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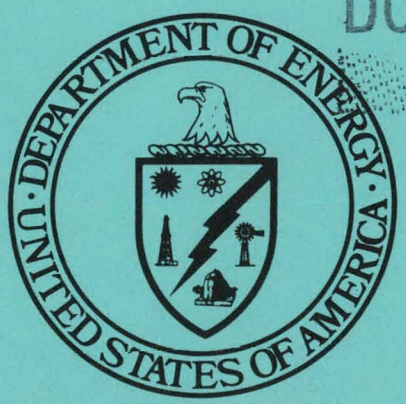
Environmental Compliance Guide

Guidance Manual For Department of Energy Compliance With The Clean Water Act: National Pollutant Discharge Elimination System (NPDES)

July 1982



U.S. Department of Energy
Office Environmental Protection,
Safety, and Emergency Preparedness
Office Environment, Safety, and Health
Office of Environmental Compliance

Vol. 3B

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Vol. 3B

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This guidance manual has been prepared to assist Department of Energy personnel in developing information and performing analyses required for complying with the National Pollutant Discharge Elimination System (NPDES) permit program under Sect. 402 of the Clean Water Act (Pub. L. 92-500), as amended. The manual does not add new requirements nor does it alter existing requirements under the NPDES permit program and its associated regulations. Rather, the manual is intended to be advisory and to present guidance and information that should assist DOE compliance efforts. Early contact and consultation with appropriate regulatory agencies is essential for adequate compliance with the NPDES program. Supplements to this guidance manual will be prepared if existing regulations are modified or if relevant provisions of the Clean Water Act are amended.

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Acknowledgments

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Abstract

This manual provides general guidance for Department of Energy (DOE) officials for complying with Sect. 402 of the Clean Water Act (CWA) of 1977 and amendments. Section 402 authorizes the U.S. Environmental Protection Agency (EPA) or states with EPA approved programs to issue National Pollutant Discharge Elimination System (NPDES) permits for the direct discharge of waste from a point source into waters of the United States. Although the nature of a project dictates the exact information requirements, every project has similar information requirements on the environmental setting, type of discharge(s), characterization of effluent, and discription of operations and wastewater treatment. Additional information requirements for projects with ocean discharges, thermal discharges, and cooling water intakes are discussed. Guidance is provided in this manual on general methods for collecting, analyzing, and presenting information for an NPDES permit application. The NPDES program interacts with many sections of the CWA; therefore, background material on pertinent areas such as effluent limitations, water quality standards, toxic substances, and nonpoint source pollutants is included in this manual. Modifications, variances, and extensions applicable to NPDES permits are also discussed.

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Glossary of Acronyms

Acronym	Definition
BADT	Best available demonstrated technology
BAT	Best available technology
BCT	Best conventional pollutant control technology
BEJ	Best engineering judgement
BMP	Best management practice
BPJ	Best professional judgement
BPT	Best practicable control technology
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFSA	Far field study area [CWA Sect. 316(a)]
FWCA	Fish and Wildlife Coordination Act
FWPCA	Federal Water Pollution Control Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated biphenyl
POTW	Publicly owned treatment works
RIS	Representative important species [CWA Sect. 316(a)]
SIC	Standard Industrial Classification

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1. Introduction

The purpose of this guidance manual is to assist U.S. Department of Energy (DOE) project managers in complying with the requirements of the National Pollutant Discharge Elimination System (NPDES) mandated by the Federal Water Pollution Control Act (Pub. L. 92-500) and its amendments. The NPDES program is administered either by the U.S. Environmental Protection Agency (EPA) or by a state that has a permit program approved by EPA.[1] Information requirements discussed in this manual are based on the EPA requirements. State programs have essentially the same requirements as the Federal program but may be more stringent in some cases.

This guidance manual is supplementary to the DOE Environmental Compliance Guide (DOE 1981a) which contains the procedural regulations implementing the NPDES program through the Consolidated Permits Program (Vol. II, Tab M) as well as a flowchart outlining the basic steps involved in complying with the NPDES requirements (Vol. 1, Flow III-2). The Environmental Compliance Guide and this manual will help implement DOE Order 5480.1A which establishes the Environmental Protection, Safety, and Health Protection Program for DOE (DOE 1981b). This manual provides:

- a brief history of federal water quality legislation and a description of the major parts of this legislation,
- information for determining which regulatory programs apply to a project,
- a detailed account of information required for obtaining an NPDES permit and supplementary materials and definitions necessary to understand the permit program,
- references to accepted analytical methods, and
- examples of methods for reporting information and evaluating alternatives.

Information contained herein is intended to provide general guidance and should not be considered a legal interpretation of the regulations discussed. Contact with EPA and/or state agency personnel should be established as early in the planning process as possible to obtain information on program changes and current requirements.

2. Background

2.1 The Clean Water Act

The Rivers and Harbors Act of 1899, popularly known as the Refuse Act, began the federal government's involvement in water pollution control. Although Congress enacted the Federal Water Pollution Control Act in 1948, enforcement of water pollution regulations did not begin until 1970 when the U.S. Army Corps of Engineers (COE) announced that industries discharging into navigable waters would be required to obtain permits in accordance with the Rivers and Harbors Act. With the enactment of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA) (Pub. L. 92-500), Congress gave the Environmental Protection Agency (EPA) a mandate to clean up the Nation's waters. This legislation sought to establish an effective federal-state regulatory framework incorporating the best aspects of both the water quality standards and the effluent limitation approaches to water pollution control. The FWPCA of 1972 has been amended many times. The Clean Water Act of 1977 (Pub. L. 95-217) provided major amendments to the FWPCA, dealing primarily with the regulation of toxic (i.e., priority) pollutants. In 1978 Congress again amended the Act (Pub. L. 95-576) by adding provisions for controlling accidental discharges of hazardous substances. The FWPCA and its amendments are collectively known as the Clean Water Act (CWA).

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[1] Although the Act contains provisions for states to issue NPDES permits to Federal facilities, not all states with approved permit programs have this authority.

The CWA must be reauthorized during 1982 and may be amended. Hearings in Congress on the CWA started during the summer of 1982. The EPA has released a brief outline of the major issues under review in the CWA, and these include water quality goals, industrial effluent limitations, NPDES permit period, and pretreatment regulations. The EPA may request Congress to reconsider the "zero discharge" goal of 1985 and the "fishable and swimmable waters" goal of 1983. Waivers from best available technology (BAT) and best conventional technology (BCT) effluent limitations for toxics are being considered. Increasing the length of the permit period beyond five years is also being considered. EPA may ask for extension of deadlines for industry to comply with statutory requirements or for waivers from limitations on pollutant discharge where there would be no negative impact on receiving waters. The current administration favors standards based on water quality rather than technology. The pretreatment program will also be critically reviewed (Water Pollution Control Federation 1982).

The objective of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To accomplish this objective Sect. 101 of the CWA establishes the following national goals:

- To achieve a level of water quality that "provides for the protection and propagation of fish, shellfish, and wildlife" and "recreation in and on the water" by July 1, 1983;
- To prohibit "the discharge of toxic pollutants in toxic amounts";
- To develop and implement "areawide waste treatment management planning processes" to "assure adequate control of sources of pollutants in each State";
- To eliminate the discharge of pollutants into U.S. waters by 1985.

The attainment of these goals has been a major factor in setting effluent limitations and water quality standards. Area-wide management plans have been developed for both point and nonpoint sources of pollution. A state's classification of its waters for uses such as public water supply, swimming, fish and wildlife, shellfish harvesting, and agricultural and industrial water supply determines the stringency of NPDES permit requirements. Although the goal for elimination of pollutant discharges into U.S. waters by 1985 will not be attained, it will be evaluated when Congress reexamines the entire CWA during the 1982 session.

The CWA is divided into the following titles.

- Title I establishes goals and policies and provides for research and demonstration projects designed to advance water pollution control technology.
- Title II describes a comprehensive program for providing grants to publicly owned waste treatment works (POTWs).
- Title III provides for establishment of effluent limitations that must be met by municipal and industrial waste treatment systems, the inspection of such facilities, and the penalties for violations of standards and permits.
- Title IV establishes permit and license requirements including the National Pollutant Discharge Elimination System (NPDES) permit program.
- Title V contains general provisions that authorize citizen suits, establish advisory committees, set forth definitions of critical terms used in the Act, and outline the procedures for judicial review of agency decisions, orders, and regulations.

This compliance manual deals primarily with Titles III and IV of the CWA.

2.2 Regulatory Programs Under the CWA

The CWA's regulatory programs that apply to a proposed project are based on the types of pollution sources associated with the project (Fig. 1). The National Pollutant Discharge Elimination System (NPDES) is EPA's permit program for control of direct discharges from point sources (CWA Sect. 402).

Nonpoint source discharges are activities that contribute to pollution through runoff or other nonlocalized means.[2] Agriculture, silviculture, mining, and construction are examples of possible nonpoint pollution sources, but these activities can also be considered point source discharges when they discharge pollutants from any discernible, confined, and discrete conveyance (e.g., a sediment basin or a log sorting facility). Nonpoint source pollution is regulated at the state and local level by local ordinances and management plans developed under the CWA. Regulation of nonpoint source pollutants is discussed in Appendix A.

Point source discharges into navigable waters of the United States are regulated under Sect. 402 of the CWA. A point source discharge is defined as:

> "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, or vessel or other floating craft, from which pollutants are or may be discharged." [CWA Sect. 502(14)]

An issue of current debate is whether or not dams should be regulated as point or nonpoint sources (Bureau of National Affairs 1982, Inside EPA 1982). Under the CWA, EPA's jurisdiction for regulating point source discharges includes intrastate waters used by interstate or foreign trawlers for recreational or other purposes, intrastate waters from which fish or shellfish are taken and sold in interstate commerce, and intrastate waters used by industries in interstate commerce (40 CFR 122.3, Subpart A),[3] as well as interstate waters and all waters susceptible to use in interstate or foreign commerce, wetlands adjacent to any of the above, and the territorial seas.

Point source dischargers are categorized as either direct or indirect. Direct dischargers, industrial plants and publicly owned treatment works (POTW) that discharge effluent directly into surface water, are subject to NPDES regulations. Indirect dischargers (Fig. 1), activities that discharge treated or untreated wastewater to a publicly owned treatment works (POTW), must comply with other regulations (Appendix B).

The CWA stipulates that NPDES permits must: (1) limit discharges of effluents via technology-based guidelines and, where necessary, water quality standards; (2) impose schedules of compliance for the permittee to complete construction or to install new pollution control technology; and (3) require permittees to monitor their discharges and report results and violations to the permitting agency.

Other provisions of the CWA that may be applicable to DOE activities include:

> Section 311 which requires vessels or other point sources to report a spill of oil or hazardous substances (40 CFR 110, 112, 113, 114, 116, and 117) (Appendix C), and

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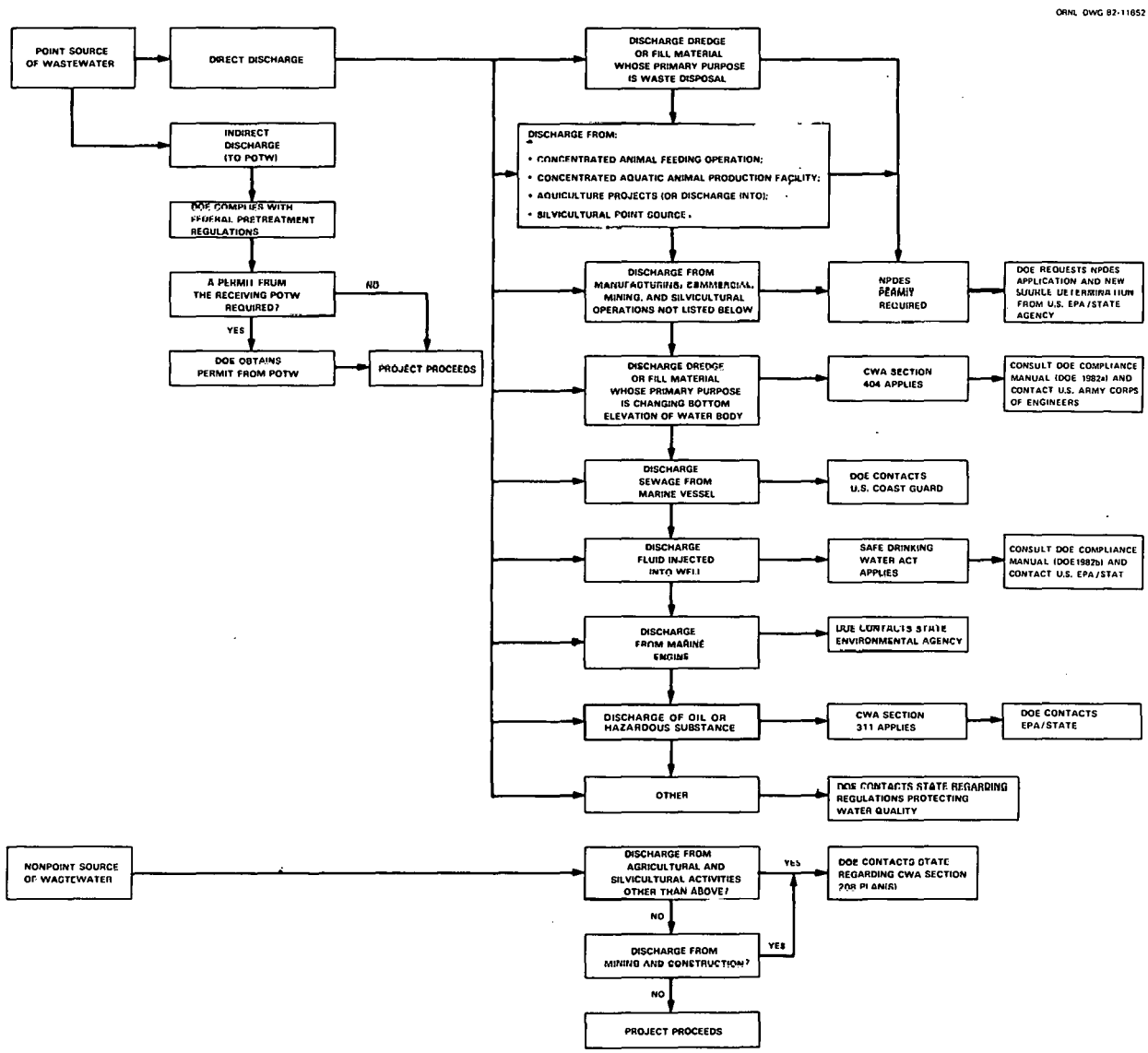
[2] Understanding the terminology in a piece of legislation and its regulations is essential for compliance. Terms used in this manual are, therefore, either defined in the glossary or where they are first discussed in the text. The glossary also contains definitions of all acronyms used in this manual.

[3] References to the Code of Federal Regulations (CFR) in this document are to the edition printed in July of 1981 unless otherwise indicated. Changes in the regulations since then are published in the Federal Register.

Figure 1. Flowchart of pollution sources and applicable regulations under the Clean Water Act.



- Section 404 which requires proper disposal of dredged or fill material (40 CFR 230 and 33 CFR 323) (DOE 1982a).

2.3 Other Regulatory Programs

Projects that are required to obtain an NPDES permit will usually be subject to other environmental regulations. All NPDES permits must "contain conditions consistent with requirements of applicable federal laws" (CWA Sect. 122.12). Requirements of the National Environmental Policy Act (NEPA, Pub. L. 91-190), the Fish and Wildlife Coordination Act (FWCA, Pub. L. 85-624), as well as the conditions of Executive Orders such as No. 11990 on wetlands, No. 11988 on floodplains, and No. 12088 on federal compliance with pollution control standards must be met by DOE projects.

The National Environmental Policy Act of 1969 (NEPA) requires that an environmental impact statement (EIS) be prepared for any major federal action significantly affecting the quality of the human environment. If required, an EIS is prepared in the planning stages of the project, prior to detailed design. Initial contact with the agency responsible for issuing NPDES permits should be made early in the project design stage. Submission of an NPDES permit application would generally be made after preparation of an EIS. However, the assembling of information and the collecting of data for a NPDES permit application can and should be integrated with the preparation of the NEPA document. The DOE guidelines for compliance with NEPA give detailed information on the NEPA process (45 FR 20694).

The FWCA requires interagency cooperation for management of fish and wildlife resources at all water-related projects in which federal agencies are involved. Projects requiring NPDES permits are also covered by the FWCA. The interagency coordination referred to in the FWCA requires DOE to consult state and federal wildlife agencies, but it also requires EPA to consult with the same agencies before approving an NPDES permit. Therefore, DOE project managers who are involved in the NPDES permit process should be aware of FWCA requirements. For guidance on the FWCA, refer to the "Manual for DOE Compliance with the Fish and Wildlife Coordination Act" (DOE 1982c).

3. DOE Compliance with the NPDES Program

The National Pollutant Discharge Elimination System (NPDES), established under Sect. 402 of the CWA, is a regulatory program that imposes detailed pollution control requirements on industry through permits issued by EPA or by states having permit programs approved by EPA (hereafter referred to as approved state programs). Thirty-two states and one territory have approved NPDES permit programs as of June 1982 (Table 1). If a project is located in a state or territory with an approved program, the water quality agency within that state or territory should be contacted (Appendix D). Otherwise, permitting will be handled by the appropriate EPA regional office as listed in Table 1.

3.1 Determining the Need for an NPDES Permit

The NPDES permit program is part of the Consolidated Permits Program (40 CFR Parts 122, 123, and 124). Figure 2 outlines the basic steps for obtaining an NPDES permit. To determine if a DOE project requires an NPDES permit or any other permit under these regulations, the General Information Form (Appendix E) must be filed with EPA or the appropriate state agency. Figure 1 indicates the pollution sources regulated by NPDES permits as well as those regulated by other parts of the CWA. In most cases, an individual NPDES permit is required for direct point source discharges that originate from:

- Existing manufacturing, commercial, mining, or silvicultural operations or privately owned treatment works (Form 2C, Appendix E);
- Proposed manufacturing, commercial, mining, or silvicultural operations or privately owned treatment works (Form 2D, proposed);

Table 1. EPA regional offices and states having jurisdiction over NPDES permitting.

EPA Region	Permit Contact	States included in the region	States with approved NPDES programs
I	U.S. Environmental Protection Agency Environmental and Economic Impact Office John F. Kennedy Building Boston, Massachusetts 02203 (617) 223-4635, FTS 223-4635	Connecticut, Maine, Massachusetts New Hampshire, Rhode Island, Vermont.	Connecticut, Vermont
II	U.S. Environmental Protection Agency Permits Administration Branch, Room 432 26 Federal Plaza New York, New York 10007 (212) 264-9880, FTS 264-9880	New Jersey, New York, Virgin Islands, Puerto Rico	New Jersey, New York, Virgin Islands
III	U.S. Environmental Protection Agency (3EN23) 6th & Walnut Streets Philadelphia, Pennsylvania 19106 (215) 597-8816, FTS 597-8816	Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia	Delaware, Maryland, Pennsylvania, Virginia
IV	U.S. Environmental Protection Agency 345 Courtland Street, N.E. Atlanta, Georgia 30365 (404) 881-2017, FTS 257-2017	Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee	Alabama, Georgia, Mississippi, North Carolina, South Carolina, Tennessee
V	U.S. Environmental Protection Agency (5EP) 230 South Dearborn Street Chicago, Illinois 60604 (312) 353-2105, FTS 353-2105	Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin	Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin
VI	U.S. Environmental Protection Agency (6AEP) First International Building 1201 Elm Street Dallas, Texas 75270 (214) 767-2765, FTS 729-2765	Arkansas, Louisiana, New Mexico, Oklahoma, Texas.	None
VII	U.S. Environmental Protection Agency 324 East 11th Street Kansas City, Missouri 64106 (816) 758-5955, FTS 758-5955	Iowa, Kansas, Missouri, Nebraska	Iowa, Kansas, Missouri, Nebraska
VIII	U.S. Environmental Protection Agency (8E-WE) 1860 Lincoln Street Denver, Colorado 80295 (303) 837-4901, FTS 327-4901	Colorado, Montana, North Dakota South Dakota, Utah, Wyoming	Colorado, Montana, North Dakota Wyoming
IX	U.S. Environmental Protection Agency (E-4) 215 Fremont Street San Francisco, California 94105 (415) 556-3450, FTS 556-3450	Arizona, California, Hawaii, Nevada, Guam, American Samoa, Trust Territories	California, Hawaii, Nevada
X	U.S. Environmental Protection Agency (MS 521) 1200 6th Avenue Seattle, Washington 98101 (206) 442-7176, FTS 399-7176	Alaska, Idaho, Oregon, Washington	Oregon, Washington

- Existing or proposed facilities that are or contain either a concentrated animal feeding operation or an aquatic animal production facility (Form 2B, Appendix E); or
- A publicly owned treatment works (POTW).

General permits under the NPDES program do not require an application. The general permit is applicable to certain categories of point sources (e.g., separate storm sewers or oil and gas wells) that have similar operations and discharges within a category and that do not have a major impact on water quality within an EPA region (40 CFR 122.59). Because the categories of point sources covered by a general permit vary from region to region, DOE should contact the appropriate EPA regional office for additional information. The EPA has agreed to issue general permits to mobile drilling rigs provided certain conditions are met such as not being in an area of biological concern as determined by EPA (Natural Resources Defense Council v. USEPA and Gorsuch, case no. 80-1697 and consolidated cases, pending in the U.S. Court of Appeals, District of Columbia).

The DOE must file an NPDES permit application at least 180 days before expiration of an existing permit or before a facility begins operating. New sources must have an NPDES permit prior to facility construction. The need for an NPDES permit and/or an EIS is determined during the preliminary design of a facility. Information requirements for the NPDES permit should be coordinated with the EIS process (refer to flowchart III-2, DOE 1981a). To accommodate pollution control engineering into the design of a new facility, DOE should apply for an NPDES permit and state certification (if required) several years in advance of the date when a discharge would begin. The NPDES permit application should be submitted during the detailed design of the facility. EPA has acted on advance application for permits and is willing to do so, unless special complications exist (Quarles 1979).

3.2 New and Existing Sources

A new source is defined as:

> "Any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section" [CWA Sect. 306(a)(2)].

Before beginning construction of a proposed facility, DOE must submit information as requested by EPA for determination of new source status. EPA will make an initial determination, which is subject to public comment, within 30 days.

Either a brand new facility, a total reconstruction, or a major alteration of an existing source (i.e., a change in the nature or quantity of pollutants discharged) can be considered a new source, depending on the timing of two events: (1) the start of construction, and (2) the date of the proposal of an applicable new source performance standard (i.e., effluent limitation). Construction [CWA Sect. 306(a)(5)] is considered to have started if significant site preparation work has occurred or if a company has entered into a binding contract (not terminable without a substantial penalty) for the purchase or installation of the new facilities. EPA recently proposed a revision of the criteria for new source determination to distinguish more clearly between construction that creates a new source and construction that merely modifies an existing source (40 CFR 122.66(b), 45 FR 59343).

If an applicable new source performance standard is promulgated within 120 days of its proposal, the date for determining if a facility is a new source is the proposal date of the standard; otherwise the determination date is the promulgated date of the standard. If EPA is required to revise a given effluent limitation, a facility classified as a new source may no longer be considered a new source under the revised new source performance standard.

A proposed facility that does not fit the definition of new source would be considered a new discharger. A new discharger is any building, structure, facility, or

installation that may discharge pollutants from a site that never discharged pollutants as of October 18, 1972, and that has never received an effective NPDES permit for the site (40 CFR 122.3).

3.3 Information Requirements

Information requirements for concentrated animal feeding operations, aquatic production facilities, and POTWs are not discussed in this manual because they will probably have limited applicability to future DOE activities. The following information is needed to obtain an NPDES permit for either an existing or proposed facility, and these information requirements are discussed in detail in the following sections:

- Topographic map of the project area showing facility location, intake and discharge structures, injection wells, and waste storage area;
- Description of operations and wastewater treatment;
- Schematic of water flow within the facility;
- Applicable effluent limitation guidelines and any existing regulatory restrictions on discharges;
- Characterization of effluent including concentration of pollutants, type of samples taken and type of analyses performed on pollutants, potential for change in effluent composition in five years, and any data on biological tests for toxicity with the last three years.

Figure 2 outlines the basic steps for completing the information requirements for an NPDES permit. Figure 3 is supplementary to Fig. 2 and shows additional steps that may be necessary if a project has an ocean discharge, cooling water intake, or thermal discharge. Before an NPDES permit will be granted, DOE must obtain state certification that a new discharge would not violate state water quality standards (see Appendix K).

3.3.1 Existing Operations

The information discussed below is required by EPA or a state agency to obtain an NPDES permit or to make a major modification in an existing permit for an existing facility and is based on Form 2C for manufacturing, commercial, mining, or silvicultural operations (Appendix E). Information requirements for NPDES permits are also discussed at 40 CFR 122.53. All or only some of this information may be required of a DOE facility depending on the standard industrial classification (SIC) code(s) assigned to the facility.

3.3.1.1 Topographic map

A topographic map or maps of the project area extending at least to 1.6 km (one mile) beyond the property boundaries must be provided. A 7.5-minute series map published by the U.S. Geological Survey (USGS), or a 15-minute map when a 7.5-minute is not available for the site, should be provided. Each map should include the map scale, a meridian arrow showing north, latitude and longitude to the nearest whole second, and the name and number of the map. The direction of the current in rivers and the direction of the ebb and flow tides in tidal waters should also be shown. The legal boundaries of the facility, the location and serial number of each of the existing and proposed intake and discharge structures, and all springs and water bodies in the area must be shown. If an intake or discharge structure is located off the map, an additional map showing these structures should be attached. Figure 4 is an example of the type of map needed.

3.3.1.2 Description of the action

The action requiring an NPDES permit must be described. The standard industrial classification (SIC) codes and names that best describe the facility in terms of the

Figure 2. Basic steps in complying with the NPDES program.

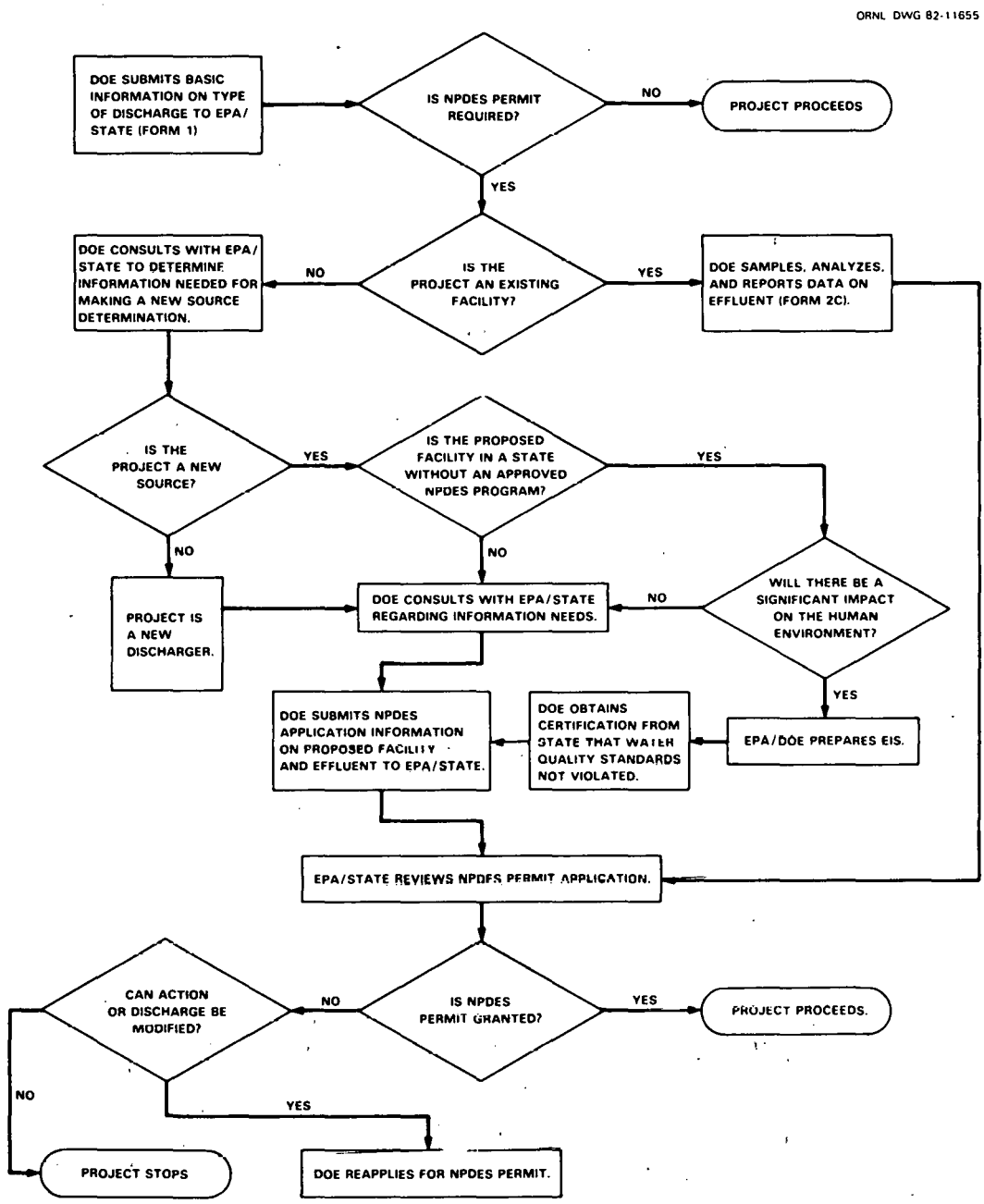


Figure 3. Determining additional information requirements for NPDES permits.

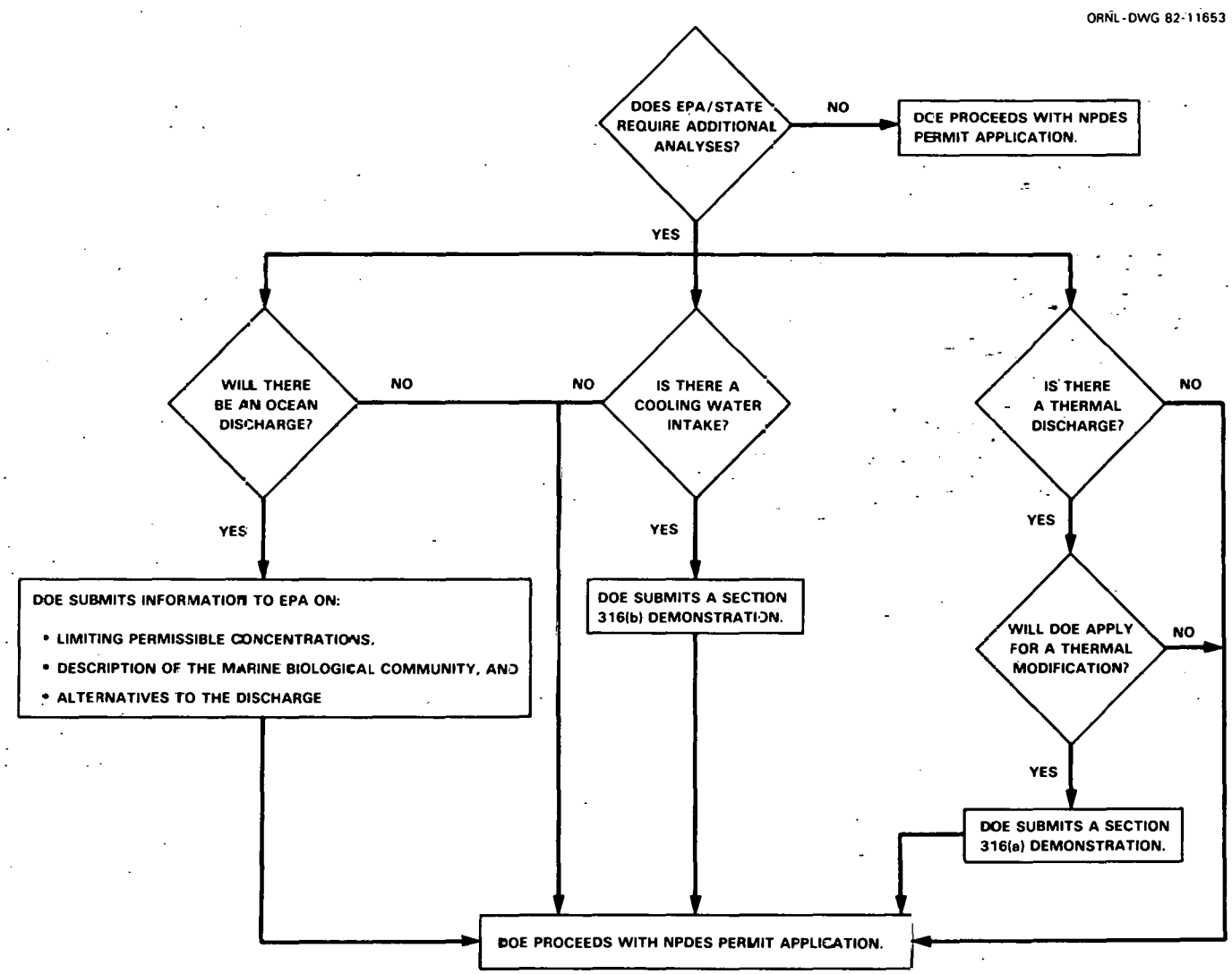
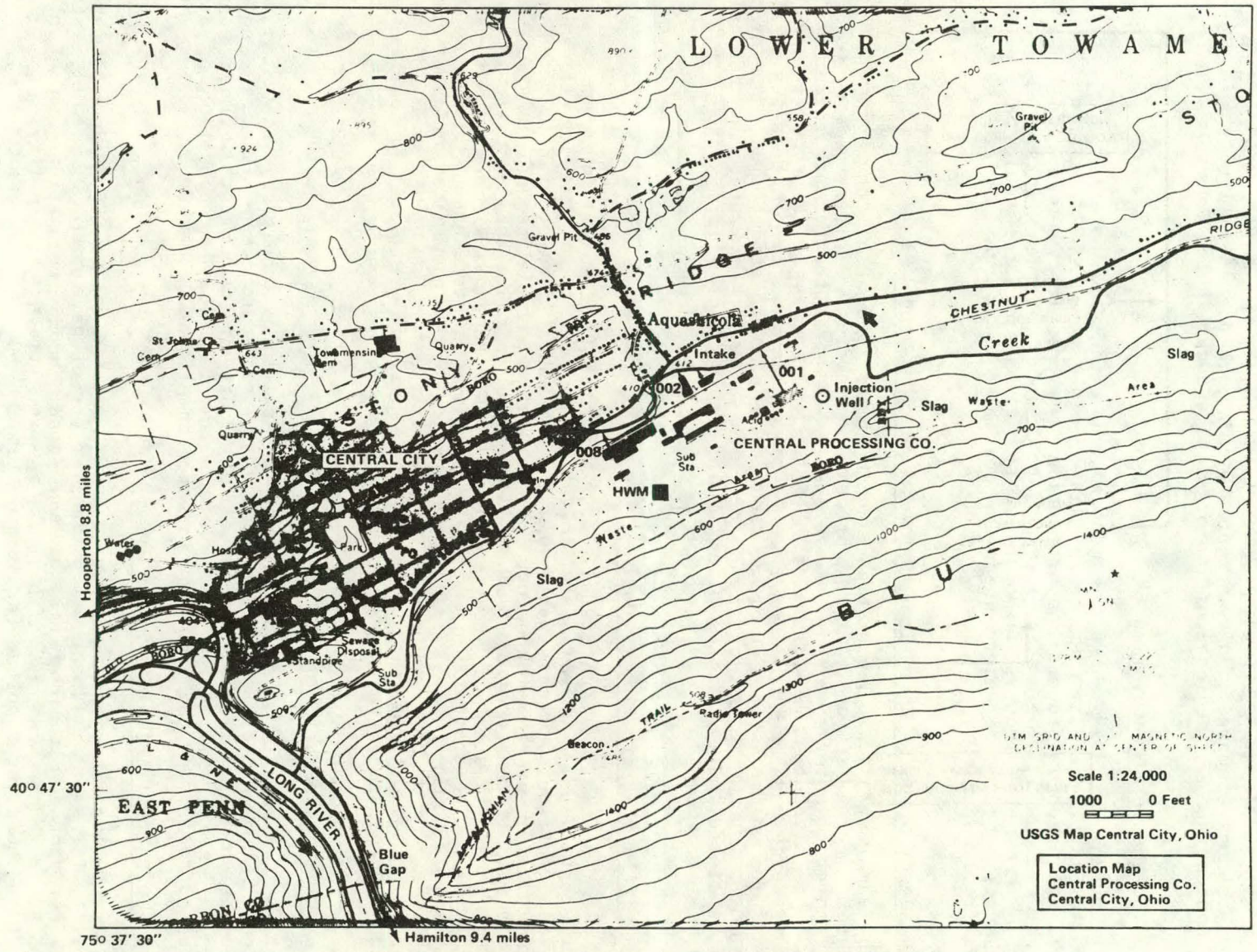


Figure 4. Example of topographic map showing the Central Processing Company and its associated slag waste area, intake and discharge structure locations and injection well (EPA 1980).



principal products or services provided should be listed. The codes are found in the "Standard Industrial Classification Manual" (Executive Office of the President and Department of Commerce 1972, 1978). These classifications may differ from the SIC codes describing the specific operation generating the discharge. For example, a national laboratory is classified as a noncommercial research organization, SIC code 8922. Questions concerning the appropriate SIC code for a facility should be directed to the appropriate EPA regional office or state agency (Tables 1 and D.1).

3.3.1.3 Schematic of water flow

A line drawing that shows the general route taken by water in the facility from intake to discharge is required. It should show all operations contributing wastewater, including process and production areas, sanitary flows, cooling water, and storm-water runoff. The water balance should show average flows. All significant losses of water to products, atmosphere, and discharge also should be shown. Actual measurements should be used whenever possible. Figure 5 is an example of an appropriate line drawing.

3.3.1.4 Description of operations and wastewater treatment

For each outfall, a description should be provided of all operations contributing wastewater to the effluent (i.e., process wastewater, sanitary wastewater, cooling water, and storm-water runoff), the average flow contributed by each operation, and the treatment received by the wastewater. If no data are available, the flow contributed by each source should be estimated. A reasonable measure of duration, volume, or frequency for storm water should be used. For each treatment unit, the proper code from Table 2 should be selected and the unit's size, flow rate, and retention time should be listed. The ultimate disposal of any solid or liquid wastes not discharged should be indicated.

3.3.1.5 Effluent limitation guidelines

Any effluent limitation guidelines promulgated by EPA that apply to the facility must be identified. An effluent limitation applies to a facility if any of its operations contribute process wastewater in any subcategory covered by a guideline on best practicable control technology (BPT), best available technology (BAT), or best conventional pollutant control technology (BCT). [Refer to the discussion of BPT, BAT, and BCT under effluent limitation guidelines (Appendix F) and toxic substances (Appendix G)]. The appropriate EPA regional office or state agency (Table 1) should be contacted to clarify if the facility is covered by a promulgated effluent guideline. If effluent limitations apply to the facility, the maximum level of production (expressed in the terms and units of the applicable effluent guideline) must be provided and the associated outfalls must be indicated.

3.3.1.6 Existing restrictions

If a facility is operating under an existing regulatory restriction (i.e., existing permit conditions, administrative or enforcement orders, enforcement complicance schedule letters, stipulations, court orders, grant or loan conditions, etc.), the permit application must identify and describe the condition or agreement, affected outfalls, and required and projected compliance date(s).

3.3.1.7 Characterization of intake water

Characterization of intake water is not required unless DOE wishes to demonstrate eligibility for a net effluent limitation for one or more pollutants. Net, rather than gross, effluent limitations are allowed under NPDES regulations only in certain circumstances [40 CFR 122.63(h)]. To demonstrate eligibility, the following information should be reported for each pollutant:

- The average of the results of analyses on the facility intake water. (If the water is treated before use, it should be tested after treatment.)

Figure 5. Example of a line drawing of water flow within a facility (EPA 1980).

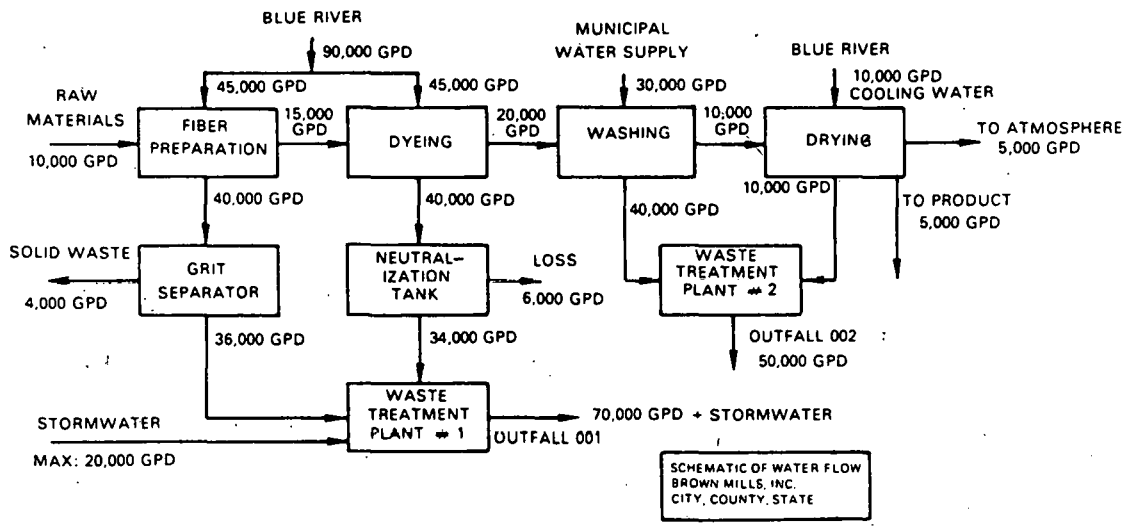


Table 2. Codes for treatment units (EPA 1980)

Physical Treatment Processes	
1-A Ammonia Stripping	1-M Grit Removal
1-B Dialysis	1-N Microstraining
1-C Diatomaceous Earth Filtration	1-O Mixing
1-D Distillation	1-P Moving Bed Filters
1-E Electrodialysis	1-Q Multimedia Filtration
1-F Evaporation	1-R Rapid Sand Filtration
1-G Flocculation	1-S Reverse Osmosis (Hyperfiltration)
1-H Flotation	1-T Screening
1-I Foam Fractionation	1-U Sedimentation (Settling)
1-J Freezing	1-V Slow Sand Filtration
1-K Gas-Phase Separation	1-W Solvent Extraction
1-L Grinding (Comminutors)	1-X Sorption
Chemical Treatment Processes	
2-A Carbon Adsorption	2-G Disinfection (Ozone)
2-B Chemical Oxidation	2-H Disinfection (Others)
2-C Chemical Precipitation	2-I Electrochemical Treatment
2-D Coagulation	2-J Ion Exchange
2-E Dechlorination	2-K Neutralization
2-F Disinfection (Chlorine)	2-L Reduction
Biological Treatment Processes	
3-A Activated Sludge	3-E Pre-Aeration
3-B Aerated Lagoons	3-F Spray Irrigation/Land Application
3-C Anaerobic Treatment	3-G Stabilization Ponds
3-D Nitrification-Denitrification	3-H Trickling Filtration
Other Processes	
4-A Discharge to Surface Water	4-C Reuse/Recycle of Treated Effluent
4-B Ocean Discharge Through Outfall	4-D Underground Injection
Sludge Treatment and Disposal Processes	
5-A Aerobic Digestion	5-M Heat Drying
5-B Anaerobic Digestion	5-N Heat Treatment
5-C Belt Filtration	5-O Incineration
5-D Centrifugation	5-P Land Application
5-E Chemical Conditioning	5-Q Landfill
5-F Chlorine Treatment	5-R Pressure Filtration
5-G Composting	5-S Pyrolysis
5-H Drying Beds	5-T Sludge Lagoons
5-I Elutriation	5-U Vacuum Filtration
5-J Flotation Thickening	5-V Vibration
5-K Freezing	5-W Wet Oxidation
5-L Gravity Thickening	

- A statement that the intake water is drawn from the body of water into which the discharge is made. (Otherwise, the facility is not eligible for net effluent limitations.)

- A statement of the extent to which the level of the pollutant is reduced by treatment of wastewater. (Limitations will be adjusted only to the extent that the pollutant is not removed or the applicable effluent limitations and standards contained in 40 CFR Subchapter N specifically provide that they shall be applied on a net basis.)

- When applicable (e.g., when the pollutant represents a class of compounds), a demonstration of the extent to which the pollutants in the intake vary physically, chemically, or biologically from the pollutants contained in the discharge. [Limitations will be adjusted only to the extent that the intake pollutants do not vary from the discharged pollutants or have standards and effluent limitations applicable on a net basis (40 CFR Subchapter N).]

3.3.1.8 Characterization of effluent

The effluent for each outfall must be characterized to include data on color, fecal coliform counts, radioactivity, metals, pH, biochemical oxygen demand, suspended solids, total phenols, organics, etc. as discussed below. The following guidance on procedures for sampling, analyzing, and reporting these characteristics is based on the information required for Form 2C (Appendix E).

Sampling. Guidance on procedures for water sampling can be found in several documents: EPA (1973), EPA (1976a), DOI (1972), DOI (1979), Slack et al. (1973), Knop and McKee (1979), Brown et al. (1970), and Fishman and Brown (1976). Specific requirements contained in the applicable analytical methods for sample containers, sample preservation, holding times, the collection of duplicate samples, etc. should be followed. Sampling time should be representative of normal operation, to the extent feasible, with all processes which contribute wastewater in normal operation and with the treatment system operating properly. Samples should be collected from the center of the flow channel, where turbulence is at a maximum, at a site specified in the present permit, or at a site adequate for the collection of a representative sample. EPA or the state permitting authority should be contacted for detailed guidance on sampling and for answers to specific questions.

Analyzing. EPA has established test procedures and methods for the analysis of particular pollutants or classes of pollutants. Appendix H lists the test procedures (40 CFR 136) that must be used for analyzing samples for an NPDES permit application. More than one approved method is given for analyzing some water quality parameters, and more than one reference that describes the approved method(s) is usually listed. There are also provisions for the EPA Regional Administrator to approve alternate test procedures (40 CFR 136.5). If no test method has been approved for a particular pollutant, any suitable method for measuring the level of the pollutant in the discharge may be used. However, a description of the method including the sample holding times, preservation techniques, and the quality control measures used or a reference to a published account of the method must be included. Generally accepted analytical methods can be located in the references listed in the sampling subsection above, and in American Public Health Association et al. (1972, 1981a, b), American Society for Testing and Materials (1973), Lichtenberg (1971), and Goerlitz and Brown (1972).

Information Requirements and Reporting. Pollutant data must be reported both as concentration and as total mass, using the units listed in Table 3.

Table 3. Units for reporting pollutant data (EPA 1980)

Concentration		Mass	
ppm	parts per million	lbs	pounds
mg/L	milligrams per liter	ton	tons (English or short tons)
ppb	parts per billion	mg	milligrams
ug/L	micrograms per liter	g	grams
		kg	kilograms
		T	tonnes (metric tons)

If only one daily sample is taken, it should be reported as the maximum daily value. However, the permitting authority may require that additional analyses be conducted to further characterize the discharges. If more than one daily measure for a pollutant is taken, the average of all values within the last year should be determined and reported as a long-term average value (including the total number of days for which values were obtained). Also, the average of all daily values taken during each calendar month should be calculated, and the highest average should be reported as a maximum 30-day value.

For composite samples, the daily value is the total mass or average concentration found in a composite sample taken over the operating hours of the facility during a 24-hour period. For grab samples, the daily value is the arithmetic or flow-weighted total mass or average concentration found in a series of at least four grab samples taken over the operating hours of the facility during a 24-hour period.

Data on biochemical oxygen demand, ammonia, total suspended solids, etc. (Part V-A of Form 2C, Appendix E) must be given for each outfall, including outfalls containing only noncontact cooling water or storm runoff unless they are covered by a general permit. At DOE's request, the permitting authority may waive the requirements to test for one or more of these pollutants, upon a determination that testing for the pollutant(s) is not appropriate for a facility's effluents. Composite samples should be used for all pollutants listed on this part of the form, except that grab samples should be used when sampling for pH and temperature. Long term average values and maximum 30-day values are not compulsory but should be included if available.

Data on color, fecal coliform, radioactivity, and metals, etc. (Part V-B of Form 2C, Appendix E) must be given for each outfall, including outfalls containing only noncontact cooling water or storm runoff, for pollutants believed to be present. The determination that a pollutant is present in or absent from a discharge should be based on knowledge of: (1) the raw materials and maintenance chemicals used; (2) intermediate products, final products, and byproducts; and (3) any previous analyses of the effluent or of any similar effluent. (For example, at a plant that manufactures pesticides, those pesticides should be expected to be present in contaminated stormwater runoff). If DOE expects a pollutant to be present solely as a result of its presence in a facility's intake water, DOE must indicate this expectation but need not analyze for the pollutant in the discharges. Composite samples should be used for all pollutants in this Part, except for residual chlorine, oil and grease, and fecal coliform where grab samples should be used. Long-term average values and maximum 30-day values are not required but should be given if data are available.

If any of the facility's processes that contribute wastewater fall into one of the 34 primary industry categories listed in Table 4, DOE must test both for all of the toxic metals, cyanide, and total phenols and for the toxic organic pollutant fractions indicated in Table 4 for that industrial category (Part V-C of Form 2C, Appendix E). On July 7, 1981, the requirement to test for toxic organic pollutant fractions was suspended until further notice for gum and wood, leather tanning and finishing, paint and ink formulation, petroleum refining, photographic supplies, pulp and paperboard mills, and steam electric power plants (46 FR 35090). These industries must still analyze their effluent for those organic toxic pollutants that they know or have reason to believe exist in the effluent and must report existing organic testing data generated by EPA. Secondary industries, nonprocess wastewater outfalls, and

Table 4. Primary industry categories and testing requirements for organic toxic pollutants (EPA 1980)

Industry category	Gas chromatography/mass spectrometry fraction[a]			
	Volatile	Acid	Base/Neutral	Pesticide
Adhesives and sealants	X[b]	X	X	-[c]
Aluminum forming	X	X	X	-
Auto and other laundries	X	X	X	X
Battery manufacturing	X	-	X	-
Coal mining	X	X	X	X
Coil coating	X	X	X	-
Copper forming	X	X	X	-
Electric and electronic compounds	X	X	X	X
Electroplating	X	X	X	-
Explosives manufacturing	-	X	X	-
Foundries	X	X	X	-
Gum and wood chemicals[d]	X	X	X	X
Inorganic chemicals manufacturing	X	X	X	-
Iron and steel manufacturing	X	X	X	-
Leather tanning and finishing[d]	X	X	X	X
Mechanical products manufacturing	X	X	X	-
Nonferrous metals manufacturing	X	X	X	X
Ore mining	X	X	X	X
Organic chemicals manufacturing	X	X	X	X
Paint and ink formulation[d]	X	X	X	X
Pesticides	X	X	X	X
Petroleum refining	X	X	X	X
Pharmaceutical preparations	X	X	X	-
Photographic equipment and supplies[d]	X	X	X	X
Plastic and synthetic materials manufacturing	X	X	X	X
Plastic processing	X	-	-	-
Porcelain enameling	X	-	X	X
Printing and publishing	X	X	X	X
Pulp and paperboard mills[d]	X	X	X	X
Rubber processing	X	X	X	-
Soap and detergent manufacturing	X	X	X	-
Steam electric power plants[d]	X	X	X	-
Textile mills	X	X	X	X
Timber products processing	X	X	X	X

[a]The pollutants in each fraction are listed under Item V-C of Form 2-C, Appendix E.

[b]Testing required.

[c]Testing not required.

[d]Testing for organic toxic pollutants suspended on 7 July 1981 until further notice.

nonrequired gas chromatography/mass spectrometry fractions must be tested only for those pollutants that are believed to be present in the effluents. Composite samples should be used for all pollutants listed on this part of Form 2C, except for total phenols and cyanide for which grab samples should be used.

DOE must also test for dioxin if the facility uses or manufactures one of the following compounds:

- 2,4,5-trichlorophenoxy acetic acid (2,4,5-T);
- 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5-TP);
- 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon);
- 0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel);
- 2,4,5-trichlorophenol (TCP); or
- Hexachlorophene (HCP).

The permitting authority may require a quantitative analysis if a positive result is reported.

Any of the pollutants in Table 5 that are believed to be discharged must be listed in Part V-D of Form 2C (Appendix E) along with an explanation of why they may be present. No analysis is required; but if analytical data are available, it must be reported.

Certain discharges of hazardous substances may be exempted from the requirements of Sect. 311 of the CWA [40 CFR 117.12(a)(2)], which establishes reporting requirements, civil penalities, and liability for cleanup costs for spills of oil and hazardous substances (Appendix I). A discharge of a particular substance may be exempted if the origin, source, and amount of the discharged substance are identified in the NPDES permit application or in the permit, provided the permit contains a requirement for treatment of the discharge and provided the treatment is in place. To apply for an exclusion from the requirements pertaining to the discharge of any hazardous substance under Sect. 311, DOE should provide the following information:

1. The substance(s) and the amount of each which may be discharged,
2. The origin and source of the discharge of the substance, and
3. The treatment which is to be provided for the discharge by:
   - An onsite treatment system separate from any treatment system treating the normal discharge,
   - A treatment system designed to treat the normal discharge and which is additionally capable of treating the amount of the substance identified under 1 above, or
   - Any combination of the above.

For further information on exclusions from Sect. 311, DOE should refer to 40 CFR 117.12(a)(2) and (c) or contact the appropriate regional EPA office or state agency (Tables 1 and D.1). Oil and hazardous substances regulated under Sect. 311 are discussed further in Appendix C.

The NPDES permit may contain discharge limits for all pollutants listed in Part V-C of Form 2C that are substances or components of a substance expected to be used or manufactured as an intermediate or final product or byproduct in the next five years (Part VI of Form 2C, Appendix E). The permit may also require DOE to report to EPA if, in the future, the facility begins to use or manufacture as an intermediate or final

Table 5. Toxic pollutants and hazardous substances to be identified in effluent (EPA 1980)

TOXIC POLLUTANT	HAZARDOUS SUBSTANCES (cont'd)
Asbestos	Guthion
	Isoprene
	Isopropanolamine
HAZARDOUS SUBSTANCES	Kelthane
	Kepone
Acetaldehyde	Malathion
Allyl alcohol	Mercaptodimethur
Allyl chloride	Methoxychlor
Amyl acetate	Methyl mercaptan
Aniline	Methyl methacrylate
Benzonitrile	Methyl parathion
Benzyl chloride	Mevinphos
Butyl acetate	Mexacarbate
Butylamine	Monoethyl amine
Captan	Monomethyl amine
Carbaryl	Naled
Carbonfuran	Napthenic acid
Carbon disulfide	Nitrotoluene
Chlorpyrifos	Parathion
Coumaphos	Phenolsulfonate
Cresol	Phosgene
Crotonaldehyde	Propargite
Cyclohexane	Propylene oxide
2,4-D, (2,4-Dichloro-phenoxyacetic acid)	Pyrethrins
	Quinoline
Diazinon	Resorcinol
Dicamba	Strontium
Dichlobenil	Strychnine
Dichlone	Styrene
2,2-Dichloropropionic acid	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
Dichlorvos	TDE (Tetrachlorodiphenyl ethane)
Diethyl amine	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Dinitrobenzene	Trichlorofon
Diquat	Triethanolamine
Disulfoton	Triethylamine
Diuron	Trimethylamine
Epichlorohydrin	Uranium
Ethion	Vanadium
Ethylene diamine	Vinyl acetate
Ethylene dibromide	Xylene
Formaldehyde	Xylenol
Furfural	Zirconium

product or byproduct any toxic pollutant not reported here. If necessary, the permit may be modified at that time to set limits for that pollutant.

The potential for the facility's operations to result in a discharge of any pollutant at twice the maximum value reported in Part V of Form 2C during the five-year period of the permit should be reported (Part VI of Form 2C, Appendix E). These variations may be part of routine operations or part of regular cleaning cycles. The NPDES permit may contain limits on the discharge of any pollutant reported in answer to this question, as well as all pollutants at levels exceeding the technology-based limits appropriate to the facility and reported in Parts V and VI-B of Form 2C. The permit may also require DOE to report to EPA if any activity has occurred or will occur (other than bypasses or upsets) that would make the discharge of any toxic pollutant five times the maximum value reported in Part V-C or in Part VI-B. The permit may be modified at that time if necessary to set limits regulating any pollutant discharged in the volumes discussed above. The following are examples of variations to be considered:

- Changes in raw or intermediate materials,
- Changes in process equipment or materials,
- Production rate changes,
- Changes in product lines,
- Significant chemical reactions between pollutants in waste streams, and
- Significant variation in removal efficiencies of pollution control equipment.

Predictions of expected levels of these pollutants should be based upon either a knowledge of processes, raw materials, past and projected project ranges, etc., or upon any testing conducted upon the effluent which indicates the range of variability that can be expected in the effluent.

DOE should indicate any biological tests for acute or chronic toxicity that have been done within the last three years on the facility's discharges or on the water body receiving the discharges. The permitting agency may ask for more information on this subject after the application is reviewed. While the regulations do not require biomonitoring of effluents as part of the application process, toxicity-based limits may be imposed where chemical limits are deemed inadequate (45 FR 33533). EPA has stated, "biomonitoring will play an increasingly important role in the NPDES program" (45 FR 33534). "Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms" (EPA 1978) is a useful reference on biomonitoring of effluents.

3.3.2 New Sources

An NPDES form for new sources is planned under the Consolidated Permits Program but has not yet been finalized. Refer to Sect. 3.2 of this manual for a discussion on determination of new source status. New sources would be asked to submit essentially the same information for an NPDES permit as existing sources, but a new source would not be expected to have actual test data on pollutants in the effluents or to know exactly which pollutants would be in a discharge. Information submitted by a new source should be based on preliminary facility designs, best engineering judgement (BEJ), and data on effluent discharges from similar facilities and/or technologies. If effluent limitations do not exist for the technology, effluent limitations for the NPDES permit will be established on a case-by-case basis. New source performance standards and related issues are discussed in Appendix F.

In addition to information requirements discussed under existing sources, a new source is required to submit environmental information (e.g., Environmental Assessment) prior to the initiation of any on-site construction (40 CFR Part 6). The National Environmental Policy Act of 1969 (NEPA) applies to the issuance of an NPDES permit by EPA for the discharge of any pollutant by a new source (CWA Sect. 511). Regional EPA offices can provide environmental information requirements and DOE has guidelines for compliance with NEPA (45 FR 20694). If it appears that construction or operation of

the facility would result in significant environmental impacts, an Environmental Impact Statement (EIS) may be required. NPDES permits issued by a state are not subject to federal EIS requirements; however, they could be subject to state environmental regulations.

3.3.3 New Dischargers

A new discharger would have to meet the same information requirements and effluent limitations as an existing source. As with a new source, information submitted by a new discharger should be based on BEJ. Mobile drilling rigs would be considered new dischargers only if they are at a site under EPA's jurisdiction that is not covered by an individual or general permit and that is determined by EPA to be in an area of biological concern (Natural Resources Defense Council v. USEPA and Gorsuch, case no. 80-1607 and consolidated cases, pending in the U.S. Court of Appeals, District of Columbia).

3.3.4 Ocean Discharges

3.3.4.1 General requirements

Section 403 of the CWA requires EPA to promulgate guidelines "for determining the degradation of the waters of the territorial seas ... and the oceans." Guidelines for issuance of NPDES permits for the discharge of pollutants from a point source into the territorial seas, the contiguous zone, and the ocean have been developed (40 CFR Part 125, Subpart M). The Marine Protection, Research, and Sanctuaries Act (Pub. L. 92-532) also regulates ocean disposal, and ocean dumping criteria under that Act have been finalized (40 CFR Part 227).

Figures 2 and 3 outline the basic steps for complying with NPDES requirements for an ocean discharge. An NPDES permit for an ocean discharge can only be granted if the discharge will not cause unreasonable degradation of the marine environment. Unreasonable degradation is defined as: (1) significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities, (2) threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms, or (3) loss of esthetic, recreational, scientific or economic values that is unreasonable in relation to the benefit derived from the discharge [40 CFR 125.121(e)]. For the permitting agency to determine whether a discharge will cause unreasonable degradation of the marine environment, DOE could be asked to supply some or all of the following information:

- Composition and quantities of the pollutants to be discharged;
- Potential for bioaccumulation or persistence of the pollutants which will be discharged;
- Bathymetric map showing the location of discharge(s), the discharge structure(s), and the predicted mixing zone;
- Composition of the biological communities that may be exposed to discharged pollutants, including beach, intertidal, open water, and bottom communities;[4]
- Importance of the receiving water area to the surrounding biological community (e.g., the presence of spawning sites, nursery/forage areas, migratory pathways, etc.);

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[4] Unique species or communities of species, threatened, endangered, or proposed species as defined under the Endangered Species Act or state legislation, and species critical to the structure or function of the ecosystem (major forage species) should be highlighted in the biological community description.

- Existence of special aquatic sites such as marine sanctuaries and refuges, parks, national and historic monuments, national seashores, wilderness areas, and coral reefs;
- Potential impacts on human health through direct and indirect pathways;
- Existing or potential recreational and commercial fishing;
- A description of the physical and chemical oceanography of the proposed discharge location, including current patterns, temperature, dissolved oxygen concentrations, salinity, pH, nutrient concentrations, and turbidity;
- A physical description of the discharge facility, including length and depth of the discharge structure and whether it would be buried or would have a diffuser;
- Plume modeling (approved by permitting authority) that indicates ambient pollutant concentrations within the initial dilution zone and outside the mixing zone;[5]
- Bioassays appropriate for determining the permissible concentrations in the discharge.

Prior to permit application, DOE should consult with the appropriate EPA regional office or state agency to see how much of the information listed above is required, especially the bioassay tests and plume modeling, for a given project.

An evaluation of available alternatives may be required as part of an NPDES application for ocean discharge. Alternatives include available process modifications that might reduce the quantities of pollutants to be discharged, as well as alternatives to the discharge (i.e., land-based disposal or disposal in an approved ocean dumping site).

DOE should check with the state in which the facility would be located to see if it has an approved Coastal Zone Management Plan. Marine water quality criteria and standards developed by the state, pursuant to CWA Sect. 304(a)(1), will influence effluent limitations for an NPDES ocean discharge permit.

3.3.4.2 Requirements for conditional permits

A "conditional" NPDES permit for an ocean discharge can be granted when the permitting authority has insufficient information to determine that there will be "... no unreasonable degradation of the marine environment" (40 CFR 125.123). Such a permit is granted only when the discharge would not cause irreparable harm to the marine environment during the monitoring period and there are no reasonable alternatives for disposal. Irreparable harm is defined as "significant undesirable effects occurring after the date of perimit issuance which will not be reversed after cessation or modification of the discharge" (40 CFR 125.121(a)]. A "conditional" NPDES permit is subject to the following conditions.

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[5] The mixing zone means the zone extending from the sea's surface to the seabed and extending laterally to a distance of 100 m in all directions from the discharge point(s) or to the boundary of the zone of initial dilution.

- Pollutants will not exceed the limiting permissible concentration[6] in the liquid and suspended particulate phases of the discharge following dilution as measured at the boundary of the mixing zone.
- Pollutants will not exceed the limiting permissible concentration for the solid phase of the waste material or cause an accumulation of toxic materials in the human food chain following dilution as measured at the boundary of the mixing zone.
- A monitoring program will be established to assess the impact of the discharge on water, sediment, and biological quality.

Other possible conditions that could be applied to a "conditional" NPDES permit include seasonal restrictions on the discharge, process modifications, and pollutant dispersion requirements.

Appropriate marine organisms for the suspended phase bioassay should include at least one species each of phytoplankton or zooplankton, crustacean or mollusk, and fish chosen from among the most sensitive species documented in the scientific literature or accepted by EPA as reliable test organisms. Bioassays, except on phytoplankton or zooplankton, must be run for a minimum of 96 hours under temperature, salinity, and dissolved oxygen conditions representative of the extremes of environmental stress at the disposal site. Bioassays on phytoplankton or zooplankton may be run for shorter time periods if appropriate for the organisms tested.

Appropriate benthic marine organisms for the solid phase bioassay should include at least one species each of filter-feeder, deposit-feeder, and burrower from among the most sensitive species accepted by EPA as being reliable test organisms. An implementation manual on bioassay procedures for marine organisms is being developed jointly by the EPA and the U.S. Army Corps of Engineers (COE). But until this manual is available, interim guidance on appropriate procedures can be obtained from the Marine Protection Branch of EPA in Washington, D.C.

3.4 Possible Attachments To An NPDES Permit Application

3.4.1 Best Management Practices Program

The EPA may require best management practices (BMPs) for any category of point sources (SIC industrial codes) [CWA Sect. 304(e)]. BMPs are methods, measures, or practices to prevent or reduce water pollution and include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. These BMPs supplement effluent limitation guidelines and can pertain to point or nonpoint pollutants that are toxic or hazardous. Pollution sources that could require BMPs include site runoff, in-plant transfer, spills or leaks, sludge or waste disposal, and drainage from raw material storage that is ancillary to an industrial manufacturing or treatment process requiring an NPDES permit and is not a discrete source.

Best management practices shall be incorporated into an NPDES permit when required by EPA promulgated effluent limitations guidelines or on a case-by-case basis when

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[6] Limiting permissible concentrations for various phases of waste material discharged under a "conditional" NPDES permit are defined in the Ocean Dumping Criteria (Marine Protection, Research, and Sanctuaries Act of 1972, as amended, Pub. L. 92-532) [40 CFR 227.27(a)(2) and (3), 227.27(b), 227.27(c), and 227.27(d)]. The limiting permissible concentration for the liquid phase of a waste is the concentration after initial mixing that will not exceed a toxicity threshold defined as 1% of the concentration shown to be acutely toxic in a bioassay to appropriate sensitive marine organisms. The limiting permissible concentration in the suspended particulate and solid phases of a material is the concentration that will not cause unreasonable acute or chronic toxicity or other sublethal adverse effects based on bioassay results and will not result in accumulation of toxic materials in the human food chain.

determined necessary to carry out provisions of the CWA. An applicant whose facility deals with large volumes of toxic or hazardous substances would most likely be asked to prepare a 304(e) BMP program and should refer to 40 CFR Part 125, Subpart K where EPA criteria and standards for BMPs are discussed. The draft version of "NPDES Best Management Practices, Guidance Document" (Cleary et al. 1979) gives guidance on BMP plan preparation and evaluation. The EPA has suspended the requirement that all persons subject to Sect. 304(e) must attach a BMP program to an NPDES application until a final BMP guidance document is promulgated (Weinberg et al. 1982).

BMP requirements for nonpoint sources of pollutants under CWA Sect. 208 (e.g., construction, agriculture, and silviculture) are different from 304(e) requirements and are discussed in Appendix A.

3.4.2 CWA Section 316(a) Demonstration

Section 316(a) of the CWA gives EPA and approved state programs the authority to modify the effluent limitation for the thermal component of a given discharge. A Sect. 316(a) modification usually applies to facilities with cooling water discharges. To receive such a modification, DOE must show that the existing limitation is more stringent than needed to maintain and sustain the fish, shellfish, and wildlife communities and populations found in and on the body of water receiving the discharge. A modification usually allows an operator to discharge more heat and/or a larger volume of heated effluent than permitted under effluent guidelines and standards (40 CFR Part 423). If DOE wishes to apply for a 316(a) modification, a 316(a) Demonstration document must be submitted at the time an NPDES permit is applied for (see Fig. 3). This document should provide a justification of the proposed discharging location and design in light of projected environmental impacts, alternative systems, and compliance with regulations. The contents of the Demonstration are described in the draft Interagency 316(a) Technical Guidance Manual (EPA 1977a) and in Appendix J.

3.4.3 CWA Section 316(b) Study or Demonstration

Section 316(b) of the CWA requires that "... the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." If a proposed facility has a cooling water intake structure, DOE must submit an impact assessment of the facility's intake structure at the time an NPDES permit is applied for (see Fig. 3). Existing sources are required to submit assessments as determined by EPA or the state permitting agency on a case-by-case basis. The impact assessment or documentation supplied by the facility operator, called a 316(b) Study or Demonstration, is used to determine if the proposed intake technology minimizes environmental impacts. Although the CWA addresses thermal discharges [CWA Sect. 316(a)] and intake structures [CWA Sect. 316(b)] separately, these are associated with each other. A 316(a) Demonstration and a 316(b) Study must be submitted simultaneously when both are required (Fritz 1978). Requirements for 316(b) Demonstrations are discussed in the "Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment" (EPA 1977b) and in Appendix K.

3.5 Extensions, Enforcement Orders, and Modifications

Several mechanisms in the CWA allow modifications, variances, or extensions from certain CWA requirements, and those applicable to NPDES permits are discussed. All modifications, variances, and extensions are done on a case-by-case basis. The cost and time required to obtain modifications and variances should be carefully compared to their benefits.

3.5.1 Extensions

Section 301(i)(2) of the CWA allows an extension of best practicable control technology (BPT) requirements until July 1, 1983, for industrial users planning to discharge into a publicly owned treatment works (POTW) but prevented from doing so by construction delays at the POTW. This extension is available only if the POTW has received a CWA Sect. 301(i)(1) extension (40 CFR Part 125, Subpart J).

Section 301(k) of the CWA authorizes an extension of best available technology (BAT) requirements for all pollutants until July 1, 1987, for dischargers installing certain types of innovative technology. Innovative technology includes processes that will result in effluent reduction significantly greater than required by the applicable limitation or that have the potential for significantly lower costs than systems at BAT levels. Section 301(k) applies only to toxic and nonconventional pollutants. It does not apply to new sources or indirect discharges. The EPA has proposed regulations under this Section (40 CFR Part 125, Subpart C; 46 FR 46597).

3.5.2 Enforcement Orders

Section 309(a)(5)(A) of the CWA allows EPA to issue enforcement orders requiring compliance with NPDES permits within a reasonable time after deadlines have passed. EPA may order a discharger to connect with a POTW by no later than July 1, 1983, if a discharger is in violation of BPT requirements and is unable to obtain a Sect. 301(i)(2) extension and if this is determined to be the most expeditious and appropriate means of compliance [Sect. 309(a)(6)].

3.5.3 Modifications

Section 302(b) of the CWA allows EPA to modify effluent limitations based on the attainment or maintenance of a designated level of water quality or the demonstration that there is no reasonable relationship between the economic and social costs and the benefits to be obtained from such a limitation. Several other provisions exist for the modification of effluent limitations.

3.5.3.1 Nontoxic and nonconventional pollutants

The EPA may modify a BAT limitation for nontoxic and nonconventional pollutants because of economic hardship [CWA Sect. 301(c)]. The applicant must show that the modified requirement will represent the maximum use of technology within its economic capability and will result in reasonable further progress toward the elimination of the discharge of pollutants (40 CFR Part 125, Subpart E is reserved for these criteria). This modification is applicable to limitations on the thermal component of discharges (Weinberg et al. 1982).

Section 301(g) of the CWA permits EPA to modify a BAT limitation for nontoxic, nonconventional pollutants other than heat (i.e., ammonia, phosphorus, nitrate, and nitrite) based on receiving water quality. The applicant must show that the modified requirements will: (1) comply with BPT or any more stringent requirements necessary to meet water quality standards, treatment standards, or schedules of compliance; (2) not result in the imposition of additional or stricter requirements on another point or nonpoint source; and (3) not adversely affect public water supplies, the protection of aquatic life, recreational activities, human health, or the environment through bioaccumulation, persistence in the environment, acute or chronic toxicity, or synergistic effects.

The requests for BAT modifications discussed above must be applied for at the same time and not later than 270 days after promulgation of an applicable effluent limitation [40 CFR 122.53(i)(2)].

3.5.3.2 Fundamentally different variance for all pollutants

EPA may grant a variance from BPT, BCT, and BAT effluent limitations or standards [established under CWA Sects. 301, 304, and 307(b)] for all pollutants where it can be shown that factors relating to a particular discharger's facilities, equipment, processes, cost, and other items are fundamentally different from the factors considered by EPA in developing the national limits (40 CFR Part 125, Subpart D). An applicant's effort to obtain a variance will not delay the deadline for compliance with the applicable effluent limitation (Truitt and Hall 1980).

4. Alternatives

Although information on alternatives is not a direct requirement of the NPDES permit process (unless an Environmental Impact Statement is required), alternatives are an indirect part of the process. An application for an NPDES permit is site-specific; therefore, alternative site locations are not applicable to the NPDES process after a permit application is filed. However, two water quality considerations should be major factors in the site selection process prior to permit application: (1) state classification and remaining waste load allocations for the water body receiving the facility's effluent and (2) the purity or pristine state of the receiving water.

The DOE should start the NPDES permit process while still designing the facility. At this stage, several areas of the NPDES allow for negotiations between DOE and the permitting agency on the selection of process alternatives, wastewater treatment alternatives, best management practices, discharge location(s), and waivers. Consideration of these alternatives will be important in meeting effluent limitations and water quality standards, especially for toxic and hazardous substances. The "Treatability Manual" (EPA 1982) is useful when considering treatment process alternatives. If a BMP plan is required (Sect. 3.4.1), several different practices may provide the required level of protection (see Cleary et al. 1979). The location of a discharge can be very important to compliance with water quality standards or pollutant criteria. A discharge that is rapidly diluted (i.e., discharges into a good mixing area or into a stream with high flows year round) is more likely to meet ambient standards.

Several requirements in the NPDES process specifically address alternatives. An application for an NPDES permit to discharge into the ocean should contain an evaluation of available alternatives to the discharge, including an evaluation of the possibility of land-based disposal or disposal in an approved ocean dumping site [40 CFR 125.124(f)]. A 316(a) Demonstration is documentation to support an alternative DOE would request to an established effluent limitation or standard of performance for a thermal discharge [40 CFR 125.71(a)]. A 316(b) Demonstration is really an impact assessment of a facility's cooling-water intake. The demonstration should show that the location, design, construction, and capacity of the proposed cooling water intake reflects the best technology (i.e., best alternative) available for minimizing adverse environmental impact.

Most DOE projects requiring an NPDES permit would also require an environmental analysis (i.e., an environmental assessment or environmental impact statement) to comply with the National Environmental Policy Act (NEPA). NEPA requires a detailed consideration of environmental impacts associated with alternatives such as site location, processes, wastewater treatment processes, and discharge location. The data and rationale being used to prepare the NPDES permit could also be used in discussing alternatives under NEPA.

5. Public Participation in the Permitting Process

Section 401(a)(2) of the CWA contains provisions for public notice and a public hearing on an NPDES permit application (see DOE 1981a, Flow III-2). Regulatory procedures for NPDES public hearings and public notice are at 40 CFR 124.10 through 124.14 and at 124.57. After state certification has been obtained for a project, the permitting agency makes a preliminary decision to grant or deny the NPDES permit and issues a public notice on the decision. Public notice includes printing the decision in newspapers, posting a notice in public places near the project site and in post offices, contacting individuals that have requested direct notification, and contacting appropriate federal and state agencies. A draft permit would be available at this time. The minimum public comment period is 30 days. The permitting agency decides if a public hearing is necessary based on the public comments. A public hearing is necessary whenever there is a "significant degree of public interest in the draft permit" or at the permitting agency's discretion (40 CFR 124.12). The public hearing must be announced 30 days in advance. The EPA or state agency then makes a decision to grant or deny the permit based on the permit application and input from the public and other agencies. The public comments and public hearing proceedings for a controversial project or a project with a lot of public interest can substantially influence the granting of a permit, the provisions of a permit, and the conditions under which a permit is granted.

6. Compliance with Issued Permits

The NPDES permit contains the final definition of DOE's responsibilities. Within fourteen days of all interim and final compliance dates, DOE must notify the permitting authority in writing of its compliance. Compliance with an NPDES permit constitutes compliance with the applicable sections of the CWA. This provision does not provide a defense in actions brought under the emergency provisions of CWA Sect. 504. NPDES permits are effective for a fixed term not to exceed five years (45 FR 33427).

DOE must keep records of all data used to complete an NPDES permit application and any supplemental information for at least three years from the date the application was signed (45 FR 33425). Any information submitted to EPA may be claimed as confidential, but the applicant must claim confidentiality at the time of application. An NPDES application cannot be confidential (45 FR 33432).

6.1 Monitoring and Reporting

An NPDES permit customarily includes requirements that the operator regularly monitor and record facility discharges and submit a uniform Discharge Monitoring Report to the regulatory authority on the quantities of pollutants discharged from the plant. The frequency and type of monitoring required of a permittee is discretionary with the permitting authority. Requirements and procedures for reporting information of environmental significance at DOE operations are contained in DOE Order 5484.1 (DOE 1981c). This order requires an annual environmental monitoring report at DOE sites.

Effluent limitation guidelines and new source performance standards are usually set at levels based upon normal operating procedures. Occasionally a plant will experience an upset or other unusual condition (e.g., abnormally heavy rainfall) when the control technology is unable to treat the effluent adequately. In some cases provisions for these unusual conditions exist in the regulations. For example, each toxic pollutant effluent standard states that the standard does "not apply ... to stormwater runoff that exceeds that from the ten year 24-hour rainfall event" [e.g., 40 CFR 129.100(c)(ii) and 129.101(c)(ii)].

If a bypass or upset occurs at a facility with an NPDES permit, prompt notice must be given to the permit issuing authority. A bypass is defined as an intentional diversion of waste and is allowed only when there is no feasible alternative and it is essential to prevent loss of life or severe property damage [40 CFR 122.60(g)]. Notice must be given ten days prior to a bypass when the need for a bypass is known in advance. The lack of adequate backup equipment will not be a defense unless the discharger could not anticipate the need for such equipment. An upset is an exceptional, temporary, and unintentional noncompliance for reasons beyond the control of the permittee. Upset is an acceptable defense to a violation of technology based permit limitations [40 CFR 122.60(h)]. Because the permittee seeking to establish the occurrence of an upset has the burden of proof, DOE would be benefitted by adopting a standard procedure for recording the information necessary to prove the occurrence of an upset [40 CFR 122.60(h)(3)]. This information should include: (1) the fact that an upset occurred, (2) specific causes of the upset, (3) the fact that the facility was being operated properly, (4) the permittee complied with any remedial measures, and (5) notice was given within 24 hours. The DOE Order 5484.2 (DOE 1981d) establishes policy, assigns responsibility, and provides criteria and instructions for a system of reporting unusual occurrences at DOE operations.

Reporting procedures for spills of toxic and hazardous substances are discussed in Appendices C and G.

6.2 Permit Modification

Any alteration that will significantly affect wastewater discharges at an existing source must be reported in advance to EPA. If the alteration would result in either a discharge of different pollutants or in quantities of pollutants not allowed by the existing permit, a modification of the permit would be required. For existing sources, this modification would entail the application of pollution control requirements only to the new activities (Quarles 1979).

The permissible conditions for NPDES modification are specified at 40 CFR 122.15(a)(5). For example, the EPA may modify a permit to incorporate a toxic effluent standard or to impose additional limitations whenever the level of discharge of any pollutant not limited in the permit exceeds the level attainable by the installation of the technology-based treatment requirements applicable to the permittee.

6.3 Permit Transfer

A permit may be transferred to another person if: (1) the permittee notifies the permitting authority 30 days in advance of the proposed transfer date, (2) a written agreement between the permittee and transferee regarding permit responsibility is submitted, and (3) EPA or the state does not notify the permittee of its intent to modify or revoke and reissue the permit (40 CFR 122.14).

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Glossary of Terms

Term	Definition
Administrator	Administrator of the U.S. Environmental Protection Agency
Animal feeding operation	A lot or facility (other than an aquatic animal production facility) where the following conditions are met: A. Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period; and B. Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.
Approved program or approved state	A State program which has been approved or authorized by EPA under 40 CFR Part 123.
Aquaculture project	A defined managed water area that uses discharges of pollutants into a designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals. "Designated area" means the portions of the waters of the United States within which the applicant plans to confine the cultivated species, using a method of plan or operation (including, but not limited to, physical confinement) which, on the basis of reliable scientific evidence, is expected to ensure the specific individual organisms comprising an aquaculture crop will enjoy increased growth attributable to the discharge of pollutants and be harvested within a defined geographic area.
Best management practices (BMP)	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 include treatment requirements, operation procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
Biological monitoring test	Any test which includes the use of aquatic algal, invertebrate, or vertebrate species to measure acute or chronic toxicity, and any biological or chemical measure of bioaccumulation.
Bypass	The intentional diversion of wastes from any portion of a treatment facility.
Composite sample	A combination of at least eight sample aliquots of at least 100 mL, collected at periodic intervals during the operating hours of a facility over a 24-h period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the

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Term	Definition
	volume of each aliquot must be proportional to the stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.
Concentrated animal feeding operation	An animal feeding operation which meets the criteria set forth in either (A) or (B) below or which the Director designates as such on a case-by-case basis: A. More than the numbers of animals specified in any of the following categories are confined: 1. 1000 slaughter or feeder cattle, 2. 700 mature dairy cattle (whether milked or dry cows), 3. 2500 swine each weighing over 25 kg (approximately 55 lbs), 4. 500 horses, 5. 10,000 sheep or lambs, 6. 55,000 turkeys, 7. 100,000 laying hens or broilers (if the facility has a continuous overflow watering system), 8. 30,000 laying hens or broilers (if the facility has a liquid manure handling system), 9. 5000 ducks, or 10. 1000 animal units; or B. More than the following numbers and types of animals are confined: 1. 300 slaughter or feeder cattle, 2. 200 mature dairy cattle (whether milked or dry cows), 3. 750 swine each weighing over 25 kg (approximately 55 lbs), 4. 150 horses, 5. 3000 sheep or lambs, 6. 16,500 turkeys, 7. 30,000 laying hens or broilers (if the facility has a continuous overflow watering system), 8. 9000 laying hens or broilers (if the facility has a liquid manure handling system), 9. 1500 ducks, or 10. 300 animal units; and either one of the following conditions are met: (1) Pollutants are discharged into waters of the United States through a man-made ditch, flushing system, or other similar man-made device ("man-made" means constructed by man and used for the purpose of transporting wastes); or (2) pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

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Term	Definition
	No animal feeding operation is a concentrated animal feeding operation as defined above if such animal feeding operation discharges only in the event of a 25-yr, 24-h storm event.
Concentrated aquatic animal production facility	A hatchery, fish farm, or other facility which contains, grows, or holds aquatic animals in either of the following categories, or which the Director designates as such on a case-by-case basis: A. Cold-water fish species or other cold-water aquatic animals including, but not limited to, the Salmonaide family of fish (i.e., trout and salmon) in ponds, raceways, or other similar structures which discharge at least 30 days per year but not including: 1. Facilities which produce less than 9090 kg harvest weight (approximately 20,000 lb) of aquatic animal per year, and 2. Facilities which feed less than 2272 kg (approximately 5000 lb) of food during the calendar month of maximum feeding. B. Warm-water fish species or other warm-water aquatic animals including, but not limited to, the Ameiuridae, Cetrarchidae, and Cyprinidae families of fish (e.g., catfish, sunfish, and minnows, respectively) in ponds, raceways, or other similar structures which discharge at least 30 days per year, but not including: 1. Closed ponds which discharge only during periods of exceess runoff; or 2. Facilities which produce less than 45,454 kg harvest weight (approximately 100,000 lb) of aquatic animals per year.
Contiguous zone	"The entire zone established or to be established by the United States under article 24 of the Convention of the Territorial Sea and the Contiguous Zone" [CWA Section 502(9)].
Conventional pollutant	Pollutants that have traditionally been the primary focus of wastewater control and that are naturally occurring, biodegradable oxygen demanding materials (i.e., biochemical oxygen demand, total suspended solids, fecal coliforms, pH, and oil and grease).
Clean Water Act (CWA)	The Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Pub. L. 92-500, as amended by Pub. L. 95-217 and Pub. L. 95-576, 33 U.S.C. 1251 et seq.
Diel	A 24-h period, usually a day and the adjoining night.

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Term	Definition
Discharge (of a pollutant)	A. Any addition of any pollutant or combination of pollutants to waters of the United States from any point source; or B. Any addition of any pollutant or combination of pollutants to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This definition includes discharges into waters of the United States from: surface runoff that is collected or channelled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person that do not lead to POTWs; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works. This term does not include an addition of pollutants by any indirect discharger.
Effluent limitation	Any restriction imposed by the Administrator on quantities, discharge rates, and concentrations of pollutants discharged from point sources into waters of the United States, the waters of the continguous zone, or the ocean.
Effluent limitation guideline	A regulation published by the Administrator under Section 304(b) of the Clean Water Act to adopt or revise effluent limitations.
Entrainment	The incorporation of organisms into the cooling water flow is entrainment. There are two generally recognized types of entrainment: pumped entrainment -- referring to those organisms that enter the intake and are pumped through the condenser, and plume entrainment -- referring to organisms that are incorporated into the discharge plume by the dilution water. Plume entrainment is not covered by Section 316(a) but is part of the thermal discharge effect to be considered in conjunction with thermal effects demonstrations under Section 316(a).
Existing discharger or source	Any source of wastewater that is not a new source or a new discharger.
Far Field Study Area	That portion of the receiving water body, exclusive of the primary study area, in which impacts of the thermal discharge and its interaction with other pollutants are likely to occur.
Grab sample	An individual sample of at least 100 mL collected at a randomly-selected time over a period not exceeding 15 m.
Habitat formers	Plants and/or animals with a relatively immobile life stage, an aggregated distribution, and functioning as: a living substrate, food source, part of a nutrient cycling path, stabilizing mechanism for sediments, or a spawning or nursery area for other organisms.

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Term	Definition
Hazardous substance	Any of the substances designated under 40 CFR Part 116 pursuant to Section 311 of the CWA. See Appendix C.
Impingement	The physical blocking of larger organisms by a barrier, generally some type of screen system in the cooling water intake.
Indirect discharger	A nondomestic discharger introducing pollutants into a publicly owned treatment works.
Navigable waters	"All waters of the United States, including the territorial seas" [CWA Section 502(7)].
New discharger	Any building, structure, facility, or installation: (A) From which there is or may be a new or additional discharge of pollutants and at a site from which pollutants had never been discharged as of October 18, 1972; (B) Which has never received a finally effective NPDES permit for discharges at that site; and (C) Which is not a "new source." This definition includes an indirect discharger which commences discharging into waters of the United States. It also includes any existing mobile point source, such as a seafood processing vessel, an aggregrate plant, or possibly an offshore oil drilling rig that begins discharging at a location for which it does not have an existing permit.
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 CWA Section 306 which are applicable to such source; or B. After proposal of standards of performance in accordance with CWA Section 306 which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.
Ocean	"Any portion of the high seas beyond the contiguous zone" [CWA Section 502(10)].
Permitting authority	The EPA regional director or the director of the State agency approved by EPA to grant NPDES permits.
Pollutant	Dredged spoil, solid waste, incinerator residue, filter backwash, garbage, sewage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials [except those regulated under the Atomic Energy Act of 1954, as amended (42 USC Section 2011 et seq.)], heat, wrecked or discarded equipment, rocks, sand, cellar dirt, and industrial, municipal, and agriculture waste discharged into water. It does not mean:

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Term	Definition
	A. Sewage from vessels; or B. Water, gas, or other material that is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well (used either to facilitate production or for disposal purposes) is approved by authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.
Pollution	"The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water" [CWA Section 502(19)].
Primary industry category	Any industry category listed in the NRDC Settlement Agreement [Natural Resources Defense Council v. Train, 8 ERC 2120 (D.D.C. 1976), modified 12 ERC 1833 (D.D.C. 1979)]. See Table 3.
Publicly owned treatment works (POTW)	Any device or system used in the treatment of municipal sewage or industrial wastes that is owned by a State or municipality (e.g., city, village, county, parish, association, Indian tribe, etc.).
Separate storm sewer	A conveyance or system of conveyance (including pipes, conduits, ditches, and channels) primarily used for collecting and conveying stormwater runoff and which is either: A. located in an urbanized area as designated by the Bureau of the Census according to the criteria in 39 FR 15202; or B. is designated on a case-by-case basis.
Storm-water runoff	Any water discharged as a result of rain, snow, or other precipitation.
Territorial seas	"The belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles" [CWA Section 502(19)].
Toxic pollutant	Any pollutant listed as toxic under CWA Section 307(a)(1). See Table B.1.
Upset	An exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations of a permit because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance caused by operational error, improperly designed or inadequate treatment facilities, lack of preventive maintenance, or improper operation.

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Term	Definition
Waters of the United States	A. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide; B. All interstate waters, including interstate wetlands; C. All other waters [e.g., intrastate lakes, rivers, streams, (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playas and natural ponds], the use, degradation, or destruction of which would or could affect interstate or foreign commerce including any such waters: 1. Which are or could be used by interstate or foreign travelers for recreational or other purposes, 2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce, and 3. Which are used or could be used for industrial purposes by industries in interstate commerce; D. All impoundments of waters defined in A - C as waters of the United States; E. Tributaries of waters identified in paragraphs A - D above; F. The territorial sea; and G. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs A - F of this definition. Cooling ponds as defined in 40 CFR Section 423.11(m) also meet the criteria of this definition. However, waste treatment systems, including treatment ponds or lagoons designed to meet requirements of the CWA, are not waters of the United States. This exclusion applies only to man-made bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundments of waters of the United States.

Appendix A

Nonpoint Source Discharges

Nonpoint source pollution is directly related to land use and includes runoff from agricultural land, silvicultural land, mining operations, and urban areas and return flows from irrigated agricultural land. Estimates indicate that nonpoint sources are responsible for 50% or more of both conventional and toxic pollutants in the nation's waterways.[1] To attain water quality goals and standards, more emphasis will have to be placed on regulating pollutants from these sources.

The diffuse and nondiscrete nature of nonpoint pollution makes it difficult to study, monitor, and control. The states and local authorities were given the task of developing and implementing area-wide waste treatment management programs under Sect. 208 of the CWA. Section 303(e) of the CWA requires development of statewide plans for achieving water quality standards. The Governor of each state has designated areas with water quality problems as special 208 study areas. Parts of the state not contained in a special 208 study area are covered by a statewide 208 plan. If a state has a CWA Section 208 area-wide waste treatment management plan approved by EPA, an NPDES permit may not be issued to any point source that is in conflict with the plan [CWA Sections 208(e)]. A state must verify (state certification) an applicant's compliance with the state's effluent limitations, water quality standards, implementation plans, performance standards, etc. before a preliminary decision to grant or deny a permit can be made (see DOE 1981, flowchart III-2). Section 208 plans are implemented by local, regional, or state agencies as designated by the State Governor and approved by EPA. Section 208(b)(2) of the CWA sets forth the elements that must be contained in an area-wide waste treatment management plan. Two of these requirements are of interest to an NPDES permit applicant: (1) a regulatory program to control the location, modification, and construction of facilities which may discharge pollutants in the area; and (2) a process to identify nonpoint sources of pollution and methods to control such sources. The DOE should be familiar with the 208 plan that covers the location of a proposed facility and should incorporate best management practices (BMPs) for nonpoint pollution control into the design and construction of the facility.

BMPs must be identified for the nonpoint sources listed in CWA Sect. 208(b)(2)(F)-(K). For example, a discharger associated with a construction activity may be required to install a catch basin (with or without specified design requirements) to retard runoff.

BMPs to control toxic and hazardous pollutants from ancillary activities of industrial point source categories are also mandated under CWA Sect. 304(e).

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[1] Blodgett, J. E. et al. 1980. Environmental protection issues of the 97th Congress. Congressional Research Service, Library of Congress, Washington, D.C.

Appendix B

Indirect Discharges

An indirect discharger discharges partially treated or untreated wastewater into a publicly owned treatment plant (POTW). Such dischargers need not obtain an NPDES permit and are not subject to effluent limitations guidelines. However, indirect dischargers must comply with EPA established general pretreatment standards contained in 40 CFR Part 403. The purpose of pretreatment standards is to prevent the discharge of any pollutants that could interfere with, pass through, or otherwise be incompatible with a POTW, whether or not they were on the list of 129 toxic substances (see Appendix G). The general pretreatment regulations provide a framework for application of the categorical regulations (40 CFR Parts 405-460) that are developed on an industry-by-industry basis for new and existing sources. These industrial categories coincide for the most part with the categories subject to effluent limitation guidelines. Categorical standards usually contain numerical limitations on the particular pollutants that may be discharged by any plant in a designated industrial category and are normally expressed either as a concentration or as a mass or weight per unit of production. Pretreatment regulations are being reviewed by EPA and are likely to undergo revision soon (46 FR 245).

If unsure of coverage by a categorical pretreatment standard, DOE may request that the EPA Regional Enforcement Division Director or the Director of a state NPDES program, where applicable, provide written certification that the industrial user does or does not come within a particular categorical regulation. DOE must make the request within 30 days after the effective date of the pretreatment standard under question (40 CFR 403.6).

As an indirect discharger, DOE would be required to report average and maximum flows in gallons per day discharged to the POTW. Monitoring reports must be submitted each year in June and December, unless required more frequently. The DOE must notify the POTW of any "slug loading" of an exceptionally voluminous or potent discharge. DOE must also comply with local pretreatment programs and obtain a permit from the POTW, if required. Every POTW (or combination of POTWs operated by the same authority) with a total design flow greater than five million gallons per day and receiving any pollutants from industrial users that (1) pass through untreated or interfere with the operation of the POTW or (2) are subject to any categorical pretreatment standards, is required to establish a local POTW pretreatment program.

Many POTWs provide better than secondary treatment and thus can remove industrial pollutants that the pretreatment standards assume cannot be removed. Therefore, EPA proposed a mechanism for granting removal allowances to indirect dischargers. The effective date of the revised pretreatment regulations is January 31, 1982; however, EPA has proposed to postpone the effective date (46 FR 50503).

Categorical pretreatment standards for toxic substances may be revised based on the removal capabilities of a particular POTW [CWA Sect. 307(b)(1)]. The variance is available only if the discharge from the POTW would not exceed limitations applicable to the source if it were a direct discharger and if the lowered standard would not prevent sludge use or disposal.

An indirect discharger may also request a variance from categorical pretreatment standards for fundamentally different factors (40 CFR 403.13). This variance is similar to its counterpart for direct dischargers (see Sect. 3.5.3.2 of this manual).

Appendix C

Oil and Hazardous Substances

The discharge of oil and hazardous substances in United States' waters (to 200-mile limit) is regulated by Sect. 311 of the CWA. This provision covers three areas: (1) spill prevention, (2) spill cleanup, and (3) liability for the costs of cleanup.

Certain discharges of hazardous substances may be exempted from the requirements of Sect. 311 of the CWA, which establishes reporting requirements, civil penalities, and liability for cleanup costs for spills of oil and hazardous substances [40 CFR 117.12(a)]. A discharge of a particular substance may be exempted if (1) the origin, source, and amount of the discharged substance are identified in the NPDES permit application or in the permit itself, (2) the permit contains a requirement for treatment of the discharge, and (3) the treatment is in place. Continuous or anticipated intermittent discharges, from a point source identified in an NPDES permit or permit application, that are caused by events occurring within the scope of relevant operating of treatment systems are also exempt from CWA Sect. 311. This exemption primarily covers discharges caused by upsets and treatment system failures (Weinberg et al. 1982). A permittee who is discharging a hazardous substance in amounts greater than the reportable quantity but is not aware of the situation because his permit designates monitoring of an indicator for the hazardous substance, is exempt from CWA Sect. 311. A discussion of these exemptions is being developed for "Section 311/402 Permit and Enforcement Guidance Document" (EPA n.d.).

To apply for an exclusion from the requirements pertaining to the discharge of any hazardous substance under Section 311, DOE should provide the following:

- The substance(s) and the amount of each which may be discharged;
- The origin and source of the discharge of the substance; and
- The treatment which is to be provided for the discharge by:
    - An onsite treatment system separate from any treatment system treating the normal discharge,
    - A treatment system designed to treat the normal discharge and which is additionally capable of treating the amount of the substance identified under the first paragraph above, or
    - Any combination of the above.

For further information on exclusions from Section 311, DOE should refer to 40 CFR 117.12, published on August 29, 1979, (44 FR 50766) or contact the appropriate regional EPA office (Table 1). Dischargers of hazardous substances into POTWs are exempt from liability under CWA Sect. 311 (44 FR 50769).

Comprehensive regulations governing spills of hazardous substances under CWA Sect. 311 are at 40 CFR Part 117. Table C.1 lists the 299 substances considered hazardous (equivalent of "may be harmful" wording in CWA). The reportable quantities of these hazardous substances are given at 40 CFR 117.3. Harmful quantities of oil are discharges that violate applicable water quality standards or cause a sheen or discoloration of the water or adjoining shoreline (40 CFR 110.3).

Notice must be given as soon as there is knowledge of a discharge of a reportable quantity of oil or hazardous substance. The DOE Order 5484.1 classifies such a discharge as a Type A investigation and establishes the requirements and procedures for such an investigation (DOE 1981a). Reporting procedures for an unusual occurrence are contained in DOE Order 5484.2; an unusual occurrence is any unusual or unplanned event having programmatic significance such that it adversely affects or potentially affects the performance, reliability, or safety of a facility (DOE 1981b). Any person in charge of a vessel or an onshore or offshore facility is required to immediately notify the Duty Officer at the U.S. Coast Guard's Response Center or, if this is impractical,

other specified persons. Failure to give notice is punishable by fines. The owner/operator of a facility from which oil or a hazardous substance is discharged in reportable quantities is also fiscally liable for cleanup. When a discharge is caused solely by an act of God, an act of war, negligence on the part of the U.S. government, an act or omission of a third party, or any combination of these causes the owner/operator may not be liable for cleanup. To the extent that NPDES facilities are exempt, the impact of these regulations may fall principally on transporters of oil or hazardous substances.

Table C.1. Hazardous substances (40 CFR 116.4)

Acetaldehyde
Acetic acid
Acetic anhydride
Acetone cyanohydrin
Acetyl bromide
Acetyl chloride
Acrolein
Acrylonitrile
Adipic acid
Aldrin
Allyl alcohol
Allyl chloride
Aluminum sulfate
Ammonia
Ammonium acetate
Ammonium benzoate
Ammonium bicarbonate
Ammonium bichromate
Ammonium bifluoride
Ammonium bisulfite
Ammonium carbamate
Ammonium carbonate
Ammonium chloride
Ammonium chromate
Ammonium citrate
Ammonium fluoroborate
Ammonium fluoride
Ammonium hydroxide
Ammonium oxalate
Ammonium silicofluoride
Ammonium sulfamate
Ammonium sulfide
Ammonium sulfite
Ammonium tartrate
Ammonium thiocyanate
Ammonium thiosulfate
Amyl acetate
Aniline
Antimony pentachloride
Antimony potassium tartrate
Antimony tribromide
Antimony trichloride
Antimony trifluoride
Arsenic disulfide
Arsenic pentoxide
Arsenic trichloride
Arsenic trioxide
Arsenic trisulfide
Barium cyanide
Benzene
Benzoic acid
Benzonitrile
Benzoyl chloride
Benzyl chloride
Beryllium chloride
Beryllium fluoride
Beryllium nitrate
Butylacetate
n-Butylphthalate
Butylamine
Butyric acid
Cadmium acetate
Cadmium bromide
Cadmium chloride
Calcium arsenate
Calcium arsenite
Calcium carbide
Calcium chromate
Calcium cyanide
Calcium dodecylbenzenesulfonate
Calcium hypochlorite
Captan
Carbaryl
Carbonfuran
Carbon disulfide
Carbon tetrachloride
Chlordane
Chlorine
Chlorobenzene
Chloroform
Chloropyrifos
Chlorosulfonic acid
Chromic acid
Chromic acetate
Chromic sulfate
Chromous chloride
Cobaltous bromide
Cobaltous formate
Coumaphos
Cresol
Crotonaldehyde
Cupric acetate
Cupric acetoarsenite
Cupric chloride
Cupric nitrate
Cupric oxalate
Cupric sulfate
Cupric sulfate ammoniated
Cupric tartrate
Cyanogen chloride
Cyclohexane
2,4-D acid (2,4-Dichloro-phenoxyacetic acid)
2,4-D esters (2,4-Dichloro-phenoxyacetic acid esters)

Table C.1. Cont'd

DDT
Diazinon
Dicamba
Dichlobenil
Dichlone
Dichlorobenzene
Dichloropropane
Dichloropropene
Dichloropropene-dichloproropane mix
2,2-Dichloropropionic acid
Dichlorvos
Dieldrin
Diethylamine
Dimethylamine
Dinitrobenzene
Dinitrophenol
Dinitrotoluene
Diquat
Disulfoton
Diuron
Dodecylbenzesulfonic acid
Endosulfan
Endrin
Epichlorohydrin
Ethion
Ethylbenzene
Ethylenediamine
Ethylene dibromide
Ethylene dichloride
Ethylene diaminetetracetic acid (EDTA)
Ferric ammonium citrate
Ferric ammonium oxalate
Ferric chloride
Ferric fluoride
Ferric nitrate
Ferric sulfate
Ferrous ammonium sulfate
Ferrous chloride
Ferrous sulfate
Formaldehyde
Formic acid
Fumaric acid
Furfural
Guthion
Heptachlor
Hexachlorocyclopentadiene
Hydrochloric acid
Hydrogen cyanide
Hydrofluoric acid
Hydrogen sulfite
Isoprene
Isopropanolamine
  dodecylbenzenesulfonate
Kelthane
Kepone
Lead acetate
Lead arsenate
Lead chloride
Lead fluoborate
Lead flourite
Lead iodide
Lead nitrate
Lead stearate
Lead sulfate
Lead sulfide
Lead thiocyanate
Lindane
Lithium chromate
Malathion
Maleic acid
Maleic anhydride
Mercaptodimethur
Mercuric cyanide
Mercuric nitrate
Mercuric sulfate
Mercuric thiocyanate
Mercurous nitrate
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mevinphos
Mexacarbate
Monoethylamine
Monomethylamine
Naled
Napthalene
Napthenic acid
Nickel ammonium sulfate
Nickel chloride
Nickel hydroxide
Nickel nitrate
Nickel sulfate
Nitric acid
Nitrobenzene
Nitrogen dioxide
Nitrophenol
Nitrotoluene
Paraformaldehyde
Parathion
Pentachlorophenol
Phenol
Phosgene
Phosphoric acid
Phosphorus
Phosphorus oxychloride
Phosphorus pentasulfide
Phosphorus trichloride
Polychlorinated biphenyls (PCB)
Potassium arsenate
Potassium arsenite
Potassium bichromate
Potassium chromate
Potassium cyanide
Potassium hydroxide
Potassium permanganate
Propargite
Propionic acid
Propionic anhydride
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
Selenium oxide
Silver nitrate
Sodium

Table C.1. Cont'd

Sodium arsenate
Sodium arsenite
Sodium bichromate
Sodium bifluoride
Sodium bisulfite
Sodium chromate
Sodium cyanide
Sodium dodecylbenzenesulfonate
Sodium fluoride
Sodium hydrosulfide
Sodium hydroxide
Sodium hypochlorite
Sodium methylate
Sodium nitrite
Sodium phosphate (dibasic)
Sodium phosphate (tribasic)
Sodium selenite
Strontium chromate
Strychnine
Styrene
Sulfur monochloride
Sulfuric acid
2,4,5-T acid (2,4,5-Trichlorophenoxyacetic acid)
2,4,5-T amines (2,4,5-Trichlorophenoxyacetic acid amines)
2,4,5-T esters (2,4,5-Trichlorophenoxyacetic acid esters)
2,4,5-T salts (2,4,5-Trichlorophenoxyacetic acid salts)
2,4,5-TP acid (2,4,5-Trichlorophenoxypropanoic acid)
2,4,5-TP acid esters (2,4,5-Trichlorophenoxy propanoic acid esters)
TDE (Tetrachlorodiphenyl ethane)
Tetraethyl lead
Tetraethyl pyrophosphate
Thallium sulfate
Thrichloroethylene
Thrichlorophenol
Toluene
Toxaphene
Trichlorofon
Triethanolamine dodecylbenzenesulfonate
Triethylamine
Trimethylamine
Uranyl acetate
Uranyl nitrate
Vanadium pentoxide
Vanadyl sulfate
Vinyl acetate
Vinylidene chloride
Xylene
Xylenol
Zinc acetate
Zinc ammonium chloride
Zinc borate
Zinc bromide
Zinc carbonate
Zinc chloride
Zinc cyanide
Zinc fluoride
Zinc formate
Zinc hydrosulfonate
Zinc nitrate
Zinc phenolsulfonate
Zinc phosphide
Zinc silicofluoride
Zinc sulfate
Zirconium nitrate
Zirconium potassium flouride
Zirconium sulfate
Zirconium tetrachloride

Appendix C Literature Cited

Department of Energy (DOE). 1981a. Environmental protection, safety, and health protection information reporting requirements. DOE Order 5484.1 (2-24-81). U.S. Department of Energy, Washington, D.C.

Department of Energy (DOE). 1981b. Unusual occurrence reporting system. DOE Order 5484.2 (8-13-81). U.S. Department of Energy, Washington, D.C.

Environmental Protection Agency (EPA). n.d. Section 311/402 permit and enforcement guidance document, draft. Office of Water Enforcement, Permits Division, Washington, D.C.

Weinberg, D. B., B. W. Wyche, and L. A. Miller. 1982. Background materials for Executive Enterprises environmental regulation course. Executive Enterprises, Washington, D.C.

Appendix D

State Contacts

Table D.1 Agency contacts for states and territories with approved NPDES permit programs

State	Agency
Alabama	Alabama Water Improvement Commission State Office Building Montgomergy, AL 36130 Com:[a] (205) 277-3630 FTS Op:[b] 229-1000
California	State Water Resources Control Board P.O. Box 100, Rm. 605 Sacramento, CA 95801 Com: (916) 322-3132 FTS: Direct dial
Colorado	Water Quality Control Division Colorado Department of Health 4210 East 11th Avenue Denver, CO 80220 Com: (303) 320-8333 FTS: Direct dial
Connecticut	Water Compliance Department of Environmental Protection State Office Building, Rm. 117 165 Capitol Avenue Hartford, Connecticut 06115 Com: (202) 566-3245 FTS Op: 641-2211
Delaware	Division of Environmental Control Department of Natural Resources and Environmental Control Edward Tatnall Building P.O. Box 1401 Dover, DE 19901 Com: (302) 736-4580 FTS Op: 487-6011
Georgia	Water Division Environmental Protection Division Department of Natural Resources 270 Washington Street, SW, Rm. 822 Atlanta, GA 30334 Com: (404) 881-4737 FTS: Direct dial
Hawaii	Environmental Protection and Health Services Division Hawaii State Department of Health P.O. Box 3378 Honolulu, HI 96801 Com: (808) 548-6505 FTS: Direct dial

Appendix D Cont'd.

State	Agency
Illinois	Division of Water Pollution Control Illinois Environmental Protection Agency 2200 Churchill Road Springfield, IL 62706 Com: (217) 782-1654 FTS Op: 956-4228
Indiana	Indiana Stream Pollution Control Board 1330 West Michigan Street Indianapolis, IN 46206 Com: (317) 633-0167 FTS: Direct dial
Iowa	Water Quality Division Department of Environmental Quality Henry A. Wallace Building 900 E. Grand Des Moines, IA 50319 Com: (515) 281-8693 FTS: Direct dial
Kansas	Division of Environment State Department of Health and Environment Topeka, KS 66620 Com: (913) 862-9360 FTS: Direct dial
Maryland	Water Resources Administration Maryland Department of Natural Resources Tawes State Office Building Annapolis, MD 21401 Com: (301) 269-3846 FTS: Direct dial
Michigan	Environmental Protection Bureau Department of Natural Resources P.O. Box 30028 Lansing, MI 48909 Com: (517) 373-2347 FTS Op: 253-1837
Minnesota	Water Quality Division Minnesota Pollution Control Agency 1935 West County Road B2 Roseville, MN 55113 Com: (612) 296-7202 FTS: Direct dial
Mississippi	Department of Natural Resources Bureau of Pollution Control P.O. Box 10385 Jackson, MS 39209 Com: (601) 961-5171 FTS: Direct dial

Appendix D Cont'd.

State	Agency
Missouri	Permits Water Pollution Control Program Clean Water Commission 2010 Missouri Blvd. P.O. Box 1368 Jefferson City, MO 65102 Com: (314) 751-3241 FTS: Direct dial
Montana	Water Quality Bureau Environmental Sciences Division Department of Health and Environmental Sciences Cogswell Building, Rm. A206 Helena, MT Com: (406) 449-3948 FTS Op: 587-2511
Nebraska	Department of Environmental Control P.O. Box 94877 State House Station Lincoln, NE 68509 Com: (402) 471-2186 FTS Op: 541-2311
Nevada	Environmental Commission Department of Conservation and Natural Resources 201 South Fall Street, Capitol Complex Carson City, NV 89710 Com: (702) 885-4670 FTS Op: 598-6011
New Jersey	Division of Water Resources Department of Environmental Protection P.O. Box 1390 Trenton, NJ 08625 Com: (609) 292-2203 FTS Op: 477-2011
New York	Division of Water Department of Environmental Conservation 50 Wolf Road Albany, NY 12233 Com: (518) 457-3446 FTS: Direct dial
North Carolina	Division of Environmental Management North Carolina Department of Natural Resources and Community Development P.O. Box 27687 Raleigh, NC 27611 Com: (919) 733-4006 FTS: Direct dial
North Dakota	Environmental Control North Dakota State Department of Health 1200 Missouri Avenue Bismarck, ND 58505 Com: (701) 224-2371 FTS Op: 703-4011

Appendix D Cont'd.

State	Agency
Ohio	Ohio Environmental Protection Agency P.O. Box 1049 Columbus, OH 43216 Com: (614) 466-8318 FTS: Direct dial
Oregon	Department of Environmental Quality P.O. Box 1760 Portland, OR 97207 Com: (503) 229-5395 FTS: Direct dial
Pennsylvania	Bureau of Water Quality Management Department of Environmental Resources P.O. Box 2063 11th Floor - Fulton Building Harrisburg, PA 17120 Com: (717) 787-2666 FTS: Direct dial
South Carolina	South Carolina Department of Health and Environmental Control J. Marion Sims Building 2600 Bull Street Columbia, SC 29201 Com: (803) 758-5443 FTS Op: 677-5011
Tennessee	Division of Water Quality Control Tennessee Department of Public Health TERRA Building 150 9th Avenue, North Nashville, TN 37203 Com: (615) 741-6610 FTS: Direct dial
Vermont	Division of Environmental Engineering Department of Water Resources and Environmental Engineering State Office Building Montpelier, VT 05602 Com: (802) 828-3361 FTS Op: 832-1110
Virgin Islands	Department of Conservation and Cultural Affairs P.O. Box 4340 Charlotte Amalie St. Thomas, VI 00801 Com: (809) 774-3320 FTS: Direct dial
Virginia	Virginia State Water Control Board P.O. Box 11143 Richmond, VA 23230 Com: (804) 257-0056 FTS Op: 936-0000

Appendix D Cont'd.

State	Agency
Washington	Department of Ecology Mail Stop P-111 Olympia, WA 98504 Com: (206) 753-2800 FTS: Direct dial
Wisconsin	Division of Environmental Standards Department of Natural Resources P.O. Box 7921 Madison, WI 53707 Com: (608) 266-1099 FTS Op: 366-2211
Wyoming	Department of Environmental Quality Equality State Bank, 2nd Floor 401 West 19th Street Cheyenne, WY 82002 Com: (307) 777-7937 FTS Op: 328-1110

[a]Commercial telephone number.

[b]FTS Operator's number - ask for commercial number

SOURCE: Based in part on information compiled for DOE by the Aerospace Corporation, 2030 Century Blvd, Germantown, Maryland 20767 and J. Water Pollut. Cont. Fed, 54(3):68-70, 1982b.

Appendix E

Permit Forms

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

LABEL ITEMS

- I. EPA I.D. NUMBER
- III. FACILITY NAME
- V. FACILITY MAILING ADDRESS
- VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)			
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)			
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)			
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)			
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)			
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)			
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)			
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)			
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)			
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)			

III. NAME OF FACILITY

1 SKIP

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)* | B. PHONE *(area code & no.)*

2

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3

B. CITY OR TOWN | C. STATE | D. ZIP CODE

4

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5

B. COUNTY NAME

C. CITY OR TOWN | D. STATE | E. ZIP CODE | F. COUNTY CODE *(if known)*

6

EPA Form 3510-1 (6-80)

CONTINUE ON REVERSE

Appendix E Cont'd.

CONTINUED FROM THE FRONT

VII. SIC CODES *(4-digit, in order of priority)*

A. FIRST	B. SECOND
C 7 (specify)	C 7 (specify)
C. THIRD	**D. FOURTH**
C 7 (specify)	C 7 (specify)

VIII. OPERATOR INFORMATION

A. NAME — C 8

B. Is the name listed in Item VIII-A also the owner? ☐ YES ☐ NO

C. STATUS OF OPERATOR *(Enter the appropriate letter into the answer box; if "Other", specify.)*

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC *(other than federal or state)*
O = OTHER *(specify)*

(specify)

D. PHONE *(area code & no.)* — C A

E. STREET OR P.O. BOX

F. CITY OR TOWN — C 8

G. STATE

H. ZIP CODE

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☐ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES *(Discharges to Surface Water)*	D. PSD *(Air Emissions from Proposed Sources)*
C T I 9 N	C T I 9 P
B. UIC *(Underground Injection of Fluids)*	**E. OTHER** *(specify)*
C T I 9 U	C T I 9 (specify)
C. RCRA *(Hazardous Wastes)*	**E. OTHER** *(specify)*
C T I 9 R	C T I 9 (specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS *(provide a brief description)*

XIII. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. SIGNATURE	C. DATE SIGNED

COMMENTS FOR OFFICIAL USE ONLY

C

EPA Form 3510-1 (6-80) REVERSE

Appendix E Cont'd.

See the instructions on the reverse.
Please print or type in the unshaded areas only.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*

Form Approved OMB No. 158-R0174

FORM **2B** NPDES

U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
CONCENTRATED ANIMAL FEEDING OPERATIONS AND AQUATIC ANIMAL PRODUCTION FACILITIES
Consolidated Permits Program

I. GENERAL INFORMATION

A. TYPE OF BUSINESS	B. LEGAL DESCRIPTION OF FACILITY LOCATION	C. FACILITY OPERATION STATUS
☐ 1. CONCENTRATED ANIMAL FEEDING OPERATION *(complete Items B,C, and Section II)* ☐ 2. CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY *(complete Items B,C, and Section III)*		☐ 1. EXISTING FACILITY ☐ 2. PROPOSED FACILITY

II. CONCENTRATED ANIMAL FEEDING OPERATION CHARACTERISTICS

A. TYPE & NUMBER OF ANIMALS IN OPEN CONFINEMENT & HOUSED UNDER ROOF			B. NO. OF ACRES FOR CONFINEMENT FEEDING
1. TYPE	2. NO. IN OPEN CONFINEMENT	3. NO. HOUSED UNDER ROOF	
			C. If there is open confinement, has a runoff diversion and control system been constructed? ☐ YES *(complete Items 1, 2, & 3 below)* ☐ NO *(go to Section IV)*

1. What is the design basis for the control system?

a. 10 YEAR, 24 – HOUR STORM *(specify inches)*	INCHES	b. 25 YEAR, 24 – HOUR STORM *(specify inches)*	INCHES	c. OTHER *(specify inches & type)*	INCHES	TYPE
☐		☐		☐		

2. Report the number of acres of contributing drainage.	ACRES	3. Report the design safety factor.	SAFETY FACTOR

III. CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY CHARACTERISTICS

A. For each outfall give the maximum daily flow, maximum 30 day flow, and the long term average flow.

1. OUTFALL NO.	2. FLOW *(gallons per day)*		
	a. MAXIMUM DAILY	b. MAXIMUM 30 DAY	c. LONG TERM AVERAGE

B. Indicate the total number of ponds, raceways, and similar structures in your facility.

1. PONDS	2. RACEWAYS	3. OTHER

C. Provide the name of the receiving water and the source of water used by your facility.

1. RECEIVING WATER	2. WATER SOURCE

D. List the species of fish or aquatic animals held and fed at your facility. For each species, give the total weight produced by your facility per year in pounds of harvestable weight, and also give the maximum weight present at any one time.

1. COLD WATER SPECIES			2. WARM WATER SPECIES		
a. SPECIES	b. HARVESTABLE WEIGHT *(pounds)*		a. SPECIES	b. HARVESTABLE WEIGHT *(pounds)*	
	(1) TOTAL YEARLY	(2) MAXIMUM		(1) TOTAL YEARLY	(2) MAXIMUM

E. Report the total pounds of food fed during the calendar month of maximum feeding.

1. MONTH	2. POUNDS OF FOOD

IV. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
C. SIGNATURE	D. DATE SIGNED

EPA Form 3510-2B (6-80)

THIS FORM REPLACES EPA FORMS 7550-7 & 7550-7A WHICH ARE OBSOLETE

Appendix E Cont'd.

Please print or type in the unshaded areas only.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*

Form Approved OMB No. 158-R0173

FORM 2C NPDES

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURAL OPERATIONS
Consolidated Permits Program

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER *(list)*	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER *(name)*
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined *(e.g., for certain mining activities)*, provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NO. *(list)*	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION *(list)*	b. AVERAGE FLOW *(include units)*	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	

OFFICIAL USE ONLY *(effluent guidelines sub-categories)*

Appendix E Cont'd.

CONTINUED FROM THE FRONT

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES *(complete the following table)* ☐ NO *(go to Section III)*

1. OUTFALL NUMBER *(list)*	2. OPERATION(s) CONTRIBUTING FLOW *(list)*	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK *(specify average)*	b. MONTHS PER YEAR *(specify average)*	a. FLOW RATE *(in mgd)*		b. TOTAL VOLUME *(specify with units)*		c. DURATION *(in days)*
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	

III. MAXIMUM PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES *(complete Item III-B)* ☐ NO *(to to Section IV)*

B. Are the limitations in the applicable effluent guideline expressed in terms of production *(or other measure of operation)*?

☐ YES *(complete Item III-C)* ☐ NO *(go to Section IV)*

C. If you answered "Yes" to Item III-B, list the quantity which represents an actual measurement of your maximum level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. MAXIMUM QUANTITY			2. AFFECTED OUTFALLS *(list outfall numbers)*
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES *(complete the following table)* ☐ NO *(go to Item IV-B)*

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs *(or other environmental projects which may affect your discharges)* you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction. ☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

Appendix E Cont'd.

EPA I.D. NUMBER (copy from Item 1 of Form 1)

CONTINUED FROM PAGE 2

Form Approved OMB No. 158-R0173

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding – Complete one set of tables for each outfall – Annotate the outfall number in the space provided. NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-9.

D. Use the space below to list any of the pollutants listed in Table 2c-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

A. Is any pollutant listed in Item V-C a substance or a component of a substance which you do or expect that you will over the next 5 years use or manufacture as an intermediate or final product or byproduct?

☐ YES *(list all such pollutants below)* ☐ NO *(go to Item VI-B)*

B. Are your operations such that your raw materials, processes, or products can reasonably be expected to vary so that your discharges of pollutants may during the next 5 years exceed two times the maximum values reported in Item V?

☐ YES *(complete Item VI-C below)* ☐ NO *(go to Section VII)*

C. If you answered "Yes" to Item VI-B, explain below and describe in detail the sources and expected levels of such pollutants which you anticipate will be discharged from each outfall over the next 5 years, to the best of your ability at this time. Continue on additional sheets if you need more space.

Appendix E Cont'd.

CONTINUED FROM THE FRONT

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purposes below)* ☐ NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☐ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE (area code & no.)	D. POLLUTANTS ANALYZED (list)

IX. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
C. SIGNATURE	D. DATE SIGNED

PLEASE PRINT OF TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*

Form Approved OMB No. 158-R0173

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)*

OUTFALL NO.

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*												
e. Ammonia *(as N)*												
f. Flow	VALUE		VALUE		VALUE					VALUE		
g. Temperature *(winter)*	VALUE		VALUE		VALUE			°C		VALUE		
h. Temperature *(summer)*	VALUE		VALUE		VALUE			°C		VALUE		
i. pH	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM				STANDARD UNITS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2-a for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		3. EFFLUENT							4. UNITS		5. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Bromide (24959-67-9)														
b. Chlorine, Total Residual														
c. Color														
d. Fecal Coliform														
e. Fluoride (16984-48-8)														
f. Nitrate-Nitrite *(as N)*														

Appendix E Cont'd.

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X' a. REQUIRED PRESENT	2. MARK 'X' b. REQUIRED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE (if available) (2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	c. LONG TERM AVRG. VALUE (if available) (2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	4. UNITS b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (2) MASS	5. INTAKE (optional) b. NO. OF ANALYSES
g. Nitrogen, Total Organic (as N)														
h. Oil and Grease														
i. Phosphorus (as P), Total (7723-14-0)														
j. Radioactivity														
(1) Alpha, Total														
(2) Beta, Total														
(3) Radium, Total														
(4) Radium 226, Total														
k. Sulfate (as SO_4) (14808-79-8)														
l. Sulfide (as S)														
m. Sulfite (as SO_3) (14265-45-3)														
n. Surfactants														
o. Aluminum, Total (7429-90-5)														
p. Barium, Total (7440-39-3)														
q. Boron, Total (7440-42-8)														
r. Cobalt, Total (7440-48-4)														
s. Iron, Total (7439-89-6)														
t. Magnesium, Total (7439-95-4)														
u. Molybdenum, Total (7439-98-7)														
v. Manganese, Total (7439-96-5)														
w. Tin, Total (7440-31-5)														
x. Titanium, Total (7440-32-6)														

EPA I.D. NUMBER (copy from Item 1 of Form 1)	OUTFALL NUMBER

CONTINUED FROM PAGE 3 OF FORM 2-C

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PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, non-process wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe to be absent. If you mark either columns 2-a or 2-b for any pollutant, you must provide the results of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table *(all seven pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER *(if available)*	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)															
2M. Arsenic, Total (7440-38-2)															
3M. Beryllium, Total, 7440-41-7)															
4M. Cadmium, Total (7440-43-9)															
5M. Chromium, Total (7440-47-3)															
6M. Copper, Total (7550-50-8)															
7M. Lead, Total (7439-92-1)															
8M. Mercury, Tota (7439-97-6)															
9M. Nickel, Total (7440-02-0)															
10M. Selenium, Total (7782-49-2)															
11M. Silver, Total (7440-22-4)															
12M. Thallium, Total (7440-28-0)															
13M. Zinc, Total (7440-66-6)															
14M. Cyanide, Total (57-12-5)															
15M. Phenols, Total															
DIOXIN															
2,3,7,8 Tetrachlorodibenzo-P Dioxin (1764-01-6)				DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X' a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)															
2V. Acrylonitrile (107-13-1)															
3V. Benzene (71-43-2)															
4V. Bis *(Chloromethyl)* Ether (542-88-1)															
5V. Bromoform (75-25-2)															
6V. Carbon Tetrachloride (56-23-5)															
7V. Chlorobenzene (108-90-7)															
8V. Chlorodibromomethane (124-48-1)															
9V. Chloroethane (75-00-3)															
10V. 2-Chloroethylvinyl Ether (110-75-8)															
11V. Chloroform (67-66-3)															
12V. Dichlorobromomethane (75-27-4)															
13V. Dichlorodifluoromethane (75-71-8)															
14V. 1,1-Dichloroethane (75-34-3)															
15V. 1,2-Dichloroethane (107-06-2)															
16V. 1,1-Dichloroethylene (75-35-4)															
17V. 1,2-Dichloropropane (78-87-5)															
18V. 1,3-Dichloropropylene (542-75-6)															
19V. Ethylbenzene (100-41-4)															
20V. Methyl Bromide (74-83-9)															
21V. Methyl Chloride (74-87-3)															

CONTINUED FROM PAGE V-4

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1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – VOLATILE COMPOUNDS *(continued)*															
22V. Methylene Chloride (75-09-2)															
23V. 1,1,2,2-Tetrachloroethane (79-34-5)															
24V. Tetrachloroethylene (127-18-4)															
25V. Toluene (108-88-3)															
26V. 1,2-Trans-Dichloroethylene (156-60-5)															
27V. 1,1,1-Trichloroethane (71-55-6)															
28V. 1,1,2-Trichloroethane (79-00-5)															
29V. Trichloroethylene (79-01-6)															
30V. Trichlorofluoromethane (75-69-4)															
31V. Vinyl Chloride (75-01-4)															
GC/MS FRACTION – ACID COMPOUNDS															
1A. 2-Chlorophenol (95-57-8)															
2A. 2,4-Dichlorophenol (120-83-2)															
3A. 2,4-Dimethylphenol (105-67-9)															
4A. 4,6-Dinitro-O-Cresol (534-52-1)															
5A. 2,4-Dinitrophenol (51-28-5)															
6A. 2-Nitrophenol (88-75-5)															
7A. 4-Nitrophenol (100-02-7)															
8A. P-Chloro-M-Cresol (59-50-7)															
9A. Pentachlorophenol (87-86-5)															
10A. Phenol (108-95-2)															
11A. 2,4,6-Trichlorophenol (88-06-2)															

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X' a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
GC/MS FRACTION -- BASE/NEUTRAL COMPOUNDS															
1B. Acenaphthene (83-32-9)															
2B. Acenaphtylene (208-96-8)															
3B. Anthracene (120-12-7)															
4B. Benzidine (92-87-5)															
5B. Benzo *(a)* Anthracene (56-55-3)															
6B. Benzo *(a)* Pyrene (50-32-8)															
7B. 3,4-Benzo-fluoranthene (205-99-2)															
8B. Benzo *(ghi)* Perylene (191-24-2)															
9B. Benzo *(k)* Fluoranthene (207-08-9)															
10B. Bis *(2-Chloro-ethoxy)* Methane (111-91-1)															
11B. Bis *(2-Chloro-ethyl)* Ether (111-44-4)															
12B. Bis *(2-Chloro-isopropyl)* Ether (39638-32-9)															
13B. Bis *(2-Ethyl-hexyl)* Phthalate (117-81-7)															
14B. 4-Bromo-phenyl Phenyl Ether (101-55-3)															
15B. Butyl Benzyl Phthalate (85-68-7)															
16B. 2-Chloro-naphthalene (91-58-7)															
17B. 4-Chloro-phenyl Phenyl Ether (7005-72-3)															
18B. Chrysene (218-01-9)															
19B. Dibenzo *(a,h)* Anthracene (53-70-3)															
20B. 1,2-Dichloro-benzene (95-50-1)															
21B. 1,3-Dichloro-benzene (541-73-1)															

CONTINUE ON PAGE V-7.

EPA I.D. NUMBER (copy from Item 1 of Form 1) | OUTFALL NUMBER

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1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPCUNDS (continued)															
22B. 1,4-Dichlorobenzene (106-46-7)															
23B. 3,3'-Dichlorobenzidine (91-94-1)															
24B. Diethyl Phthalate (84-66-2)															
25B. Dimethyl Phthalate (131-11-3)															
26B. Di-N-Butyl Phthalate (84-74-2)															
27B. 2,4-Dinitrotoluene (121-14-2)															
28B. 2,6-Dinitrotoluene (606-20-2)															
29B. Di-N-Octyl Phthalate (117-84-0)															
30B. 1,2-Diphenylhydrazine (as Azobenzene) (122-66-7)															
31B. Fluoranthene (206-44-0)															
32B. Fluorene (86-73-7)															
33B. Hexachlorobenzene (118-71-1)															
34B. Hexachlorobutadiene (87-68-3)															
35B. Hexachlorocyclopentadiene (77-47-4)															
36B. Hexachloroethane (67-72-1)															
37B. Indeno (1,2,3-cd) Pyrene (193-39-5)															
38B. Isophorone (78-59-1)															
39B. Naphthalene (91-20-3)															
40B. Nitrobenzene (98-95-3)															
41B. N-Nitrosodimethylamine (62-75-9)															
42B. N-Nitrosodi-N-Propylamine (621-64-7)															

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X' a. TESTING REQUIRED	2. MARK 'X' b. BELIEVED PRESENT	2. MARK 'X' c. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	3. EFFLUENT a. MAXIMUM DAILY VALUE (2) MASS	3. EFFLUENT b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	3. EFFLUENT b. MAXIMUM 30 DAY VALUE (if available) (2) MASS	3. EFFLUENT c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	3. EFFLUENT c. LONG TERM AVRG. VALUE (if available) (2) MASS	3. EFFLUENT d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	4. UNITS b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (2) MASS	5. INTAKE (optional) b. NO. OF ANALYSES
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS *(continued)*															
43B. N-Nitrosodiphenylamine (86-30-6)															
44B. Phenanthrene (85-01-8)															
45B. Pyrene (129-00-0)															
46B. 1,2,4-Trichlorobenzene (120-82-1)															
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)															
2P. α-BHC (319-84-6)															
3P. β-BHC (319-85-7)															
4P. γ-BHC (58-89-9)															
5P. δ-BHC (319-86-8)															
6P. Chlordane (57-74-9)															
7P. 4,4'-DDT (50-29-3)															
8P. 4,4'-DDE (72-55-9)															
9P. 4,4'-DDD (72-54-8)															
10P. Dieldrin (60-57-1)															
11P. α-Endosulfan (115-29-7)															
12P. β-Endosulfan (115-29-7)															
13P. Endosulfan Sulfate (1031-07-8)															
14P. Endrin (72-20-8)															
15P. Endrin Aldehyde (7421-93-4)															
16P. Heptachlor (76-44-8)															

EPA I.D. NUMBER (copy from Item 1 of Form 1) | OUTFALL NUMBER

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1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
GC/MS FRACTION — PESTICIDES (continued)															
17P. Heptachlor Epoxide (1024-57-3)															
18P. PCB-1242 (53469-21-9)															
19P. PCB-1254 (11097-69-1)															
20P. PCB-1221 (11104-28-2)															
21P. PCB-1232 (11141-16-5)															
22P. PCB-1248 (12672-29-6)															
23P. PCB-1260 (11096-82-5)															
24P. PCB-1016 (12674-11-2)															
25P. Toxaphene (8001-35-2)															

Appendix F

Effluent Limitations

The National Pollutant Discharge Elimination System (NPDES) is the principal mechanism for regulating point sources that discharge directly into U.S. waters. Such discharges are subject to measurement and control through the statutorily mandated effluent limitation guidelines. An effluent limitation is defined in CWA Sect. 502(11) as:

> "Any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters or the ocean, including the waters of the contiguous zone, or the ocean, including schedules of compliance."

Effluent limitations are restrictions on the amount of a pollutant an industry may discharge within a specified time. Effluent limitations are occasionally given in terms of maximum allowable concentrations, but more frequently they are expressed as the amount of substances that may be discharged per volume of production (e.g., 0.053 lbs of sulfide per 1000 barrels of crude oil feedstock produced per day). Effluent limitations are developed for industrial categories and subcategories based on the Standard Industrial Code (SIC). Effluent limitations have been established for 42 industrial categories (Table F.1), which have been divided into hundreds of subcategories.

The amount of pollutants that may be discharged from a point source depends on the level of pollution control technology for a source and whether the source is classified as existing or new. The CWA defined three levels of technology for existing sources: (1) best practicable control technology currently available (BPT), (2) best available technology economically achievable (BAT), and (3) best conventional pollutant control technology (BCT). Section 306 of the Act directs EPA to establish stricter effluent limitations for new sources based on the "best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants." The general provisions for effluent guidelines and standards are at 40 CFR Part 401. Effluent limitation regulations for specified industrial categories are at 40 CFR Parts 400-460. The EPA withdrew several effluent limitations that were proposed before January 1, 1979; however, some of these regulations may be reproposed at a later date (46 FR 17567).

F.1 Best Practicable Control Technology (BPT)

Direct dischargers were required to comply with effluent limitations based on BPT by July 1, 1977. Sections 301(a) and (b) and 304(b) of the CWA pertain to BPT effluent limitations. In general, EPA has defined BPT as the average of the best control technology in current use by an industry.[1]

Effluent limitations are based on the information contained in Development Documents for each class or category of point sources [CWA Section 304(b)(1)(B)]. The total cost of the technology in relation to the effluent reduction benefits, the age of equipment and facilities, the process employed, and environmental impacts other than water quality (e.g., generation of solid waste) are some of the factors considered in the Development Documents. The entire Development Document is required to be published in the Federal Register or to be both reasonably available and incorporated by reference in the preamble to the regulations (Administrative Procedure Act, Pub. L. 89-554). In determining BPT, EPA is not limited to processes in use in this country and may base a limitation on a technology not presently in use by the industry being

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[1] Truitt, T. H., and R. M. Hall. 1980. Practical environmental law, course manual. Federal Publications, Inc.

Table F.1. Industrial categories with established effluent limitations (40 CFR Parts 400-460)[a]

Dairy products processing
Grain mills
Canned and preserved fruits and vegetables processing
Canned and preserved seafood processing
Sugar processing
Textile industry
Cement manufacturing
Feedlots
Electroplating
Organic chemicals manufacturing
Inorganic chemicals manufacturing
Plastics and synthetics
Soap and detergents manufacturing
Fertilizer manufacturing
Petroleum refining
Iron and steel manufacturing
Nonferrous metals manufacturing
Phosphate manufacturing
Steam electric power generating
Ferroalloy manufacturing
Leather tanning and finishing industry
Glass manufacturing
Asbestos manufacturing
Rubber manufacturing
Timber products processing
Pulp, paper, and paperboard
Builders paper and roofing felt segment of the builders paper and board mills
Meat products
Coal mining
Offshore segment of the oil and gas extraction industry
Mineral mining and processing
Pharmaceutical manufacturing
Ore mining and dressing
Paving and roofing materials (tars and asphalt)
Paint formulating
Ink formulating
Gum and wood chemicals manufacturing
Pesticide chemicals
Explosives manufacturing
Carbon black manufacturing
Photographic industry
Hospital

[a] Effluent limitations guidelines for existing sources, pretreatment standards, and standards of performance for new sources may not all have been promulgated for all the industrial categories listed.

regulated, if there is a rational basis for transfer to the regulated industry. The EPA must require a limitation that is achievable by at least one available technology, and it cannot require an industry to use a specific technology.[2]

Effluent limitation regulations usually consist of single numbers representing maximum discharge levels. These limitations are incorporated into every permit, subject to a variance procedure, to achieve uniform regulation throughout each industry.

States may establish more stringent limitations than those in federal regulations; however, they may not establish less stringent limitations (CWA Sect. 510). Section 301(b)(1)(C) of the CWA requires industrial dischargers to comply with "any more stringent limitations," such as those necessary to meet state water quality standards (see Appendix K). Effluent limitations for a point source may be more stringent than BPT and BAT when based on state water quality standards; effluent limitations in a permit have been held valid despite the technological impossibility of compliance [United States Steel Corp. v. Train, 556 F.2d 822 (7th Cir. 1977)].

NPDES permits have a maximum term of five years. EPA has revised several of the BPT regulations since the first NPDES permits were issued. The EPA General Counsel has determined that permits reissued to existing sources need not require immediate compliance with the revised BPT standards but must contain schedules for expeditious compliance. Permits issued to sources that have never received an NPDES permit before must require immediate compliance with the more stringent BPT limitations. Such sources cannot ignore BPT requirements by simply adopting a direct schedule to achieve BAT or best conventional pollutant control technology (BCT) requirements.[3]

F.2 Best Available Technology (BAT)

Direct dischargers of toxic pollutants must comply with effluent limitations based on best available technology (BAT) economically achievable by July 1, 1984, or in three years after the date such limitations are established [CWA Sect. 301(b)(2)(C) and (D)]. Dischargers of nonconventional, nontoxic pollutants must comply with BAT not later than three years after the date such limitations are established, or not later than July 1, 1984, but in no instance later than July 1, 1987 (CWA Sect. 301(b)(2)(F). BAT is usually a more stringent level of control than BPT. Section 304 (b)(2)(B) of the CWA requires EPA to consider and specify factors such as the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving a level of effluent reduction, and environmental impacts other than water quality [e.g., energy requirements Sect. 304(b)(4)(B)]. As with BPT, EPA addresses these factors in the Development Document for each class or category of point sources. Following the 1972 FWPCA, EPA promulgated both BAT and BPT regulations. The EPA has undertaken a major rewriting of BAT standards, partly because of the increased emphasis on controlling toxic pollutants. The BAT requirement has been dropped for pollutants classified as conventional.

F.3 Conventional Pollutants and Best Conventional Pollutant Control Technology (BCT)

By mid-1984, direct dischargers must comply with effluent limitations for conventional pollutants; these limitations will require application of the best conventional pollutant control technology [CWA Sects. 301(b)(2)(E) and 304 (a)(4) and (b)(4)]. When establishing BCT, EPA must consider the costs of attaining pollutant reduction and the benefits derived from the reduction, the cost and level of pollutant reduction from a POTW discharge versus a class or category of industrial source, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, and the environmental impacts other than water quality [CWA Sect. 304(b)(4)(B)]. The EPA defined conventional pollutants as "generally those pollutants which are naturally

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[2]Ibid.

[3]Ibid.

occurring, biodegradable, oxygen demanding materials" that traditionally have been the primary focus of wastewater control (43 FR 32857). Five pollutants have been classifed as conventional pollutants: biochemical oxygen demand, total suspended solids, fecal coliforms, pH, and oil and grease. The EPA has reviewed BAT requirements for conventional pollutants in 93 industrial subcategories not included on the priority list of 21 industries and decided to withdraw or suspend BAT for 45 subcategories, leaving only BPT requirements. For some of these subcategories, BCT eventually will be developed. On February 17, 1982, EPA withdrew regulations for which BCT effluent limitations require higher levels of control than BPT limitations. EPA will be reviewing and revising the withdrawn 1979 BCT limitations (47 FR 6835).

F.4 Nontoxic, Nonconventional Pollutants

Direct dischargers of all pollutants that are neither listed as toxic under CWA Sect. 307(a) nor as conventional under CWA Sect. 304(a)(4) must comply with effluent limitations based on BAT by July 1, 1984 or three years after the date such limitations are established. The EPA currently regulates fewer than ten nontoxic, nonconventional pollutants; however, the category could be huge. Substances such as phosphate, bromide, nitrate, ammonia, etc. fall into this category. The EPA is considering which pollutants should be regulated under this category and whether a list would be appropriate.[4]

F.5 New Source Performance Standards

The EPA is directed by Sect. 306 of the CWA to set stricter standards for new sources than for existing sources. A new source "standard of performance" means a standard for the control of the discharge of pollutants that reflects the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology. In most cases, new source performance standards approach or coincide with BAT effluent limitations. The EPA and the state authority which issues permits must incorporate new source performance standards into NPDES permits [CWA Sects. 402(a)(1) and (b)(1)]. Table F.2 lists industrial categories with new source performance standards. New sources must achieve effluent limitations based on best available demonstrated technology (BADT) within 90 days from the date operation is commenced. There is no statutory provision for variances from new source performance standards.

Once a new source is constructed to meet CWA Sect. 306 performance standards, a more stringent standard of performance may not be imposed on that point source for the next ten years (or during its depreciable life, whichever is shorter). In the NPDES portion of the Consolidated Permit Regulations, EPA states that the 10-year protection period regarding more stringent permit limitations for new sources applies only to: (1) new source performance standards and (2) other technology based requirements. It does not apply to: (1) BAT limitations for toxic pollutants, (2) toxic pollutant effluent standards, (3) water quality standards, or (4) permit conditions controlling hazardous substances listed under CWA Sect. 311 [40 CFR 122.66(d)]. If a facility commenced construction before proposal of new source performance standards and is thus not classified as a new source, it can be eligible for the ten-year protection period if it complies with the standards when it goes into operation. In this case, the ten-year period (or period of depreciation or amortization) begins when operation starts.[5]

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[4]Ibid.

[5]Ibid.

Table F.2. Industrial categories with new source performance standards.[6]

ASBESTOS
BUILDERS PAPER AND BOARD MILLS
CANNED AND PRESERVED FRUITS AND VEGETABLES
  Canned and Preserved Fruits
  Canned and Preserved Vegetables
  Canned and Miscellaneous Specialties
CANNED AND PRESERVED SEAFOODS
CANNED AND PRESERVED SEAFOOD PROCESSING
CEMENT MANUFACTURING
DAIRY PRODUCTS PROCESSING
  Receiving Stations[a]
FEEDLOTS
FERROALLOYS
  Open Electric Furnaces w/Wet Air Pollution Control Devices
  Converted Electric Furnaces & Other Smelting Operations w/Wet Air Pollution Control Devices
  Slag Processing
FERTILIZER MANUFACTURING
  Phosphate
  Ammonia
  Urea
  Nitric Acid
  Ammonium Sulfate Production
  Mixed and Blend Fertilizer Production
Glass Manufacturing (Insulation Fiberglass)
Glass Manufacturing (Flat Glass Segment)
  Machine Pressed and Blown Glass Mfg[a]
GRAIN MILLS
HOSPITAL INDUSTRY
INORGANIC CHEMICALS
  Aluminum Sulfate
  Calcium Carbide
  Calcium Chloride
  Calcium Oxide
  Chlorine & Sodium or Potassium Hydroxide
  Hydrofluoric Acid
  Potassium Metal
  Potassium Dichromate
  Potassium Sulfate
  Sodium Bicarbonate
  Sodium Chloride
  Sodium Dichromate
  Sodium Sulfite
  Titanium Dioxide
  Aluminum Fluoride
  Chrome Pigments
  Copper Sulfate
  Hydrogen Cyanide
  Nickel Sulfate
  Sodium Bisulfate
IRON AND STEEL MANUFACTURING
  Cokemaking
  Sintering
  Ironmaking
  Steelmaking
  Vacuum Degassing
  Continuous Casting
  Hot Forming
  Scale Removal
  Acid Pickling
  Cold Forming
  Alkaline Cleaning
  Hot Coating
MEAT PRODUCTS
  Small Processor
  Meat Cutter
  Sausage & Luncheon Meats Processor
  Ham Processor
  Canned Meats Processor
MEAT PRODUCTS (POULTRY)
  Chicken Processor[a]
  Turkey Processor[a]
  Fowl Processor[a]
  Duck Processor[a]
  Further Processing[a]
MINERAL MINING
  Phosphate Rock
NONFERROUS METALS
  Bauxite Refining
  Primary Aluminum - Refining
  Secondary Aluminum - Smelting
ORGANIC CHEMICALS
  Process w/Process Water Contact-Steam Dilutant, Quench or Vent Gas Absorbent
PAVING AND ROOFING
PETROLEUM REFINING
  Cracking
PHOSPHATE MANUFACTURING
PRINTING INK FORMULATING
PULP PAPER AND PAPERBOARD MANUFACTURING
  Unbleached Kraft
  Sodium Base Neutral Sulfite Semi-Chemicol
  Ammonia Base Neutral Sulfite Semi-Chemical
  Unbleached Kraft-Neutral Sulfite Semi-Chemical
  Paperboard from Waste Paper
RUBBER MANUFACTURING
SOAPS AND DETERGENTS
SUGAR PROCESSING (CANE REFINING SEGMENT)
TEXTILE INDUSTRY
TIMBER INDUSTRY
TIMBER PRODUCTS PROCESSING
TIMBER PRODUCTS PROCESSING (FURNITURE)

[a]Proposed only

[6]Quarles, J. 1979. Federal regulation of new industrial plants. Monograph No. 28. Environ. Rep. 10(1):22-30.

F.6 Other Requirements

Direct dischargers may be required to achieve effluent limitations more stringent than BPT, BCT, or BAT based on the following standards and requirements:

- Water quality standards,
- Health-based toxic effluent standards,
- Requirements under state law,
- Best management practices,
- Requirements of water quality management plans,
- Conditions of Environmental Impact Statements.

Appendix G

Toxic Substances

EPA's regulatory program for the control of toxic substances is a strategy based on BAT effluent limitation guidelines, new source performance standards, and pretreatment standards on an industry-by-industry basis. Primary emphasis is placed on BAT effluent limitations under CWA Sects. 301 and 304, rather than effluent standards under CWA Sect. 307(a).

Toxic pollutants are defined in a general way at Sect. 502(13) of the CWA. However, permitting focuses on 21 categories of major industrial dischargers (35 subcategories) and 65 toxic pollutants designated for priority regulation. Because some of the 65 pollutants are generic categories or families of compounds, these pollutants have been subcategorized into 129 pollutants, sometimes called priority pollutants (Table G.1).

G.1 Best Available Technology

EPA has subcategorized some of the 21 major industries and assigned separate regulatory timetables to those subcategories (Table G.2). EPA has not met this timetable, and BAT limitations for toxic pollutants have been promulgated for only the timber industry and the iron and steel manufacturing industry. The EPA now proposes to issue the rest of these regulations by July 1, 1984 (Banks 1982). EPA's delay in issuing BAT limitations for the toxic pollutants has prompted a House Subcommittee to recommend that the statutory deadline for compliance with BAT limits be extended to July 1, 1987. This delay will probably result in the establishment of permit limitations controlling toxic pollutants on the basis of best engineering judgement (BEJ) (Weinberg et al. 1982). Information on the current status of effluent limitations for toxic pollutants can be obtained from the staff of the Effluent Guidelines Division at EPA headquarters in Washington, D.C.

In many cases, effluent limitations will not have been established either for a particular discharger or for particular pollutants of concern in a discharger's waste stream. Permit writers may then establish effluent limitations on a case-by-case basis using best professional judgement (BPJ) or BEJ [CWA Sect. 402(a)(1)]. A five volume "Treatability Manual" (EPA 1982) exists to assist permit writers in establishing BEJ limitations for toxic pollutants (45 FR 54135). This manual is updated periodically; the most recent update was in 1982 (47 FR 43309). The "Treatability Manual" includes physical, chemical, biological, and treatability data on the toxic (priority) pollutants; descriptive information on numerous industrial categories; performance data on existing treatment technologies; and capital, operating and maintenance cost estimates for these treatment technologies. This information would also be useful for selecting treatment process alternatives for toxic pollutants.

G.2 Effluent Standards

Effluent standards have been promulgated for six toxic pollutants: aldrin/dieldrin, DDT (DDD, DDE), endrin, toxaphene, benzidine, and PCBs (40 CFR Part 129).

G.3 Water Quality Criteria

The EPA has published final Water Quality Criteria Documents on 64 toxic pollutants or pollutant categories (Table G.3). These documents contain recommended maximum permissible pollutant concentrations consistent with the protection of aquatic organisms, human health, and some recreational activities. Summaries of aquatic-based and health-based criteria and guidelines used to derive these criteria are published at 45 FR 79318 and 46 FR 40919. Copies of the complete documents are available from the National Technical Information Service, Springfield, Virginia. These water quality criteria replace the criteria for the same pollutants found in Quality Criteria for Water (EPA 1976); criteria for all other pollutants and water constituents in the earlier publication remain valid.

Table G.1. Toxic (priority) pollutants and their relative frequency in industrial wastewaters (from Keith and Telliard 1979)

Pollutant	Pollutant
Purgeable organics	
Acrolein	1,2-Dichloropropane
Acrylonitrile	1,3-Dichloropropene
Benzene	Methylene chloride
Toluene	Methyl chloride
Ethylbenzene	Methyl bromide
Carbon tetrachloride	Bromoform
Chlorobenzene	Dichlorobromomethane
1,2-Dichloroethane	Trichlorofluoromethane
1,1,1-Trichloroethane	Dichlorodifluoromethane
1,1-Dichloroethane	Chlorodibromomethane
1,1-Dichloroethylene	Tetrachloroethylene
1,1,2-Trichloroethane	Trichloroethylene
1,1,2,2-Tetrachloroethane	Vinyl chloride
Chloroethane	1,2-trans-Dichloroethylene
2-Chloroethyl vinyl ether	bis(Chloromethyl) ether
Chloroform	
Base/neutral extractable organic compounds	
1,2-Dichlorobenzene	Fluorene
1,3-Dichlorobenzene	Fluoranthene
1,4-Dichlorobenzene	Chrysene
Hexachloroethane	Pyrene
Hexachlorobutadiene	Phenanthrene
Hexachlorobenzene	Anthracene
1,2,4-Trichlorobenzene	Benzo(a)anthracene
bis(2-Chloroethoxy) methane	Benzo(b)fluoranthene
Naphthalene	Benzo(k)fluoranthene
2-Chloronaphthalene	Benzo(a)pyrene
Isophorone	Indeno(1,2,3-c,d)pyrene
Nitrobenzene	Dibenzo(a,h)anthracene
2,4-Dinitrotoluene	Benzo(g,h,i)perylene
2,6-Dinitrotoluene	4-Chlorophenyl phenyl ether
4-Bromophenyl phenyl ether	3,3-Dichlorobenzidine
bis(2-Ethylhexyl)phthalate	Benzidine
Di-n-octyl phthalate	bis(2-Chloroethyl) ether
Dimethyl phthalate	1,2-Diphenylhydrazine
Diethyl phthalate	Hexachlorocyclopentadiene
Di-n-butyl phthalate	N-Nitrosodiphenylamine
Acenaphthylene	N-Nitrosodimethylamine
Acenaphthene	N-Nitrosodi-n-propylamine
Butyl benzyl phthalate	bis(2-Chloroisopropyl) ether
Acid extractable organic compounds	
Phenol	p-Chloro-m-cresol
2-Nitrophenol	2-Chlorophenol
4-Nitrophenol	2,4-Dichlorophenol
2,4-Dinitrophenol	2,4,6-Trichlorophenol
4,6-Dinitro-o-cresol	2,4-Dimethylphenol
Pentachlorophenol	

Table G.1. Cont'd

Pollutant	Pollutant
Pesticides and PCB's	
-Endosulfan	Heptachlor
-Endosulfan	Heptachlor epoxide
Endosulfan sulfate	Chlordane
-BHC	Toxaphene
-BHC	Aroclor 1016
-BHC	Aroclor 1221
-BHC	Aroclor 1232
Aldrin	Aroclor 1242
Dieldrin	Aroclor 1248
4,4'-DDE	Aroclor 1254
4,4'-DDD	Aroclor 1260
4,4'-DDT	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
Endrin	
Endrin aldehyde	
Metals	
Antimony	Mercury
Arsenic	Nickel
Beryllium	Selenium
Cadmium	Silver
Chromium	Thallium
Copper	Zinc
Lead	
Miscellaneous	
Total cyanides	Asbestos (fibrous)
	Total phenols

Table G.2. Regulatory schedule by industrial category for implementation of EPA's toxic pollutant control program (from Weinberg et al. 1982)

Industrial category	Scheduled proposal date	Scheduled promulgation date
Adhesives	2/1/80	8/29/80
Leather Tanning & Finishing	1/12/79[a]	8/10/79
Soaps & Detergents	7/18/80	1/30/81
Alumium Forming	3/21/80	10/17/80
Battery Manufacturing	3/28/80	10/24/80
Coil Coating	8/14/79[a]	3/21/80
Copper Forming	4/11/80	11/7/80
Electroplating	3/21/80	10/17/80
Foundries	10/26/79	5/23/80
Iron & Steel Manufacturing	11/2/79	5/30/80[b]
Nonferrous Metals	8/24/79	3/21/80
Photographic Supplies	2/1/80	8/29/80
Plastics Processing	10/10/80[a]	5/8/81
Porcelain Enamel	10/12/79	5/9/80
Gum & Wood Chemicals	8/31/79[a]	3/28/80
Paint & Ink	9/21/79[a]	4/18/80
Printing & Publishing	11/16/79	6/13/80
Pulp & Paper	2/1/80[a]	8/29/80
Textile Mills	5/18/79[a]	12/14/79
Timber	5/11/79	12/7/79[c]
Coal Mining	12/14/79[a]	6/20/80
Ore Mining	11/23/79	7/5/80
Petroleum Refining	3/16/79[a]	10/2/79
Steam Electric	5/24/79	12/20/79
Organic Chemicals	1/11/80	8/18/80
Pesticides	3/21/80	10/17/80
Pharmaceuticals	12/2/79	7/18/80
Plastic & Synthetic Materials	1/25/80	8/22/80
Rubber	6/23/79	1/12/80
Auto & Other Laundries	12/7/79	7/4/80
Mechanical Products	8/15/80	3/13/81
Electric & Electronic Components	3/14/79	10/10/80
Explosives Manufacturing	12/21/79	7/18/80
Inorganic Chemicals	9/21/79[a]	4/18/80[d]

[a]Regulation that has been proposed as of January 1, 1982.

[b]Regulation that has been promulgated as of May 27, 1982.

[c]Regulation that has been promulgated as of January 1, 1982.

[d]Regulation that has been promulgated as of June 29, 1982.

Table G.3. Toxic pollutants with finalized Water Quality Criteria Documents (45 FR 79318, 46 FR 40919)

Acenaphthene	Endosulfan
Acrolein	Endrin
Acrylonitrile	Ethylbenzene
Aldrin/Dieldrin	Fluoranthene
Antimony	Haloethers
Arsenic	Halomethanes
Asbestos	Heptachlor
Benzene	Hexachlorobutadiene
Benzidine	Hexachlorocyclohexane
Beryllium	Hexachlorocyclopentadiene
Cadmium	Isophorone
Carbon tetrachloride	Lead
Chlordane	Mercury
Chlorinated benzenes	Napthalene
Chlorinated ethanes	Nickel
Chloroalkyl ethers	Nitrobenzene
Chlorinated naphthalene	Nitrophenols
Chlorinated phenols	Nitrosamines
Chloroform	Pentachlorophenol
2-Chlorophenol	Phenol
Chromium	Phthalate esters
Copper	Polychlorinated biphenyls
Cyanides	Polynuclear aromatic hydrocarbons
DDT	Selenium
Dichlorobenzenes	Silver
Dichlorobenzidine	Tetrachloroethylene
Dichloroethylenes	Thallium
2,4-Dichlorophenol	Toluene
Dichloropropanes/propenes	Toxaphene
2,4-Dimethylphenol	Trichloroethylene
Dinitrotoluene	Vinyl chloride
Diphenylhydrazine	Zinc

Water quality criteria [CWA Sect. 304(a)(1)] are not rules and have no regulatory impact. They present scientific data and guidance on the environmental effect of pollutants that can be useful in the promulgation of water quality-based effluent limitations (CWA Sect. 302), water quality standards (CWA Sect. 303), or toxic pollutant effluent standards (CWA Sect. 307). In the forthcoming proposed revision to the water quality standard regulations, states would have the option of adopting the published criteria or of adjusting those criteria based on site specific analysis (45 FR 79319, 79321).

G.4 Other Requirements

Two regulatory requirements exist to prevent significant discharges of toxic pollutants that are not limited by an NPDES permit. The DOE must notify the permitting authority as soon as it becomes aware that:

- Some activity has occurred or will occur to cause it to discharge a toxic pollutant at 100 micrograms per liter (higher for certain pollutants) or five times the maximum concentration reported for that pollutant in the permit application, whichever is greater; or
- It has begun or will begin to use or manufacture a toxic pollutant as an intermediate or final product or byproduct.

An NPDES permit may be modified to control increased discharges of toxic pollutants.

Appendix G Literature Cited

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Environmental Protection Agency (EPA). 1982. Treatability manual. Publication stock number 055-000-00215-1. U.S. Govt. Printing Office, Washington, D.C.

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Appendix H

Test Procedures for Chemical and Biological Substances in Water

TABLE I—*List of approved test procedures* [1]

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	References (page nos.) USGS methods	Other approved methods
1. Acidity, as $CaCO_3$, milligrams per liter.	Electrometric end point (pH of 8.2) or phenol-phthalein end point.	1	273(4d)	116	40	[2](607)
2. Alkalinity, as $CaCO_3$, milligrams per liter.	Electrometric titration (only to pH 4.5) manual or automated, or equivalent automated methods.	3 5	278	111	41	[2](607) .....
3. Ammonia (as N), milligrams per liter.	Manual distillation [4] (at pH 9.5)	.....	410	.....	.....	.....
	followed by nesslerization,	159	412	237	116	[2](614)
	titration, electrode,	165	.....	.....	.....	.....
	Automated phenolate.	168	616	.....	.....	.....
BACTERIA						
4. Coliform (fecal) [5], number per 100 ml.	MPN; [6] membrane filter.	.....	922	.....	.....	.....
		.....	937	.....	[7](45)	.....
5. Coliform (fecal) [5] in presence of chlorine, number per 100 ml.	do. [6] [8]	.....	922	.....	.....	.....
		.....	928,937	.....	.....	.....
6. Coliform (total), [5] number per 100 ml	do. [6]	.....	916	.....	.....	.....
		.....	928	.....	[7](35)	.....
7. Coliform (total) [5] in presence of chlorine, number per 100 ml.	MPN; [6] membrane filter with enrichment.	.....	916	.....	.....	.....
		.....	933	.....	.....	.....
8. Fecal streptococci, [5] number per 100 ml.	MPN; [6] membrane filter; plate count.	.....	943	.....	.....	.....
		.....	944	.....	[7](50)	.....
		.....	947	.....	.....	.....
9. Benzidine, milligrams per liter	Oxidation—colorimetric [9]	.....	.....	.....		
				.....		.....
10. Biochemical oxygen demand, 5-d (BOD_5), milligrams per liter.	Winkler (Azide modification) or electrode method.	.....	543	.....	[7](50)	.....
		.....	.....	.....	.....	[10](17)
11. Bromide, milligrams per liter	Titrimetric, iodine-iodate	14	.....	323	58	.....
12. Chemical oxygen demand (COD), milligrams per liter.	Dichromate reflux	20	550	472	124	[2](610)
		.....	.....	.....	.....	[10](17)
13. Chloride, milligrams per liter	Silver nitrate; mercuric nitrate;	.....	303	267	.....	.....
	or automated colori-metric-ferricyanide.	29 31	304 613	265	.....	[2](615) [11](46)
14. Chlorinated organic compounds (except pesticides), milligrams per liter.	Gas chromatography [12]	.....	.....	.....	.....	.....
15. Chlorine—total residual, milligrams per liter.	Iodometric titration,	.....	318	.....	.....	.....
	amperometric or starch-iodine end-point; DPD colori-metric or Titrimetric methods (these last 2 are interim methods pending laboratory testing).	35	322 332	278	.....	.....
		.....	329	.....	.....	.....
16. Color, platinum cobalt units or dominant wave length, hue, lumi-nance, purity.	Colorimetric;	38	64	.....	82	.....
	spectrophotometric; or ADMI procedure. [13]	39	68	.....	.....	.....
		.....	.....	.....	.....	.....
17. Cyanide, total, [14] milligrams per liter	Distillation followed by silver nitrate titration or pyridine pyrazolone (or barbituric acid) colorimetric.	40	361	503	85	[10](22)
18. Cyanide amendable to chlorination, milligrams per liter.	do	49	376	505	.....	.....
19. Dissolved oxygen, milligrams per liter.	Winkler (Azide modification) or electrode method.	51 56	443 450	369	126	[3](609) .....

See footnotes at end of table.

Appendix H Cont'd.

TABLE I—*List of approved test procedures*—Continued

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	References (page nos.) USGS methods	Other approved methods
20. Fluoride, milligrams per liter	Distillation [4] followed by ion		389			
	electrode; SPADNS; or	65	391	307	93	
	automated complexione.	59	393	305		
		61	614			
21. Hardness—Total, as $CaCO_3$, milligrams per liter	EDTA titration; automated	68	202	161	94	[3](617)
	colorimetric; or atomic	70				
	absorption (sum of Ca and					
	Mg as their respective					
	carbonates)					
22. Hydrogen ion (pH), pH units	Electrometric measurement	239	460	178	129	[3](606)
23. Kjeldahl nitrogen (as N), milligrams per liter.	Digestion and distillation	175	437		122	[3](612)
	followed by nesslerization,	165				
	titration, or electrode;	182				
	automated digestion					
	automated phenolate.					
METALS						
24. Aluminum—Total, milligrams per liter.	Digestion [15] followed by atomic	92	152		[11](19)	
	absorption [16] or by		171			
	colorimetric (Eriochrome					
	Cyanine R).					
25. Aluminum—Dissolved, milligrams per liter	0.45 micron filtration [17] followed					
	by referenced methods for					
	total aluminum.					
26. Antimony—Total, milligrams per liter.	Digestion [15] followed by atomic	94				
	absorption. [16]					
27. Antimony—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total antimony					
28. Arsenic—Total, milligrams per liter.	Digestion followed by silver		285			
	diethyldithiocarbamate, or	9	289		[11](31)	
	atomic absorption. [15, 16]	95	159		[11](37)	
29. Arsenic—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total arsenic.					
30. Barium—Total, milligrams per liter	Digestion [15] followed by atomic	97	152		52	
	absorption. [16]					
31. Barium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total barium					
32. Beryllium—Total milligrams per liter.	Digestion [15] followed by atomic	90	152		58	
	absorption [16] or by		177			
	colorimetric (Aluminon)					
33. Beryllium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total beryllium.					
34. Boron—Total, milligrams per liter	Colorimetric (Curcumin)	13	287			
35. Boron—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total boron.					
36. Cadmium—Total, milligrams per liter.	Digestion [15] followed by atomic	101	148	345	62	[3](619)
	absorption [16] or by		182			[10](37)
	colorimetric (Dithizone).					
37. Cadmium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total cadmium.					
38. Calcium—Total, milligrams per liter.	Digestion [15] followed by atomic	103	148	345	66	
	absorption; or EDTA titration.		189			
39. Calcium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed					
	by referenced method for					
	total calcium.					
40. Chromium VI, milligrams per liter	Extraction and atomic	89, 105			76	
	absorption, colorimetric		192		75	
	(Diphenylcarbazide)					

See footnotes at end of table.

Appendix H Cont'd.

TABLE I—*List of approved test procedures* —Continued

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	References (page nos.) USGS methods	Other approved methods
41. Chromium VI—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for chromium VI.	.....	.....	.....	.....	.....
42. Chromium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption [16] or by colonmetnc (Diphenylcarbazide).	105	148 192	345 288	78 77	[3](619) .....
43. Chromium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total chromium.	.....	.....	.....	.....	.....
44. Cobalt—Total, milligrams per liter...	Digestion [15] followed by atomic absorption, [16]	107	148	345	80	[18](37)
45. Cobalt—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total cobalt.	.....	.....	.....	.....	.....
46. Copper—Total, milligrams per liter..	Digestion [15] followed by atomic absorption [16] or by colonmetnc (Neocuproine).	108	148 196	345 293	83	[3](619) [18](37)
47. Copper—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total copper.	....	.....	....	.....	.....
48. Gold—Total, milligrams per liter.....	Digestion [15] followed by atomic absorption, [16]	.....	.....	.....	.....	.....
49. Indium—Total, milligrams per liter...	Digestion [15] followed by atomic absorption, [16]	....	.....	.....	.....	.....
50. Iron—Total, milligrams per liter.....	Digestion [15] followed by atomic absorption [16] or by colonmetric (Phenanthrohne).	110	148 208	345 326	102	[3](619) .....
51. Iron—Dissolved, milligrams per liter	0.45 micron filtration [17] followed by referenced method for total iron.	.. ..	.....	.....	.....	.....
52. Lead—Total, milligrams per liter.....	Digestion [15] followed by atomic absorption [16] or by colonmetnc (Dithizone).	112	148 215	345	105	[3](619) .....
60. Lead—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total lead.	.....	.....	.....	.....	.....
54. Magnesium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption; or gravimetric.	114	148 221	345	109	[3](619) .....
55. Magnesium—Dissolved milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total magnesium	.....	.....	.....	.....	.....
56. Manganese—Total milligrams per liter.	Digestion [15] followed by atomic absorption [16] or by colonmetnc (Persulfate or periodate).	116	148 225, 227	345	111	[3](619) .....
57. Manganese—Dissolved milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total manganese.	.....	.....	.....	.....	.....
58. Mercury—Total, milligrams per liter.	Flameless atomic absorption.	118	156	338	[11](51)	.....
59. Mercury—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total mercury.	.....	.....	.....	.....	.....
60. Molybdenum—Total, milligrams per liter.	Digestion [15] followed by atomic absorption, [16]	139	.....	350	.....	.....
61. Molybdenum—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total molybdenum.	.....	.....	.....	.....	.....
62. Nickel—Total, milligrams per liter....	Digestion [15] followed by atomic absorption [16] or by colorimetnc (Heptoxime).	141 223	148	345	113	....
63. Nickel—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total nickel	....	....	.....	.....	.....
64 Osmium—Total, milligrams per liter	Digestion [15] followed by atomic absorption [16]		.. ....	.....	.. ..	. .....

See footnotes at end of table.

Appendix H Cont'd.

TABLE I—*List of approved test procedures* [1]—Continued

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	References (page nos.) USGS methods	Other approved methods
65. Palladium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption. [19]	.....	.....	.....	.....	.....
66. Platinum—Total, milligrams per liter	Digestion [15] followed by atomic absorption. [19]	.....	.....	.....	.....	.....
67. Potassium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption, colorimetric (Cobaltinitrite), or by flame photometric	143	..... 235 234	 403	134	[3](620) ....
68. Potassium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total potassium.	.....	.....	.....	.....	.....
69. Rhodium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption. [19]	.....	.....	.....	.....	.....
70. Ruthenium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption [19]	.....	.....	.....	.....	.....
71. Selenium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption. [19, 19]	145	159	.....	.....	.....
72. Selenium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total selenium.	.....	.....	.....	.....	.....
73. Silica—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by colorimetric (Molybdosilicate).	274	487	398	139	.....
74. Silver—Total, [20] milligrams per liter..	Digestion [15] followed by atomic absorption [19] or by colorimetric (Dithizone).	146	148 243	....	142	[3](619) [19](37)
75. Silver—Dissolved, [20] milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total silver.	.....	.....	.....	.....	.....
76. Sodium—Total, milligrams per liter..	Digestion [15] followed by atomic absorption or by flame photometric.	147	 250	 403	143	[3](621) .....
77. Sodium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total sodium.				.....	.....
78. Thallium—Total, milligrams per liter	Digestion [15] followed by atomic absorption. [19]	149	.....	.....	.....	.....
79. Thallium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total thallium.	.....	.....	.....	.....	.....
80. Tin—Total, milligrams per liter	Digestion [15] followed by atomic absorption. [19]	150	.....	.....	[11](65)	.....
81. Tin—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total tin.	.....	.....	.....	.....	.....
82. Titanium—Total, milligrams per liter	Digestion [15] followed by atomic absorption [19]	151	.....	.....	.....	.....
83. Titanium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total titanium.	.....	.....	.....	.....	.....
84. Vanadium—Total, milligrams per liter.	Digestion [15] followed by atomic absorption [19] or by colorimetric (Gallic acid).	153	152 260	 441	..... [11](67)	.....
85. Vanadium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total vanadium	.....	.....	.....	.....	.....
86. Zinc—Total, milligrams per liter	Digestion [15] followed by atomic absorption [19] or by colorimetric (Dithizone)	155	148 265	345	159	[3](619) [19](37)
87. Zinc—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total zinc	.....	.....	.....	.....	.....
88. Nitrate (as N), milligrams per liter....	Cadmium reduction; brucine sulfate, automated cadmium or hydrazine reduction [21]	201 197 207	423 427 620	..... 358	..... 119	..... [3](614) [19](28)

See footnotes at end of table.

Appendix H Cont'd.

TABLE I—*List of approved test procedures* —Continued

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	References (page nos.) USGS methods	Other approved methods
89. Nitrite (as N), milligrams per liter	Manual or automated colorimetric (Diazotization).	215	434	.....	121	.....
90. Oil and grease, milligrams per liter	Liquid-liquid extraction with trichloro-trifluoro-ethane-gravimetric.	229	515	.....	.....	.....
91. Organic carbon; total (TOC), milligrams per liter.	Combustion—infrared method. [23]	238	532	487	[23](4)	.....
92. Organic nitrogen (as N), milligrams per liter.	Kjeldahl nitrogen minus ammonia nitrogen.	175, 159	437	.....	122	[3](612, 614)
93. Orthophosphate (as P), milligrams per liter.	Manual or automated ascorbic acid reduction.	249 256	481 624	384	131	[3](621) .....
94. Pentachlorophenol, milligrams per liter.	Gas chromatography [18]	.....	.....	.....	.....	.....
95. Pesticides, milligrams per liter	do. [18]	.....	555	529	[23](24)	.....
96. Phenols, milligrams per liter	Distillation followed by Colorimetric. (4AAP)	241	574	545	.....	.....
97. Phosphorus (elemental), milligrams per liter.	Gas chromatography [18]	.....	.....	.....	.....	.....
98. Phosphorus; total (as P), milligrams per liter.	Persulfate digestion followed by manual or automated ascorbic acid reduction.	249 256	476, 481 624	384	133	[3](621) .....
RADIOLOGICAL						
99. Alpha—Total, pCi per liter	Proportional or scintillation counter.	.....	648	591	[11] [23](75+78)	.....
100. Alpha—Counting error, pCi per liter.	do.	.....	648	594	[11](79)	.....
101. Beta—Total, pCi per liter	Proportional counter	.....	648	601	[11] [23](75+78)	.....
102. Beta—Counting error, pCi per liter	do	.....	648	606	[11](79)	.....
103. (a) Radium—Total, pCi per liter	do	.....	661	661	.....	.....
(b) [3] [26]Ra, pCi per liter	Scintillation counter	.....	667	.....	[11](81)	.....
RESIDUE						
104. Total, milligrams per liter	Gravimetric, 103 to 105° C	270	91	.....	.....	.....
105. Total dissolved (filterable), milligrams per liter.	Glass fiber filtration, 180° C	268	92	.....	.....	.....
106. Total suspended residue	Glass fiber filtration, 103 to 105° C., post-washing of residue.	268	94	.....	.....	[37](537)
107. Settleable, milliliters per liter or milligrams per liter.	Volumetric or gravimetric	.....	95	....	.....	.....
108. Total volatile, milligrams per liter	Gravimetric, 550° C	272	95	.....	.....	.....
109. Specific conductance, micromhos per centimeter at 25° C.	Wheatstone bridge conductimetry.	275	71	120	148	[3](606)
110. Sulfate (as SO_4), milligrams per liter.	Gravimetric; turbidimetric; or automated colorimetric (barium chloranilate).	.... 277 279	493 498	424 425	....	[3](624) [3](623) .....
111. Sulfide (as S), milligrams per liter	Titrimetric—iodine for levels greater than 1 mg per liter; Methylene blue photometric.	284	505 503	....	154	....
112. Sulfite (as SO_3), milligrams per liter.	Titrimetric, iodine-iodate	285	508	435	.....	.....
113. Surfactants, milligrams per liter	Colorimetric (Methylene blue).	157	600	494	[28](11)	.....
114. Temperature, degrees C	Calibrated glass or electrometric thermometer.	286	125	.....	[28](31)	.....
115. Turbidity, NTU	Nephelometric	295	132	223	156	.....

[1] Recommendations for sampling and preservation of samples according to parameter measured may be found in "Methods for Chemical Analysis of Water and Wastes, 1974" U.S. Environmental Protection Agency, table 2, pp. viii–xii.

[2] All page references for USGS methods, unless otherwise noted, are to Brown, E., Skougstad, M.W., and Fishman, M.J., "Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases," U.S. Geological Survey Techniques of Water-Resources Inv., book 5, ch. A1 (1970).

[3] EPA comparable method may be found on indicated page of "Official Methods of Analysis of the Association of Official Analytical Chemists" methods manual, 12th ed. (1975).

Appendix H Cont'd.

[4] Manual distillation is not required if comparability data on representative effluent samples are on company file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies

[5] The method used must be specified

[6] The 5 tube MPN is used

[7] Slack, K.V. and others, "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples: U.S. Geological Survey Techniques of Water-Resources Inv. book 5, ch. A4 (1973)."

[8] Since the membrane filter technique usually yields low and variable recovery from chlorinated wastewaters, the MPN method will be required to resolve any controversies

[9] Adequately tested methods for benzidine are not available. Until approved methods are available, the following interim method can be used for the estimation of benzidine: (1) "Method for Benzidine and its Salts in Wastewaters," available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

[10] American National Standard on Photographic Processing Effluents, Apr. 2, 1975. Available from ANSI, 1430 Broadway, New York, N.Y. 10018

[11] Fishman, M.J. and Brown, Eugene, "Selected Methods of the U.S. Geological Survey for Analysis of Wastewaters," (1976) open-file report 76-177.

[12] Procedures for pentachlorophenol, chlorinated organic compounds, and pesticides can be obtained from the Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268

[13] Color method (ADMI procedure) available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268

[14] For samples suspected of having thiocyanate interference, magnesium chloride is used as the digestion catalysts. In the approved test procedure for cyanides, the recommended catalysts are replaced with 20 ml of a solution of 510 g/l magnesium chloride ($MgCl_2 \cdot 6H_2O$). This substitution will eliminate thiocyanate interference for both total cyanide and cyanide amendable to chlorination measurements.

[15] For the determination of total metals the sample is not filtered before processing. Because vigorous digestion procedures may result in a loss of certain metals through precipitation, a less vigorous treatment is recommended as given on p. 83 (4.1.4) of "Methods for Chemical Analysis of Water and Wastes" (1974). In those instances where a more vigorous digestion is desired the procedure on p. 82 (4.1.3) should be followed. For the measurement of the noble metal series (gold, indium, osmium, palladium, platinum, rhodium and ruthenium), an aqua regia digestion is to be substituted as follows: Transfer a representitive aliquot of the well-mixed sample to a Griffin beaker and add 3 ml of concentrated redistilled HNO_3. Place the beaker on a steam bath and evaporate to dryness. Cool the beaker and cautiously add a 5 ml portion of aqua regia. (Aqua regia is prepared immediately before use by carefully adding 3 volumes of concentrated HCl to one volume of concentrated HNO_3.) Cover the beaker with a watch glass and return to the steam bath. Continue heating the covered beaker for 50 min. Remove cover and evaporate to dryness. Cool and take up the residue in a small quantity of 1:1 HCl. Wash down the beaker walls and wash glass with distilled water and filter the sample to remove silicates and other insoluble material that could clog the atomizer. Adjust the volume to some predetermined value based on the expected metal concentration. The sample is now ready for analysis.

[16] As the various furnace devices (flameless AA) are essentially atomic absorption techniques, they are considered to be approved test methods. Methods of standard addition are to be followed as noted in p. 78 of "Methods for Chemical Analysis of Water and Wastes," 1974.

[17] Dissolved metals are defined as those constituents which will pass through a 0.45 μm membrane filter. A prefiltration is permissable to free the sample from larger suspended solids. Filter the sample as soon as practical after collection using the first 50 to 100 ml to rinse the filter flask. (Glass or plastic filtering apparatus are recommended to avoid possible contamination.) Discard the portion used to rinse the flask and collect the required volume of filtrate. Acidify the filtrate with 1:1 redistilled HNO_3 to a pH of 2. Normally, 3 ml of (1:1) acid per liter should be sufficient to preserve the samples

[18] See "Atomic Absorption Newsletter," vol. 13, 75 (1974). Available from Perkin-Elmer Corp., Main Ave., Norwalk, Conn. 06852

[19] Method available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268

[20] Recommended methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/l and above are inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insoluble in reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to a pH of 12. Therefore, for levels of silver above 1 mg/l, 20 ml of sample should be diluted to 100 ml by adding 40 ml each of 2M $Na_2S_2O_3$ and 2M NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/l the recommended method is satisfactory.

[21] An automated hydrazine reduction method is available from the Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.

[22] A number of such systems manufactured by various companies are considered to be comparable in their performance. In addition, another technique, based on combustion-methane detection is also acceptable.

[23] Goerlitz, D., Brown, E., "Methods for Analysis of Organic Substances in Water": U.S. Geological Survey Techniques of Water-Resources Inv., book 5, ch. A3 (1972)

[24] R.F. Addison and R.G. Ackman, "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography," "Journal of Chromatography," vol. 47, No. 3, pp. 421-426, 1970

[25] The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only suspended. Therefore, the 2 results must be added together to obtain "total."

[26] Stevens, H. H., Ficke, J.F., and Smoot, G.F., "Water Temperature—Influential Factors, Field Measurement and Data Presentation: U.S. Geological Survey Techniques of Water Resources Inv., book 1 (1975)."

[27] "Standard Methods for the Examination of Water and Wastewater, 13th Edition, (1971)

[38 FR 28758, Oct. 16, 1973, as amended at 41 FR 52781, Dec. 1, 1976; 42 FR 3306, Jan. 18, 1977; 42 FR 37205, July 20, 1977]

Appendix I

CWA Section 316(a) Demonstration

Preliminary Screening Studies and Determinations

Figure I.1 is a flowchart for the planning and submission of a 316(a) Demonstration. Criteria for determining alternative effluent limitations under CWA Sect. 316(a) are at 40 CFR Part 125, Subpart H, and the draft interagency 316(a) Technical Guidance Manual describes in detail the information a 316(a) Demonstration should include.[1] This Appendix briefly summarizes these information requirements.

An initial application for a 316(a) variance should include a description of the alternative effluent limitation requested and a general description of the method DOE proposes to use for demonstrating that the applicable thermal discharge effluent limitation(s) are too stringent.

DOE must gather existing literature and field data relating to the site for the following biotic categories:

- Phytoplankton,
- Zooplankton and meroplankton,
- Habitat formers,
- Shellfish/macroinvertebrates,
- Fish,
- Other vertebrate wildlife (e.g., wildlife, other than fish, that might be attracted to a thermal plume in cold areas).

For each biotic category, DOE must determine if the site is one of low potential impact. Simple field surveys may be necessary to supplement existing information. DOE then prepares a plan for any additional studies or work necessary to complete the demonstration and submits this plan along with the potential impact determinations (rationale) by biotic category to the EPA Regional Administrator (RA) or the Director of the state NPDES program (Director). With respect to the biotic categories listed above, the characterization of the biological environment should identify and/or quantify the following organisms.

- Identify those species (and lifestages) considered important to the ecosystem in general and/or to recreational or commercial fisheries. Important species at the limit of their thermal range should be so identified, and threatened, endangered, and candidate species on federal and state lists should be identified.
- Quantify the important species susceptible to thermal and related impacts (based upon published data and/or laboratory studies specifically undertaken for the project).
- Consider benthic organisms as a focus in the survey if the plume may affect a significant portion of the benthic community.

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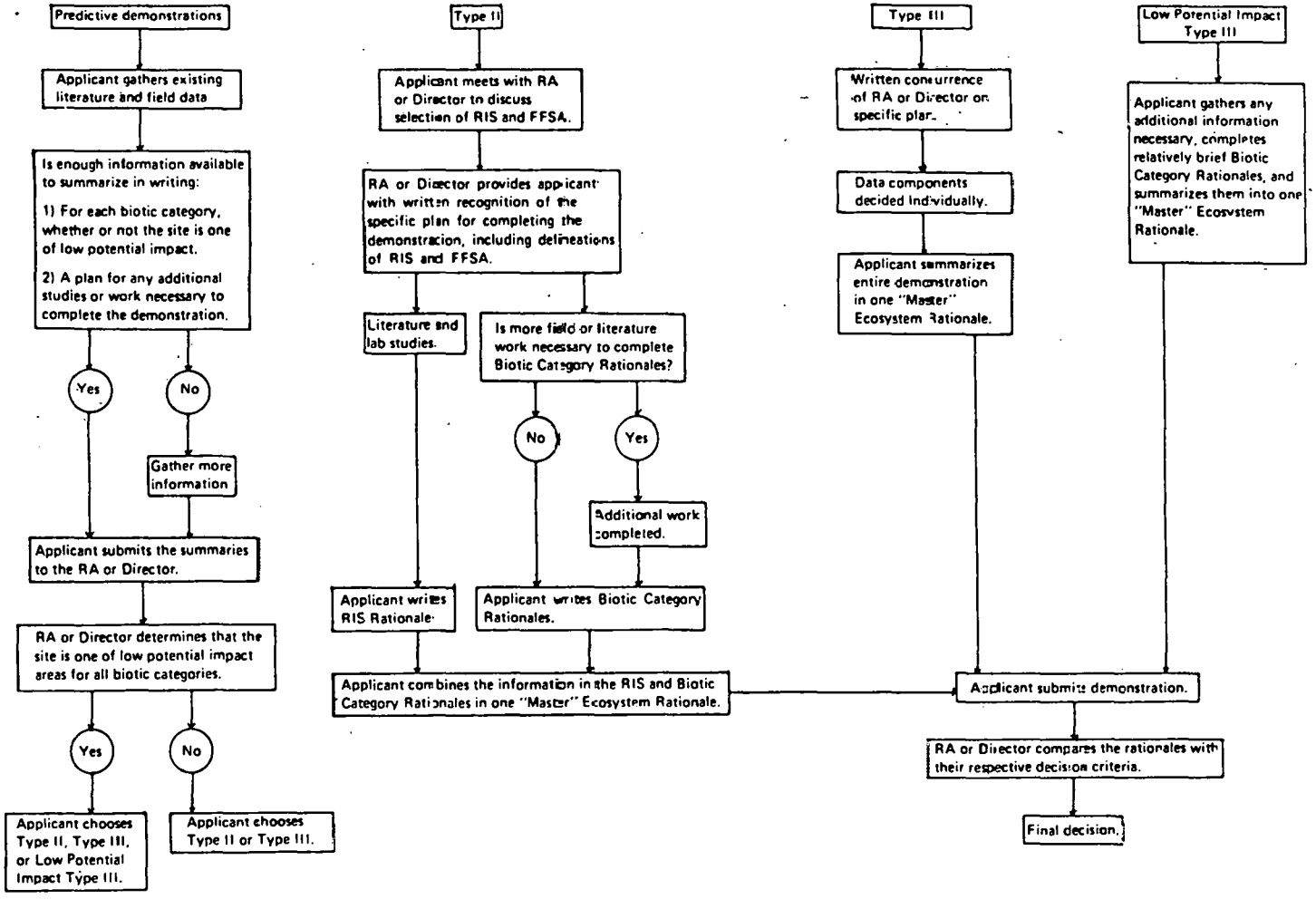
[1] Environmental Protection Agency (EPA). 1977. Draft interagency 316(a) technical guidance manual and guide for thermal effects sections of nuclear facilities environmental impact statements. Office of Water Enforcement, Permits Division, Industrial Permits Branch, Washington, D.C. 79 pp.

Figure I.1. Flowchart for the planning and submission of a 316(a) demonstration (EPA 1977).



The programs and methods for measuring biological and physical parameters relevant to a thermal discharge should be described. Sampling and monitoring programs should be presented in sufficient detail to demonstrate adequacy with respect to spatial and temporal coverage, giving due consideration to seasonal and diurnal effects.

Any proposed sampling programs should adequately estimate the diel, seasonal, and migratory abundance and distribution of important species both within the affected ecosystem in general and in the area of direct thermal impact. If existing facilities in the region have traditionally had problems with thermal effects on particular species at a certain time of the year, then the proposed sampling program should be designed to assure satisfactory definition of densities and distributions of these species (both near the discharge and throughout the affected aquatic ecosystems) during the time of year in question. The number of sample replicates needed will depend on the sample variance and the desired degree of confidence needed to make the estimates. A biostatistician should be consulted before and during sampling to assure the use of appropriate sampling methodology.

When a site is not one of low potential impact for all biotic categories, DOE may do either a Type II or Type III Demonstration. If the RA or Director decides the site is one of low potential impact for all biotic categories, DOE may do either a Type II, a Type III, or a Low Potential Impact Type III Demonstration. The Low Potential Impact Type III is a streamlined procedure. The Type II Demonstration should be used as a guide for the amount of detail required in most 316(a) demonstrations; however, the actual amount of detail will vary from site to site. When a site is one of low potential impact for most biotic categories, DOE would probably choose the Type III Demonstration which focuses on species of concern and is a less detailed version of the Type II Demonstration.

For all demonstrations, DOE must supply engineering and physical (hydrological) data. Information requirements on engineering design and the characterization of the physical environment are briefly discussed herein, but DOE should refer to the 316(a) Technical Guidance Manual for more detailed information requirements.[2]

General Information Requirements

Engineering. The thermal discharge system and its operation should be described. Diagrams and/or descriptions of the following items should be provided:

- Location and design of discharge structure(s);
- Operating needs of the heat rejection system (full load and partial load backwashing, cleaning, and abnormal operations);
- The quantity of heat discharged, the discharge flow, and the expected temperature change (Delta-T) for each operating mode based on plume modeling or field data from existing facilities;
- De-icing procedures;
- Chemical additives (e.g., chlorine), their frequency and duration of use, and the volume used.

Physical Environment. The characterization of the physical environment should provide information on the surface water hydrology of the proposed and alternative receiving water bodies. This includes flow patterns, current patterns, and tidal variations where applicable. The changes in temperature with time should be characterized by maximum, average maximum, average, average minimum, and minimum monthly temperatures. Temperatures at the surface and at several depths should be used to describe the vertical temperature profile. Diurnal variations in temperature should

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[2]Ibid.

be determined for those water bodies subject to tidal fluctuations or otherwise affected by diurnal temperature variations. Sufficient data should be obtained to characterize the heat transfer between the receiving water body and the atmosphere. Evaluation of net surface heat flux should include net solar radiation, long-wave radiation, evaporative heat flux, conductive heat flux, air temperature, and wind speed. Diagrams and descriptive information should be provided on the shoreline characteristics and bathymetry of the receiving water body.

The physical impacts resulting from the discharge of thermal effluent should be analyzed to determine changes in temperatures, salinity, dissolved oxygen, and other pertinent water quality parameters in the receiving water. Temperature and dissolved oxygen changes near the discharge, in the mixing zone, and in the region far from the discharge should be predicted for the proposed and alternative systems and sites. Physical, numerical, or analytical models can be used for predicting changes in water quality parameters. The model and its theory should be described, any assumptions stated, and verification of the model discussed. Analyses should consider, where appropriate, thermal blocks, shoreline attachment of the plume, winds, tidal influences, sinking plumes, etc.

Type II Demonstration

DOE would meet with the RA or Director to discuss a plan for completion of the demonstration, including selection of representative important species (RIS) and definitions of the far field study area (FFSA) and an allowable mixing zone.

Representative important species represent, in terms of their biological needs, organisms in a balanced indigenous community of shellfish, fish, and wildlife in the receiving water. The number of RIS selected will vary. The RIS are selected from the fish, shellfish, or habitat formers on the basis of:

- Applicable state water quality standards;
- Threatened, endangered, or candidate species on federal or state lists;
- Thermal sensitivity;
- Commercial or recreational value; and
- Importance to the aquatic ecosystem (e.g., food species or habitat formers).

The FFSA is that portion of the receiving water body, outside of the primary study area, in which impacts from the thermal discharge are likely to occur.

Within 60 days after the application is filed, DOE must submit a detailed plan of study that specifies how the following information will be developed and handled.

- Biological, hydrological, and meteorological data
- Physical monitoring data
- Engineering or diffusion models
- Laboratory studies
- Representative important species

The DOE would then complete any field and literature work required to finish any biotic category rationales (i.e, impacts) not completed in the preliminary part of the demonstration. The DOE also completes literature and laboratory studies necessary to generate information for the RIS rationale describing impacts on those particular

species. The following factors should be considered when determining the impacts on the RIS:

- Maximum temperature survival,
- Thermal shock tolerance,
- Optimum temperature for performance and growth,
- Maximum temperature regime allowing completion of early development,
- Normal spawning dates and temperatures,
- Special temperature requirements for reproduction,
- The mean and maximum area or time under average and worst-case conditions that will prevent a specific biological function from occurring,
- Secondary effects such as lowered oxygen concentrations or supersaturation of dissolved gases, and
- Influence on migration patterns.

After completion of all laboratory, field, and literature studies, DOE combines the information on engineering and hydrological data with the RIS and biotic category rationales into a master ecosystem rationale. This impact analysis should summarize key findings and form a convincing argument that the balanced indigenous community would be protected with the proposed modification of the thermal effluent limitation. When the potential impacts of thermal discharges are significant, the demonstration should include mitigation measures for reducing those potential adverse impacts. Possible mitigation measures would be alternative designs or operating procedures. Mitigation measures for a thermal discharge should be designed so that results can be verified through monitoring after the facility begins operation. DOE would submit the 316(a) Demonstration to the RA or Director for a final decision.

Type III Demonstration

DOE should consult with the RA or Director on the plan of study. A Type III Demonstration provides for the submission of any information that the RA or Director believes may be necessary for evaluation of a discharge. For the biological categories with a potential to be impacted, the demonstration should reflect a degree of detail and proof comparable to the Type II Demonstration. No RIS are necessary for the demonstration. Once the RA or Director has agreed on a study plan, DOE completes the work and summarizes it along with the information on engineering and hydrology into a master ecosystem rationale. Rationales developed for a Type III Demonstration should be comparable to those discussed under a Type II Demonstration. The master ecosystem rationale and supporting information is submitted to the RA or Director as the 316(a) Demonstration.

Type III Low Potential Impact Determination

If the proposed discharge will meet state water quality standards, additional field studies beyond the preliminary screening studies and determinations will not be extensive. After preliminary screening studies and determinations that all biotic categories are of low potential impact, DOE summarizes the biotic category rationale along with engineering and hydrological data into a master ecosystem rationale. This is submitted as the 316(a) Demonstration to the RA or Director for a final decision.

Renewal

An application for the renewal of a Sect. 316(a) variance need include only the portions of the information discussed above that the permitting authority requests within 60 days after receipt of the permit renewal application. Existing dischargers may base their demonstration upon the absence of prior appreciable harm rather than predictive studies [40 CFR 125.73(c)(1)].

Appendix J

Section 316(b) Study or Demonstration

Cooling water intakes can adversely impact aquatic organisms basically in two ways -- entrainment and entrapment/impingement. Entrainment is the taking in of small organisms, such as phytoplankton, zooplankton, fish eggs, and larvae, with the cooling water. Entrapment/impingement involves larger entrained organisms, usually fish, that enter the cooling water intake and are blocked by some physical barrier such as a screen.

Careful siting of the intake system is generally recognized as the best approach toward minimizing the effects of entrainment and impingement. Another way of reducing entrainment losses is to reduce the volume of intake water. Alternative screening devices may reduce impingement and, to a lesser extent, entrainment mortality. The extent of such reductions will depend on site-specific characteristics. An extensive body of literature exists on entrainment and impingement and intake structures (Sonnichensen et al. 1975; EPA 1976; Ray et al. 1976; Jensen 1976; Jensen 1977; Cannon et al. 1979; Hinsdale 1974; American National Standard Institute 1974a, b). A discharger preparing a 316(b) Study should have a good understanding of the current technology.

The assessment methodology for 316(b) Demonstrations is less clearly defined than for 316(a) Demonstrations. Contents of the Demonstration are discussed in a draft document, "Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500" (EPA 1977). Figures J.1 and J.2 are flowcharts of the 316(b) process for new source intake structures and new intake (not new source) structures, respectively. Figure J.3 is a flowchart of this process for existing intake structures. DOE should contact the EPA (RA) or the approved-state staff (Director) responsible for decision making and biologists with knowledge of the site for more specific advice on 316(b) procedures and site evaluation. Information on intake structure technology can be found in the "Development for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact" (EPA 1976). Criteria applicable to cooling water intake structures have not been promulgated by EPA.

The purpose of the demonstration is to assess the potential for or existing entrainment and/or impingement effects and to determine what effect these impacts may have on the aquatic populations in the sphere of influence of the plant and on the total ecosystem. If a significant adverse environmental impact is identified, a recommended plan of action to minimize the impact should be developed, as well as alternatives and their anticipated results.

General Information Requirements

The extent and detail of data required for a 316(b) Study are site-specific. Facility age, receiving water body (total volume and/or flows), cooling system capacity, history of intake model, and intake location are standard considerations. Legible diagrams of the intake and associated structures and maps/charts of the shoreline and local bathymetric features should be provided for the water body. The location of any other intakes within a 50-m radius should be shown. The longshore current, the tidal patterns, and the predicted effect of intake structures and discharge flows on local current patterns should be discussed. Meteorological data (e.g., air temperature, monthly rainfall, solar radiation, and wind speed and direction) should be provided when hydrodynamic modeling is performed.

Figure J.1. Flowchart for planning, submission of, and decision making on a 316(b) study for new source intake structures (EPA 1977).

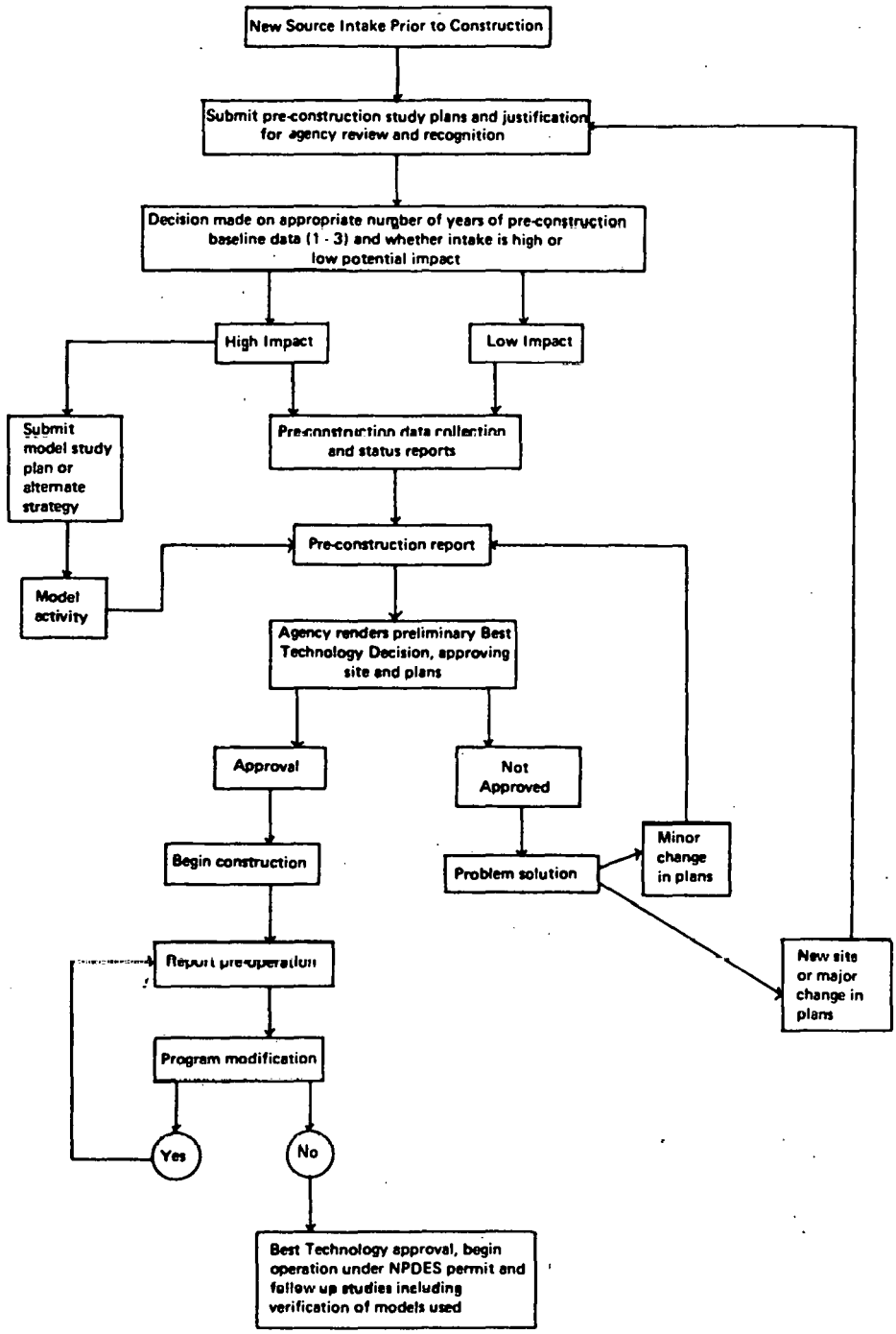


Figure J.2. Flowchart for planning, submission of, and decision making on 316(b) studies for new intake (not new source) structures (EPA 1977).

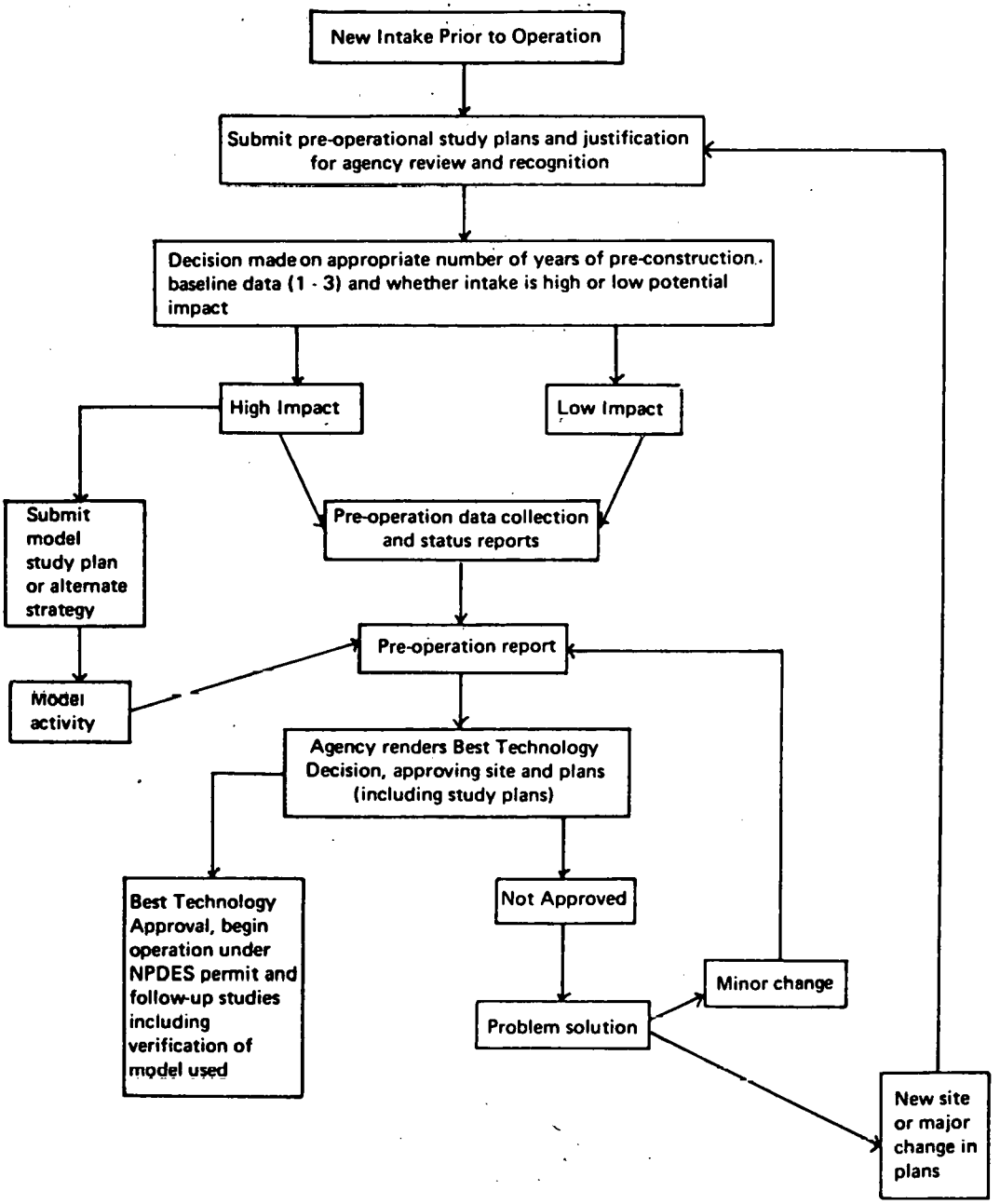
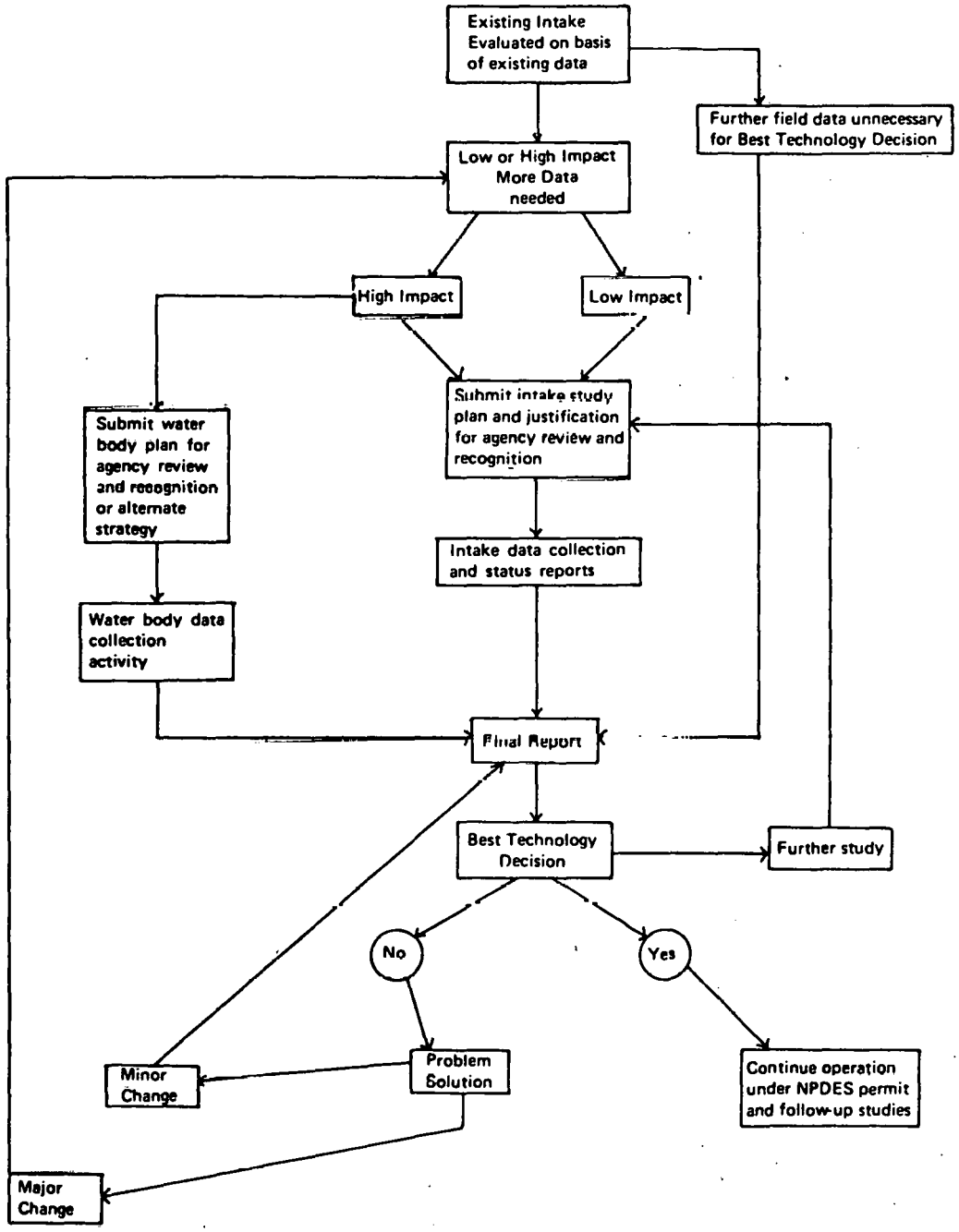


Figure J.3. Flowchart for planning, submission of, and decision making on a 316(b) study for existing intake structure (EPA 1977).



The study should include a complete description (including diagrams and other pertinent information, such as operating characteristics) of the following items:

- Screening devices (type, location, mesh size);
- Trash racks;
- Skimmer wall;
- Intake canal;
- Fish diversion devices;
- Dams, breakwaters, or other physical structures associated with the water intake;
- Pump (type and operating characteristics); and
- Fish return system.

The discharger should also supply a description of all pertinent operating characteristics, including (but not limited to) the following:

- Capacity factor and percent of time at fractional loads;
- Specifications on pumps;
- Intake velocities for normal and unusual conditions (reservoir drawdown, abnormally low tides, low-flow conditions, partial pump failure, etc.) for 100, 75, and 50% clean screen conditions (both through-screen and screen-approach velocities should be reported);
- The change in temperature (Delta-T) through the process water system;
- The residence time for organisms entrained in the system;
- Biocides used to control fouling, their concentrations, and frequency of use;
- Water vectors near the intake structure;
- Interaction between intake and discharge flows;
- Method of triggering screen wash/fish handling system (e.g., continuous washing, pressure drop-initiated, time-initiated, etc.)
- Screen washwater pressure(s);
- Back flushing procedures; and
- Quality of cooling water (e.g., dissolved gases, suspended solids, turbidity, and chemicals).

The existing or potential entrainment and impingement impacts for both normal and unusual operating conditions should be analyzed using the most appropriate methods of quantification. The following points should be considered:

- Proposed intake location and alternatives;
- Intake design and alternatives;

- Interaction between intake and discharge;
- Unusual conditions such as low water level, high intake-velocity conditions (spring tides, reservoir drawdown, low flow), partial pump failure, etc.;
- Data from regional facilities with similar designs and/or locations;
- Abundance and distribution of life stages susceptible to entrainment or impingement for both resident and migratory species;
- Diel and seasonal variations in species composition, density, and distribution;
- Regional standing stock; and
- The ecological, economic, and recreational importance of entrainable/impingeable species.

The analysis should attempt to quantify expected entrainment/impingement losses for both the proposed system and its reasonable alternatives. Such losses should be extrapolated to overall effects both on the affected population and the aquatic ecosystem as a whole. Impacts to trophically, economically, or recreationally important species should be emphasized. The study should provide a justification of the proposed system in comparison to alternative systems. The study should discuss which mitigating measures might be appropriate should losses be unacceptably greater than predicted.

The study should supply baseline aquatic biology information and should focus on life stages of resident and migratory species most likely to be affected. Emphasis should be placed on those species whose removal may present significant problems for the ecosystem (forage species) or that are of economic or recreational value. Information on the species composition and densities (at all potentially affected life stages) within the water body in general, and especially at and near the intake structure, should be collected. Data on local and regional standing stocks of adults should be presented, as well as diel and seasonal distributions, densities, and behavior relevant to the analysis. A list of general habitat preferences of entrainable life stages should be provided.

The Atomic Industrial Forum has developed INFORUM, a data system that extracts and indexes information from Utilities' 316(a) and (b) reports. Questions should be referred to INFORUM at 1747 Pennsylvania Avenue, Washington, D.C. 20006 (telephone 202/833-9234). EPA regional libraries should also have technical information submitted by industries in accordance with 316(b) and available for DOE use.

Sampling Programs

For a facility with a potentially high impact, a sampling program will usually be necessary to determine the water body's hydraulics and the composition of the aquatic ecosystem near the intake structure. Historic data and studies on nearby facilities can provide useful data. Partitioning of the baseline sampling program should be considered to provide sufficient information for clarifying important issues. As an example, if existing regional facilities have traditionally had entrainment/impingement problems with particular species at a certain time of the year, then the proposed sampling program should be designed to ensure satisfactory description of seasonal density and distribution of these targeted species, both near the intake and throughout the affected aquatic ecosystems. The number of sample replicates will depend on sample variance and the desired degree of confidence for the estimates. To ensure appropriate sampling methodology and frequency, consultation with a biostatistician before and during sampling is strongly advised.

The physical interaction between the intake and the adjacent water body must be established to assess the impact of the intake. To characterize this interaction, the dominant circulation patterns must be identified. A monitoring program on currents and other hydrological and physical parameters can be used to do this.

A sampling period of one to three years is necessary for a biological survey; the shorter period is acceptable when substantial historical data can be presented and the intake is considered to have a low impact (EPA 1977).

Designation of critical aquatic organisms is the first step in the biological survey (Fig. J.4). The species selected for a 316(b) study may or may not be the same as the Representative Important Species determined for a 316(a) demonstration. Critical aquatic organisms could include meroplankton, benthic fish, pelagic fish, benthic macroinvertebrates, phytoplankton, zooplankton, benthic infauna, and boring and fouling communities. The number of species to be sampled (e.g., 5-15) are selected from the critical aquatic organisms. Officially listed threatened or endangered species are automatically considered critical organisms. Sampling methodologies are chosen for each species and a preoperational sampling study is designed (EPA 1977).

Critical aquatic organisms to be selected are those species that would be involved with the intake structure and are:

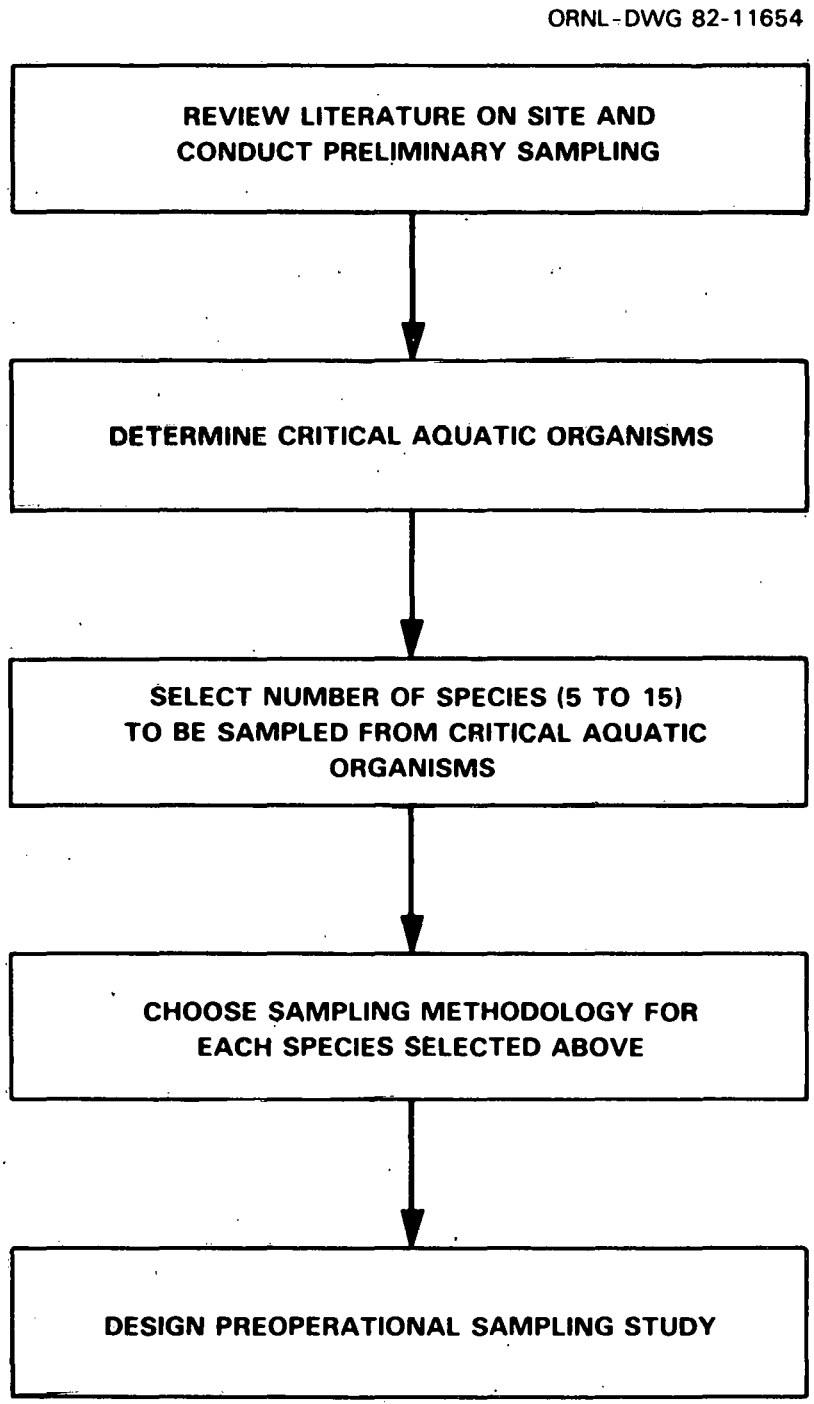
1. Representative (in terms of their biological requirements) of a balanced, indigenous community of fish, shellfish, and wildlife;
2. Commercially or recreationally valuable (e.g., among the top ten species based on monetary value);
3. Threatened or endangered;
4. Critical to the structure and function of the ecological system (e.g., habitat localized);
5. Potentially capable of becoming localized nuisance species;
6. Necessary, in the food chain, for the well-being of species meeting criteria 1 to 4;
7. A species meeting one of the criteria above and having a high potential susceptibility to entrapment-impingement and/or entrainment; and
8. Critical aquatic organisms based on criteria 1 to 7, are suggested by the applicant, and are approved by the appropriate regulatory agencies (EPA 1977).

The requirements necessary to evaluate losses of aquatic organisms at existing cooling water intakes can be considered in two steps. The first is assessment of the magnitude of the problem at each site through direct determination of the diel and seasonal variation in numbers, sizes, and weights of organisms affected by intake operation. If losses appear to be serious, a second step would be to conduct studies for evaluation of organism losses within a water body or local population. The second step should be required only if absolutely necessary for the decision on the best technology available and only to address specific questions. Such field studies are difficult to conduct and require several years of data collection without certainty of results. EPA (1977) provides some guidance on sampling for these studies.

Operational Monitoring

A plan to quantify the entrainment/impingement losses after facility startup should be provided. The preoperational baseline sampling program should be continued for at least one year after facility operation commences. The sampling methodology and gear used during the preoperational program should be continued during the operational monitoring program to preserve comparability of data. The use of a temporally stratified sampling methodology should be considered to maximize sampling effort when entrainment/impingement losses can be expected to be relatively variable and significant (e.g., during peak spawning periods or winter kills). The operational

Figure J.4. Process for designating a 316(b) biological survey.



monitoring plan should focus on species and areas of concern identified in the baseline monitoring program and allow the preparer to quantify:

- Species composition and the abundance of entrained/impinged organisms;
- Size (age) frequency of entrained/impinged species;
- Diel, migratory, and seasonal entrainment/impingement patterns;
- Survivorship of entrained species, if less than 100% through-system mortality is used in the impact analysis; and
- The condition of impinged species that are diseased, cold shocked, or weakened by abnormal, extra-facility conditions (e.g., local oil spill).

The frequency and duration of sampling, the method of species identification and quantification, and the areas to be sampled should be defined. In addition, the intake screens to be sampled for impingement losses should be identified. If only a subset of the intakes and intake screens will be sampled, the study should justify the subset selection and include a sampling method for confirming the appropriateness of the subset during operational impingement monitoring. Provisions should also be included for recording unusual impingement events that do not occur during planned sampling periods.

Appendix J Literature Cited

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Appendix K

State Water Quality Standards

A state water quality standard may be directly translated into an enforceable discharge or effluent limitation in a discharger's NPDES permit under CWA Sect. 301(b)(1)(c) or form the basis of best management practices for nonpoint sources under a state's Sect. 208 areawide management plan. An NPDES permit cannot be issued without state verification (certification) that an applicant is in compliance with state water quality standards, areawide management plans, effluent limitations, and other provisions of Sects. 301, 302, 303, 306, and 307 of the CWA (CWA Sect. 401). State certification for NPDES is discussed at 40 CFR 124.53. State water quality standards for a particular body of water usually have two elements: designated use or uses and maximum safe concentration levels for particular pollutants (scientific criteria). Water quality standards are derived from the level of effluent discharge that can be assimilated by a body of water without deterioration of the designated use. Designated uses include public water supply, swimming, fish and wildlife, industrial operation, etc.

An inventory of water quality standards established by EPA is published at 40 CFR Part 120. Under CWA Sect. 303(b), EPA is authorized to promulgate water quality standards if a state fails to submit adequate standards or fails to make necessary changes in existing standards. Specific water quality standards are available from each state.

Each state must identify those waters within its boundaries for which federal effluent limitations, including controls of thermal discharges, are not stringent enough to implement water quality standards [CWA Sect.303(d)(1)]. These water bodies are classified as water quality limited. The state must then establish the total maximum daily load of pollutants (for those pollutants identified by EPA) allowable to meet water quality standards. A similar maximum daily thermal load is required for thermal discharges. A facility planning to discharge to a water quality limited stream would encounter very stringent effluent limitations and might even be denied a permit. Alternative facility sites, alternative receiving water for discharges, zero discharge, and the indirect discharger option should be considered in such a situation.

The EPA has developed water quality criteria for some pollutants.[1] Water quality criteria for 64 toxic pollutants have also been established. These criteria are either the maximum qualitative or quantitative estimate of the amount or concentration of a water pollutant in a body of water that will ensure water quality sufficient to protect a specified use. The purpose of these criteria is to provide guidance to the states in establishing their own water quality standards. A criterion is not an enforceable water quality standard.

The EPA appears to be placing renewed emphasis on water quality standards. Water pollution regulations have the ability to prohibit or influence the location of new facilities. The revised NPDES regulations include a new section on "Prohibitions" which states that no permit shall be issued to a new source or new discharger if it will cause or contribute to the violation of water quality standards. The burden of proof is upon the permit applicant to demonstrate that the new facility would not result in a violation of water quality standards. When a new facility would be located on a water quality limited segment, the applicant would have to demonstrate the existence of remaining pollutant load allocations for the new discharge. Small water bodies of high priority or water in pristine areas where special value is placed on water quality might also preclude approval of a proposed discharge. The water quality standards of most states include a nondegradation clause.[2]

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[1] Environmental Protection Agency (EPA). 1976. Quality criteria for water. U.S. Govt. Printing Office, Washington, D.C. 256 pp.

[2] Quarles, J. 1979. Federal Regulation of new industrial plants. Monograph No. 28 Environ. Rep. 10(1):22-30.

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