NR	NO ELECTROPLATING
3546	3546	POWER DRIVEN HAND TOOLS	433	A	METAL FINISHING
3546	3546	POWER DRIVEN HAND TOOLS		NR	NO ELECTROPLATING
3547	3547	ROLLING MILL MACHINERY	433	A	METAL FINISHING
3547	3547	ROLLING MILL MACHINERY		NR	NO ELECTROPLATING
3548	3549	METALWORKING MACHINERY, NEC	433	A	METAL FINISHING
3548	3549	METALWORKING MACHINERY, NEC		NR	NO ELECTROPLATING
3548	3623	WELDING APPARATUS, ELECTRIC		NR	NO ELECTROPLATING
3548	3623	WELDING APPARATUS		NR	NO ELECTROPLATING
3549	3549	METALWORKING MACHINERY, NEC	433	A	METAL FINISHING
3549	3549	METALWORKING MACHINERY, NEC		NR	NO ELECTROPLATING
3552	3552	TEXTILE MACHINERY	433	A	METAL FINISHING
3552	3552	TEXTILE MACHINERY		NR	NO ELECTROPLATING
3553	3553	WOODWORKING MACHINERY	433	A	METAL FINISHING
3553	3553	WOODWORKING MACHINERY		NR	NO ELECTROPLATING
3554	3554	PAPER INDUSTRIES MACHINERY	433	A	METAL FINISHING
3554	3554	PAPER INDUSTRIES MACHINERY		NR	NO ELECTROPLATING
3555	3555	PRINTING TRADES MACHINERY	433	A	METAL FINISHING
3555	3555	PRINTING TRADES MACHINERY		NR	NO ELECTROPLATING
3559	3549	METALWORKING MACHINERY, NEC	433	A	METAL FINISHING
3559	3549	METALWORKING MACHINERY, NEC		NR	NO ELECTROPLATING
3559	3559	SPECIAL INDUSTRY MACHINERY, NEC	433	A	METAL FINISHING
3559	3559	SPECIAL INDUSTRY MACHINERY, NEC		NR	NO ELECTROPLATING
3559	3636	SEWING MACHINES	433	A	METAL FINISHING
3559	3636	SEWING MACHINES		NR	NO ELECTROPLATING
3561	3561	PUMPS AND PUMPING EQUIPMENT	433	A	METAL FINISHING
3561	3561	PUMPS AND PUMPING EQUIPMENT		NR	NO ELECTROPLATING
3562	3562	BALL AND ROLLER BEARINGS	433	A	METAL FINISHING
3562	3562	BALL AND ROLLER BEARINGS		NR	NO ELECTROPLATING
3563	3563	AIR AND GAS COMPRESSORS	433	A	METAL FINISHING
3563	3563	AIR AND GAS COMPRESSORS		NR	NO ELECTROPLATING
3564	3564	BLOWER AND FANS	433	A	METAL FINISHING
3564	3564	BLOWER AND FANS		NR	NO ELECTROPLATING
3565	3551	FOOD PRODUCTS MACHINERY	433	A	METAL FINISHING
3565	3569	GENERAL INDUSTRIAL MACHINERY, NEC		NR	NO ELECTROPLATING
3565	3569	GENERAL INDUSTRIAL MACHINERY, NEC	433	A	METAL FINISHING
3566	3566	SPEED CHANGERS, DRIVES AND GEARS		NR	NO ELECTROPLATING
3566	3566	SPEED CHANGERS, DRIVES AND GEARS	433	A	METAL FINISHING
3567	3433	HEATING EQUIPMENT, EXCEPT ELECTRIC	433	A	METAL FINISHING
3567	3433	HEATING EQUIPMENT, EXCEPT ELECTRIC		NR	NO ELECTROPLATING
3567	3567	INDUSTRIAL FURNACES AND OVENS	433	A	METAL FINISHING
3567	3567	INDUSTRIAL FURNACES AND OVENS		NR	NO ELECTROPLATING
3568	3568	POWER TRANSMISSION EQUIPMENT, NEC	433	A	METAL FINISHING
3568	3568	POWER TRANSMISSION EQUIPMENT, NEC		NR	NO ELECTROPLATING
3569	3569	GENERAL INDUSTRIAL MACHINERY, NEC	433	A	METAL FINISHING
3569	3569	GENERAL INDUSTRIAL MACHINERY, NEC		NR	NO ELECTROPLATING
3571	3573	ELECTRONIC COMPUTING EQUIPMENT	433	A	METAL FINISHING
3571	3573	ELECTRONIC COMPUTING EQUIPMENT		NR	NO ELECTROPLATING
3572	3573	ELECTRONIC COMPUTING EQUIPMENT	433	A	METAL FINISHING
3572	3573	ELECTRONIC COMPUTING EQUIPMENT		NR	NO ELECTROPLATING
3575	3573	ELECTRONIC COMPUTING EQUIPMENT		NR	NO ELECTROPLATING
3575	3573	ELECTRONIC COMPUTING EQUIPMENT	433	A	METAL FINISHING
3575	3661	TELEPHONE AND TELEGRAPH APPARATUS		NR	
3577	3573	ELECTRONIC COMPUTING EQUIPMENT	433	A	METAL FINISHING
3577	3573	ELECTRONIC COMPUTING EQUIPMENT		NR	NO ELECTROPLATING
3578	3574	CALCULATING AND ACCOUNTING MACHINES	433	A	METAL FINISHING
3578	3574	CALCULATING AND ACCOUNTING MACHINES		NR	NO ELECTROPLATING
3579	3572	TYPEWRITERS	433	A	METAL FINISHING
3579	3572	TYPEWRITERS		NR	NO ELECTROPLATING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 : 1987 SIC SIC CODE CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3579 3579	OFFICE MACHINES, NEC	433	A	METAL FINISHING
3579 3579	OFFICE MACHINES, NEC		NR	NO ELECTROPLATING
3581 3581	AUTOMATIC MERCHANDISING MACHINES	433	A	METAL FINISHING
3581 3581	AUTOMATIC MERCHANDISING MACHINES		NR	NO ELECTROPLATING
3582 3582	COMMERCIAL LAUNDRY EQUIPMENT	433	A	METAL FINISHING
3582 3582	COMMERCIAL LAUNDRY EQUIPMENT		NR	NO ELECTROPLATING
3585 3585	REFRIGERATION AND HEATING EQUIPMENT	433	A	METAL FINISHING
3585 3585	REFRIGERATION AND HEATING EQUIPMENT		NR	NO ELECTROPLATING
3585 3699	ELECTRICAL MACHINERY, EQUIPMENT & SUPPLIES, NEC	433	A	METAL FINISHING
3586 3586	MEASURING AND DISPENSING PUMPS	433	A	METAL FINISHING
3586 3586	MEASURING AND DISPENSING PUMPS		NR	NO ELECTROPLATING
3589 3589	SERVICE INDUSTRY MACHINERY, NEC	433	A	METAL FINISHING
3589 3589	SERVICE INDUSTRY MACHINERY, NEC		NR	NO ELECTROPLATING
3592 3592	CARBURETORS, PISTONS, RINGS, VALVES	433	A	METAL FINISHING
3592 3592	CARBURETORS, PISTONS, RINGS, VALVES		NR	NO ELECTROPLATING
3593 3599	MACHINERY, EXCEPT ELECTRICAL, NEC	433	A	METAL FINISHING
3593 3599	MACHINERY, EXCEPT ELECTRICAL		NR	NO ELECTROPLATING
3593 3728	AIRCRAFT EQUIPMENT, NEC		NR	NO ELECTROPLATING
3593 3728	AIRCRAFT EQUIPMENT, NEC	433	A	METAL FINISHING
3594 3561	PUMPS AND PUMPING EQUIPMENT		NR	NO ELECTROPLATING
3594 3561	PUMPS AND PUMPING EQUIPMENT	433	A	METAL FINISHING
3594 3566	SPEED CHANGERS, DRIVES AND GEARS	433	A	METAL FINISHING
3594 3566	SPEED CHANGERS, DRIVES AND GEARS		NR	NO ELECTROPLATING
3594 3569	GENERAL INDUSTRIAL MACHINERY, NEC	433	A	METAL FINISHING
3594 3569	GENERAL INDUSTRIAL MACHINERY, NEC		NR	NO ELECTROPLATING
3594 3728	AIRCRAFT EQUIPMENT, NEC		NR	NO ELECTROPLATING
3594 3728	AIRCRAFT EQUIPMENT, NEC	433	A	METAL FINISHING
3596 3576	SCALES AND BALANCES, EXC. LABORATORY	433	A	METAL FINISHING
3596 3576	SCALES AND BALANCES, EXC. LABORATORY		NR	NO ELECTROPLATING
3599 3599	MACHINERY, EXCEPT ELECTRICAL		NR	NO ELECTROPLATING
3599 3599	MACHINERY, EXCEPT ELECTRICAL	433	A	METAL FINISHING
3612 3612	TRANSFORMERS	433	A	METAL FINISHING
3612 3612	TRANSFORMERS		NR	NO ELECTROPLATING
3612 3612	TRANSFORMERS		NR	DRY TRANSFORMERS
3613 3613	SWITCHGEAR AND SWITCHBOARD APPARATUS		NR	NO ELECTROPLATING
3613 3613	SWITCHGEAR AND SWITCHBOARD APPARATUS	433	A	METAL FINISHING
3621 3621	MOTORS AND GENERATORS	433	A	METAL FINISHING
3621 3621	MOTORS AND GENERATORS		NR	NO ELECTROPLATING
3624 3624	CARBON AND GRAPHITE PRODUCTS		NR	CARBON & GRAPHITE PRODUCTS
3625 3613	SWITCHGEAR AND SWITCHBOARD APPARATUS	433	A	METAL FINISHING
3625 3613	SWITCHGEAR AND SWITCHBOARD APPARATUS		NR	NO ELECTROPLATING
3625 3622	RELAYS AND INDUSTRIAL CONTROLS	433	A	METAL FINISHING
3625 3622	RELAYS AND INDUSTRIAL CONTROLS		NR	NO ELECTROPLATING
3625 3679	ELECTRONIC COMPONENTS, NEC		NR	
3629 3629	ELECTRICAL INDUSTRIAL APPARATUS, NEC	433	A	METAL FINISHING
3629 3629	ELECTRICAL INDUSTRIAL APPARATUS, NEC		NR	NO ELECTROPLATING
3629 3629	ELECTRICAL INDUSTRIAL APPARATUS, NEC		NR	FUEL CELLS
3631 3631	HOUSEHOLD COOKING EQUIPMENT	433	A	METAL FINISHING
3631 3631	HOUSEHOLD COOKING EQUIPMENT		NR	NO ELECTROPLATING/PORCELAIN
3631 3631	HOUSEHOLD COOKING EQUIPMENT	466	A	STEEL BASIS MATERIAL (PORCELAIN)
3631 3631	HOUSEHOLD COOKING EQUIPMENT	466	C	ALUMINUM BASIS MATERIAL (PORCELAIN)
3632 3632	HOUSEHOLD REFRIGERATORS AND FREEZERS	433	A	METAL FINISHING
3632 3632	HOUSEHOLD REFRIGERATORS AND FREEZERS		NR	NO ELECTROPLATING (PORCELAIN)
3632 3632	HOUSEHOLD REFRIGERATORS AND FREEZERS	466	A	STEEL BASIS MATERIAL (PORCELAIN)
3633 3633	HOUSEHOLD LAUNDRY EQUIPMENT	433	A	METAL FINISHING
3633 3633	HOUSEHOLD LAUNDRY EQUIPMENT		NR	NO ELECTROPLATING/PORCELAIN
3633 3633	HOUSEHOLD LAUNDRY EQUIPMENT	466	A	STEEL BASIS MATERIAL (PORCELAIN)
3634 3634	ELECTRIC HOUSEWARES AND FANS	433	A	METAL FINISHING
3634 3634	ELECTRIC HOUSEWARES AND FANS		NR	NO ELECTROPLATING
3635 3635	HOUSEHOLD VACUUM CLEANERS	433	A	METAL FINISHING
3635 3635	HOUSEHOLD VACUUM CLEANERS		NR	NO ELECTROPLATING
3639 3636	SEWING MACHINES	433	A	METAL FINISHING
3639 3636	SEWING MACHINES		NR	NO ELECTROPLATING
3639 3639	HOUSEHOLD APPLIANCES, NEC	433	A	METAL FINISHING
3639 3639	HOUSEHOLD APPLIANCES, NEC	466	A	STEEL BASIS MATERIAL (PORCELAIN)
3641 3641	ELECTRIC LAMPS	433	A	METAL FINISHING
3641 3641	ELECTRIC LAMPS	469	D	LUMINESCENT MATERIALS
3641 3699	ELECTRICAL MACHINERY, EQUIPMENT & SUPPLIES, NEC	433	A	METAL FINISHING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3643	3643	CURRENT-CARRYING WIRING DEVICES	433	A	METAL FINISHING
3643	3643	CURRENT-CARRYING WIRING DEVICES		NR	NO ELECTROPLATING
3643	3643	CURRENT-CARRYING WIRING DEVICES		NR	
3644	3644	NONCURRENT-CARRYING WIRING DEVICES	433	A	METAL FINISHING
3644	3644	NONCURRENT-CARRYING WIRING DEVICES		NR	NO ELECTROPLATING
3645	3645	RESIDENTIAL LIGHTING FIXTURES	433	A	METAL FINISHING
3645	3645	RESIDENTIAL LIGHTING FIXTURES		NR	NO ELECTROPLATING
3646	3646	COMMERCIAL LIGHTING FIXTURES	433	A	METAL FINISHING
3646	3646	COMMERCIAL LIGHTING FIXTURES		NR	NO ELECTROPLATING
3647	3647	VEHICULAR LIGHTING EQUIPMENT	433	A	METAL FINISHING
3647	3647	VEHICULAR LIGHTING EQUIPMENT		NR	NO ELECTROPLATING
3648	3648	LIGHTING EQUIPMENT, NEC	433	A	METAL FINISHING
3648	3648	LIGHTING EQUIPMENT, NEC		NR	NO ELECTROPLATING
3651	3651	RADIO AND TV RECEIVING SETS	433	A	METAL FINISHING
3651	3651	RADIO AND TV RECEIVING SETS		NR	NO ELECTROPLATING
3652	3652	PHONOGRAPH RECORDS		NR	
3661	3661	TELEPHONE AND TELEGRAPH APPARATUS		NR	
3663	3662	RADIO AND TV COMMUNICATION EQUIPMENT		NR	
3669	3662	RADIO AND TV COMMUNICATION EQUIPMENT		NR	
3671	3672	ELECTRON TUBES	469	C	CATHODE RAY TUBE
3671	3679	ELECTRONIC COMPONENTS, NEC		NR	
3672	3679	ELECTRONIC COMPONENTS, NEC	413	H	PRINTED CIRCUIT BOARDS
3674	3674	SEMICONDUCTORS AND RELATED DEVICES	469	A	SEMI-CONDUCTORS
3675	3675	ELECTRONIC CAPACITORS	433	A	METAL FINISHING
3676	3676	RESISTORS FOR ELECTRONIC APPLICATIONS	433	A	METAL FINISHING
3676	3676	RESISTORS FOR ELECTRONIC APPLICATIONS		NR	NO ELECTROPLATING
3677	3677	ELECTRONIC COILS, TRANSFORMERS & OTHER INDUCTORS	433	A	METAL FINISHING
3677	3677	ELECTRONIC COILS, TRANSFORMERS & OTHER INDUCTORS		NR	DRY TRANSFORMERS
3678	3678	CONNECTORS FOR ELECTRONIC APPLICATIONS	433	A	METAL FINISHING
3678	3678	CONNECTORS FOR ELECTRONIC APPLICATIONS		NR	NO ELECTROPLATING
3679	3679	ELECTRONIC COMPONENTS, NEC	469	B	ELECTRONIC CRYSTALS
3679	3679	ELECTRONIC COMPONENTS, NEC		NR	
3691	3691	STORAGE BATTERIES	461	A	CADMIUM BATTERIES
3691	3691	STORAGE BATTERIES	461	B	CALCIUM BATTERIES
3691	3691	STORAGE BATTERIES	461	C	LEAD BATTERIES
3691	3691	STORAGE BATTERIES	461	D	LECLANCHE BATTERIES
3691	3691	STORAGE BATTERIES	461	E	LITHIUM BATTERIES
3691	3691	STORAGE BATTERIES	461	O	MERCURY (WESTON) CELLS
3691	3691	STORAGE BATTERIES	461	G	ZINC BATTERIES
3691	3691	STORAGE BATTERIES	461	O	MERCURY (RUBEN) BATTERIES
3691	3691	STORAGE BATTERIES	461	O	LEAD ACID RESERVE BATTERIES
3691	3691	STORAGE BATTERIES	461	F	MAGNESIUM BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	A	CADMIUM BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	B	CALCIUM BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	C	LEAD BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	E	LITHIUM BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	F	MAGNESIUM BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	O	MERCURY (RUBEN) BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	O	MERCURY (WESTON) CELLS
3692	3692	PRIMARY BATTERIES, DRY & WET	461	O	LEAD ACID RESERVE BATTERIES
3692	3692	PRIMARY BATTERIES, DRY & WET	461	G	ZINC BATTERIES
3694	3694	ELECTRICAL EQUIP FOR INTERNAL COMBUSTION ENGINES	433	A	METAL FINISHING
3694	3694	ELECTRICAL EQUIP FOR INTERNAL COMBUSTION ENGINES		NR	NO ELECTROPLATING
3695	3573	ELECTRONIC COMPUTING EQUIPMENT	433	A	METAL FINISHING
3695	3573	ELECTRONIC COMPUTING EQUIPMENT		NR	NO ELECTROPLATING
3695	3679	ELECTRONIC COMPONENTS, NEC		NR	
3699	3662	RADIO AND TV COMMUNICATION EQUIPMENT		NR	
3699	3699	ELECTRICAL MACHINERY, EQUIPMENT & SUPPLIES, NEC	433	A	METAL FINISHING
3711	3711	MOTOR VEHICLES & PASSENGER CAR BODIES	433	A	METAL FINISHING
3711	3711	MOTOR VEHICLES & PASSENGER CAR BODIES		NR	NO ELECTROPLATING
3713	3713	TRUCK & BUS BODIES	433	A	METAL FINISHING
3713	3713	TRUCK & BUS BODIES		NR	NO ELECTROPLATING
3714	3714	MOTOR VEHICLE PARTS & ACCESSORIES		NR	NO ELECTROPLATING
3714	3714	MOTOR VEHICLE PARTS & ACCESSORIES	433	A	METAL FINISHING
3715	3715	TRUCK TRAILERS	433	A	METAL FINISHING
3715	3715	TRUCK TRAILERS		NR	NO ELECTROPLATING
3721	3721	AIRCRAFT	433	A	METAL FINISHING
3721	3721	AIRCRAFT		NR	NO ELECTROPLATING

APPENDIX F -  
SIC CODE TABLE CROSS-REFERENCE OF  
1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977-1987 SIC SIC CODE CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3724 3724	AIRCRAFT ENGINES & ENGINE PARTS	433	A	METAL FINISHING
3724 3724	AIRCRAFT ENGINES & ENGINE PARTS		NR	NO ELECTROPLATING
3728 3728	AIRCRAFT EQUIPMENT, NEC		NR	NO ELECTROPLATING
3728 3728	AIRCRAFT EQUIPMENT, NEC	433	A	METAL FINISHING
3731 3731	SHIP BUILDING AND REPAIRING	470	1	SHIP BUILDING & REPAIRING
3732 3732	BOAT BUILDING AND REPAIRING		NR	NO ELECTROPLATING
3732 3732	BOAT BUILDING AND REPAIRING	433	A	METAL FINISHING
3743 3743	RAILROAD EQUIPMENT	433	A	METAL FINISHING
3743 3743	RAILROAD EQUIPMENT		NR	NO ELECTROPLATING
3751 3751	MOTORCYCLES, BICYCLES AND PARTS	433	A	METAL FINISHING
3751 3751	MOTORCYCLES, BICYCLES AND PARTS		NR	NO ELECTROPLATING
3761 3761	GUIDED MISSILES AND SPACE VEHICLES	433	A	METAL FINISHING
3761 3761	GUIDED MISSILES AND SPACE VEHICLES		NR	NO ELECTROPLATING
3764 3764	SPACE PROPULSION UNITS AND PARTS	433	A	METAL FINISHING
3764 3764	SPACE PROPULSION UNITS AND PARTS		NR	NO ELECTROPLATING
3769 3769	SPACE VEHICLE EQUIPMENT, NEC	433	A	METAL FINISHING
3769 3769	SPACE VEHICLE EQUIPMENT, NEC		NR	NO ELECTROPLATING
3792 3792	TRAVEL TRAILERS AND CAMPERS	433	A	METAL FINISHING
3792 3792	TRAVEL TRAILERS AND CAMPERS		NR	NO ELECTROPLATING
3795 3795	TANKS AND TANK COMPONENTS	433	A	METAL FINISHING
3795 3795	TANKS AND TANK COMPONENTS		NR	NO ELECTROPLATING
3799 3799	TRANSPORTATION EQUIPMENT, NEC	433	A	METAL FINISHING
3799 3799	TRANSPORTATION EQUIPMENT, NEC		NR	NO ELECTROPLATING
3812 3662	RADIO AND TV COMMUNICATION EQUIPMENT		NR	
3812 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3812 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS		NR	NO ELECTROPLATING
3821 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS		NR	NO ELECTROPLATING
3821 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3822 3822	ENVIRONMENTAL CONTROLS	433	A	METAL FINISHING
3822 3822	ENVIRONMENTAL CONTROLS		NR	NO ELECTROPLATING
3823 3823	PROCESS CONTROL INSTRUMENTS	433	A	METAL FINISHING
3823 3823	PROCESS CONTROL INSTRUMENTS		NR	NO ELECTROPLATING
3824 3824	FLUID METERS AND COUNTING DEVICES	433	A	METAL FINISHING
3824 3824	FLUID METERS AND COUNTING DEVICES		NR	NO ELECTROPLATING
3825 3825	INSTRUMENTS TO MEASURE ELECTRICITY	433	A	METAL FINISHING
3825 3825	INSTRUMENTS TO MEASURE ELECTRICITY		NR	NO ELECTROPLATING
3826 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3826 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS		NR	NO ELECTROPLATING
3826 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3826 3832	OPTICAL INSTRUMENTS AND LENSES	433	A	METAL FINISHING
3826 3832	OPTICAL INSTRUMENTS AND LENSES		NR	NO ELECTROPLATING
3827 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS		NR	NO ELECTROPLATING
3827 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3827 3832	OPTICAL INSTRUMENTS AND LENSES	433	A	METAL FINISHING
3827 3832	OPTICAL INSTRUMENTS AND LENSES		NR	NO ELECTROPLATING
3829 3662	RADIO AND TV COMMUNICATION EQUIPMENT		NR	
3829 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS	433	A	METAL FINISHING
3829 3811	ENGINEERING AND SCIENTIFIC INSTRUMENTS		NR	NO ELECTROPLATING
3829 3829	MEASURING & CONTROLLING DEVICES, NEC	433	A	METAL FINISHING
3829 3829	MEASURING & CONTROLLING DEVICES, NEC		NR	NO ELECTROPLATING
3829 3832	OPTICAL INSTRUMENTS AND LENSES	433	A	METAL FINISHING
3829 3832	OPTICAL INSTRUMENTS AND LENSES		NR	NO ELECTROPLATING
3841 3841	SURGICAL AND MEDICAL INSTRUMENTS		NR	NO ELECTROPLATING
3841 3841	SURGICAL AND MEDICAL INSTRUMENTS	433	A	METAL FINISHING
3842 3842	SURGICAL APPLIANCES AND SUPPLIES		NR	NO ELECTROPLATING
3842 3842	SURGICAL APPLIANCES AND SUPPLIES	433	A	METAL FINISHING
3843 3843	DENTAL EQUIPMENT AND SUPPLIES		NR	NO ELECTROPLATING
3843 3843	DENTAL EQUIPMENT AND SUPPLIES	433	A	METAL FINISHING
3844 3693	X-RAY APPARATUS AND TUBES	469	C	ELECTRON TUBES
3845 3693	ELECTROMEDICAL EQUIPMENT	469	C	ELECTRON TUBES
3851 3851	OPHTHALMIC GOODS		NR	NO ELECTROPLATING
3851 3851	OPHTHALMIC GOODS	433	A	METAL FINISHING
3861 3861	PHOTOGRAPHIC EQUIPMENT AND SUPPLIES	459	3	DIAZO, SOLVENT PROCESS
3861 3861	PHOTOGRAPHIC EQUIPMENT AND SUPPLIES	459	4	PHOTOGRAPHIC EQUIPMENT & SUPPLIES
3861 3861	PHOTOGRAPHIC EQUIPMENT AND SUPPLIES	459	5	THERMAL, SOLVENT PROCESS
3873 3873	WATCHES, CLOCKS AND WATCHCASES	433	A	METAL FINISHING
3873 3873	WATCHES, CLOCKS AND WATCHCASES		NR	NO ELECTROPLATING
3911 3911	JEWELRY, PRECIOUS METAL	433	A	METAL FINISHING

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1987 AND 1972 SIC CODES, NOTING ANY CHANGES

1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
3911	3911	JEWELRY, PRECIOUS METAL	471	D	PRECIOUS METAL FORMING
3914	3914	SILVERWARE AND PLATED WARE	433	A	METAL FINISHING
3914	3914	SILVERWARE AND PLATED WARE		NR	NO ELECTROPLATING
3915	3915	JEWELERS' MATERIALS & LAPIDARY WORK	433	A	METAL FINISHING
3915	3915	JEWELERS' MATERIALS & LAPIDARY WORK		NR	NO ELECTROPLATING
3931	3931	MUSICAL INSTRUMENTS		NR	NO ELECTROPLATING
3931	3931	MUSICAL INSTRUMENTS	433	A	METAL FINISHING
3942	3942	DOLLS		NR	
3944	3944	GAMES, TOYS AND CHILDREN'S VEHICLES	433	A	METAL FINISHING
3944	3944	GAMES, TOYS AND CHILDREN'S VEHICLES		NR	NO ELECTROPLATING
3949	3949	SPORTING AND ATHLETIC GOODS, NEC	433	A	METAL FINISHING
3949	3949	SPORTING AND ATHLETIC GOODS, NEC		NR	NO ELECTROPLATING
3949	3949	SPORTING AND ATHLETIC GOODS, NEC	433	A	METAL FINISHING
3951	3951	PENS AND MECHANICAL PENCILS		NR	NO ELECTROPLATING
3951	3951	PENS AND MECHANICAL PENCILS	433	A	METAL FINISHING
3952	3952	LEAD PENCILS AND ART GOODS		NR	
3953	3953	MARKING DEVICES		NR	
3955	3955	CARBON PAPER AND INKED RIBBONS		NR	
3961	3961	COSTUME JEWELRY		NR	NO ELECTROPLATING
3961	3961	COSTUME JEWELRY	433	A	METAL FINISHING
3965	3964	NEEDLES, PINS AND FASTENERS	433	A	METAL FINISHING
3965	3964	NEEDLES, PINS AND FASTENERS		NR	NO ELECTROPLATING
3991	3991	BROOMS AND BRUSHES	433	A	METAL FINISHING
3991	3991	BROOMS AND BRUSHES		NR	NO ELECTROPLATING
3993	3993	SIGNS AND ADVERTISING DISPLAYS	433	A	METAL FINISHING
3993	3993	SIGNS AND ADVERTISING DISPLAYS		NR	
3993	3993	SIGNS AND ADVERTISING DISPLAYS		NR	NO ELECTROPLATING
3995	3995	BURIAL CASKETS		NR	NO ELECTROPLATING
3995	3995	BURIAL CASKETS	433	A	METAL FINISHING
3996	3996	HARD SURFACE FLOOR COVERINGS		NR	
3996	3996	HARD SURFACE FLOOR COVERINGS	443	D	LINOLEUM & PRINTED ASPHALT FELT
3999	3962	ARTIFICIAL FLOWERS		NR	
3999	3999	MANUFACTURING INDUSTRIES, NEC	433	A	METAL FINISHING
3999	3999	MANUFACTURING INDUSTRIES, NEC		NR	
4173	4172	BUS TERMINAL AND SERVICE FACILITIES		NR	
4226	4226	SPECIAL WAREHOUSING & STORAGE, NEC		NR	
4231	4231	TRUCKING TERMINAL FACILITIES			
4493	4469	WATER TRANSPORTATION SERVICES, NEC			
4499	4469	WATER TRANSPORTATION SERVICES, NEC			
4612	4612	CRUDE PETROLEUM PIPELINES		NR	
4911	4911	ELECTRICAL SERVICES	423	A	HYDRO ELECTRIC PWR GEN.(W/ SAN. WST.)
4911	4911	ELECTRICAL SERVICES	423	A	STEAM ELECTRIC POWER GENERATING
4931	4931	ELECTRIC AND OTHER SERVICES COMBINED	423	A	HYDRO ELECTRIC PWR. GEN. (W/ SAN. WST.)
4931	4931	ELECTRIC AND OTHER SERVICES COMBINED	423	A	STEAM ELECTRIC POWER GENERATING
4941	4941	WATER SUPPLY			
4952	4952	SEWERAGE SYSTEMS			
4953	4953	REFUSE SYSTEMS			SOLID WASTE FACILITIES
4953	4953	REFUSE SYSTEMS			HAZARDOUS WASTE TREATMENT FACILITIES
4959	4469	WATER TRANSPORTATION SERVICES, NEC			
4959	4959	SANITARY SERVICES, NEC			
4961	4961	STEAM SUPPLY			
5052	5052	COAL & OTHER MINERALS & ORES			
5093	5093	SCRAP & WASTE MATERIALS			
5143	5143	DAIRY PRODUCTS	405	A	RECEIVING STATIONS
5169	5161	CHEMICALS AND ALLIED PRODUCTS			
5171	5171	PETROLEUM BULK STATIONS & TERMINALS			
5191	5191	FARM SUPPLIES			
5421	5423	MEAT AND FISH (SEAFOOD) MARKETS	432	E	SMALL PROCESSOR
5421	5423	MEAT AND FISH (SEAFOOD) MARKETS	432	F	MEAT CUTTER
5421	5423	MEAT AND FISH (SEAFOOD) MARKETS	432	G	SAUSAGE AND LUNCHEON MEATS PROCESSOR
5421	5423	MEAT AND FISH (SEAFOOD) MARKETS		NR	OTHER MARKETS WITHOUT PROCESSING
7211	7211	POWER LAUNDRIES, FAMILY AND COMMERCIAL	444	3	POWER LAUNDRIES
7213	7213	LINEN SUPPLY	444	9	LINEN SUPPLY
7215	7215	COIN-OPERATED LAUNDRIES & DRY CLEANING	444	1	COIN-OPERATED LAUNDRIES
7216	7216	DRY CLEANING PLANTS, EXCEPT RUG CLEANING	444	2	DRY CLEANING PLANTS
7217	7217	CARPET & UPHOLSTERY CLEANING	444	4	CARPET & UPHOLSTERY CLEANING
7218	7218	INDUSTRIAL LAUNDERERS	444	8	INDUSTRIAL LAUNDRY
7219	7214	DIAPER SERVICE	444	5	DIAPER SERVICE

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1972/ 1977 SIC CODE	1987 SIC CODE	1987 SIC TITLE	CFR NUMBER	CFR CODE	CFR DESCRIPTION
7219	7219	LAUNDRY, GARMENT SERVICES, NEC	444	6	LAUNDRY, GARMENT SERVICES NEC
7342	7342	DISINFECTING & EXTERMINATING SERV.			
7384	7395	PHOTOFINISHING LABORATORIES	459	A	PHOTOGRAPHIC PROCESSING
7542	7542	CAR WASHES	444	7	CAR WASH
7699	7699	REPAIR SHOPS, NEC	433	A	METAL FINISHING
7699	7699	REPAIR SHOPS, NEC		NR	NO ELECTROPLATING
7819	7819	SERV. ALLIED TO MOTION PICTURE PROD.	459	A	PHOTOGRAPHIC PROCESSING
8062	8062	GEN. MEDICAL/SURGICAL HOSPITALS			
8069	8069	SPECIALTY HOSPITALS			
8071	8071	MEDICAL LABORATORIES			
8731	7391	RESEARCH & DEVELOPMENT LABORATORIES		NR	
8733	8922	NONCOMMERCIAL RESEARCH ORGANIZATIONS			
8734	7397	COMMERCIAL TESTING LABORATORIES			